Host Integration Server 2004

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Microsoft Host Integration Server 2004

Microsoft Host Integration Server 2004 helps customers integrate IBM host applications, data sources, messaging, and security systems with new solutions developed using the Microsoft Windows Server System platform.

Host Integration Server 2004 features and technologies, including network integration, host access with enhanced security, and application integration, makes it possible for Windows developers to publish business processes in IBM mainframe and AS/400 applications as XML Web Services. This enables bringing their Host applications and processes into a Services Oriented Environment.

In This Library Section	Essentials
Product Documentation **Introduction: What's New in HIS 2004** **Planning and Architecture** **Secure Deployment Guide** **Installation and Configuration** **Operations** **Technical Reference** **SDK**	**Product Information** **Download the Product Documentation** **White Papers** **Support** **Community** **Newsgroup**

Introduction: What's New for 2004

This release of Microsoft® Host Integration Server 2004 offers many new and improved features. These features are highlighted below by product area.

Security Model

This release of Host Integration Server 2004 implements a new security model. The access control for the Host Integration Server 2004 components is based on two Windows security groups specified during setup. The Host Integration Server 2004 runtime group provides access to the Microsoft Windows® account under which all the services run. The Host Integration Server 2004 Admin group is used to provide access to users performing administrative tasks.

Setup and Configuration

Host Integration Server 2004 now installs with a new, Common Setup program used in other Microsoft e-Business products, such as Microsoft BizTalk® Server 2004.

In addition, the Resource Location Wizard has been replaced by a new Configuration Wizard, which allows you to configure all Host Integration Server 2004 services, databases, and subdomain information more efficiently, either during or after setup. A shortcut to the new Configuration Wizard is located in the Host Integration Server 2004 Start menu.

Transaction Integrator

One goal of Host Integration Server 2004 is to enable enterprise developers to move towards a services-oriented architecture (SOA) using the .NET Framework. Transaction Integrator (TI), formerly COM Transaction Integrator for CICS and IMS (COMTI), allows Microsoft Windows developers to publish business rules in mainframe CICS and IMS applications as XML Web services. The new TI Designer runs within Microsoft Visual Studio® .NET 2003, providing a more efficient developer experience. At the same time, TI has been extended to support AS/400 applications by offering a Report Program Generator (RPG) Import Wizard and distributed program call runtime across a TCP/IP network connection.

Host Integration Server 2004 includes innovative technologies, such as TI host-initiated processing (HIP) that offers TCP/IP and SNA listeners that allow a server computer running Windows to function as a peer to IBM mainframe and AS/400 computers. For example, CICS programmers can call into Windows COM+ or .NET server components, as if they were another CICS transaction program by using familiar programming models such as CICS distributed program link (DPL). HIP allows enterprises to more effectively move portions of their application logic or data onto the more cost-effective Windows and SQL Server platforms, while ensuring logical and secure bidirectional application communication.

Host Integration Server 2004 offers industry-standard technologies allowing the network administrator to move towards pure TCP/IP WANs and datacenters. Transaction Integrator supports the CICS enhanced TCP/IP listener and persistent TCP/IP connections.

The new TI allows computers running Windows to extend the functionality of existing IBM mainframe and IBM midrange AS/400 line-of-business (LOB) applications. In Host Integration Server 2004, TI offers both host-initiated processing (HIP) as well as the previously offered Windows-initiated processing (WIP). In Host Integration Server 2004, TI also supports AS/400 applications, as well as mainframe CICS and IMS applications, when integrated across a TCP/IP network connection. TI has been enhanced to offer support for the .NET Framework. Using the new TI Designer, which runs in the context of the Visual Studio .NET 2003 integrated development environment, Windows developers can use TI WIP for .NET to wrap existing LOB applications as XML Web service or .NET server components. In Host Integration Server 2004, the administrator can utilize the new TI Manager which combines TI WIP and HIP Microsoft Management Console (MMC) snap-ins into one view, allowing administrators to efficiently define and manage WIP and HIP component applications.

Finally, TI has a number of other new features, including:

- An alternative to explicit callback security by using the COMTIContext parameter to pass a user ID and password.
- Control of the TCP/IP CICS transaction request message (TRM) for interoperability with CICS using TCP/IP custom TRMs.
- Override of the remote environment (RE), program name, transaction name settings in a type library using the COMTIContext parameter.
- Support for persistent connections in WIP through client context. In Host Integration Server 2000, COMTI had to open and close a connection each time it made a method call to the mainframe. On the mainframe side, CICS had to start and stop a transaction program. In Host Integration Server 2004, persistent connections allow TI to open a connection for the first method in a group of methods, make all the method calls, and then close the connection. On the mainframe side, CICS starts an instance of the transaction program, keeps the instance active between method calls, and then stops the program after the last call.

- Support for CICS Enhanced Listener through the enhanced listener message (ELM) programming model. Host Integration Server 2004 takes advantage of the CICS Transaction Server 2.2 Enhanced Listener to provide client and server continuity and improved scalability for both the Transaction Integrator (TI) client and CICS environments through a more streamlined application level protocol exchange sequence. When you use the Enhanced Listener, TI bypasses the transport logic that waits for a TRM reply and immediately sends the application request data after the request header. TI then receives a single data stream and interprets the TRM reply prior to processing the application reply data.
- Windows Initiated and Host Initiated Single Sign-On (SSO)
- Arabic EBCDIC 420 bi-directional layout conversion
- Client Context provides an alternative to Explicit Call Back Security
- WIP Override RE via Client Context
- WIP Override Program Name via Client Context
- WIP Override Transaction Name via Client Context

The additional functionality provided by HIP and other forthcoming features prompted a renaming of the features and functionality that you may be familiar with in earlier versions of Host Integration Server:

- COM Transaction Integrator for CICS and IMS (COMTI) is now called Transaction Integrator (TI).
- COMTI Management Console is now called TI Manager.
- COMTI Component Builder is now called TI Designer.

See Also

Persistent Connections with the Mainframe

Using Custom TRMs and ELMs with COMTIContext

Security Integration

This release of Host Integration Server 2004 ships with Enterprise Single Sign-On (SSO), enabling single sign-on to end users for enterprise application integration (EAI) solutions. SSO is comprised of two main elements:

- Windows Initiated SSO maps Microsoft Windows accounts to back-end systems
- Host Initiated SSO allows host requests to access Windows accounts

SSO simplifies the management of user IDs and passwords, both for users and for administrators, by enabling users on host and Windows accounts to access systems more efficiently than before.

In addition, the new Password Sync adapters allow synchronization of passwords. A password sync adapter is an application you create that is registered within the configuration store.

Data Integration

New to this release are a .NET Framework-enabled Managed Provider for DB2 and a DB2 Network Protocol Client (DRDA AR), over which the ODBC, OLE DB, and Managed Provider communicate to the remote DB2 database server. The Data Access Tool and Data Source Wizard allow you to create and manage connection definitions to DB2 and host file systems, and make it easier to define the Host Column Descriptions used to access host data sets.

Additional new features include:

- Windows Initiated and Host Initiated Single Sign-On
- DB2 Distributed Transactions (two-phase commit) over TCP/IP
- DB2 Connection Pooling
- Arabic EBCDIC 420 bi-directional layout conversion
- DB2OLEDB support for multiple result sets on calls to DB2 stored procedures
- SNAOLEDB support access to VSAM data sets from SQL Server DTS
- UNICODE, Double-Byte, and Mixed-Byte character set support when accessing DB2
- Ability to import DB2 Connect configuration files
- Additional DB2 configuration properties such as DBMS Platform (optimizing data conversion across platforms), Default Qualifier (simplifying SQL syntax), and Quoted Prefix (ensuring better support for generic consumers such as SQL Server)

Network Integration

The new IP-DLC Link Service offers support for the industry-standard HPR/IP protocol, which IBM calls Enterprise Extender. This in turn provides SNA connectivity for applications using dependent and independent sessions over a routable IP network. The IP-DLC link service is an add-on feature to the existing SNA protocol node, transmitting each SNA packet across the IP network as a UDP datagram.

From an application perspective, such as a 3270 emulator or WinAPPC program, there is no change in functionality. However, the SNA network traffic from branch-deployed or centrally-deployed Host Integration Server computers can be routed across the IP network directly to an IBM mainframe system running OS/390 V2R10 or later and using an OSA or OSA Express compatible network adapter.

Secure Sockets Layer (SSL) and Transport-Level Services (TLS) allow a network administrator using the TN3270 Service to increase the overall security of the enterprise network when accessing mainframe terminal and printer resources, including authentication of access to mainframe sessions and encryption of data between client emulator and TN3270 server.

Although the Microsoft 3270 Client (emulator) does not support SSL or TLS, many third-party software vendors offer 3270 emulators that support this functionality, including Attachmate, IBM, NetManage, and WRQ.

Software Developers Kit

The Host Integration Server 2004 Programmer's Guide now installs with the core product documentation.

Online Documentation

The new, redesigned Host Integration Server 2004 documentation set is now entirely online. In addition to the documentation that ships with the product, you can download a fully updated documentation set over the Web on a quarterly basis. Some documents are included on your product CD; some documents are available only on the Web.

Perhaps the most important addition to the documentation is the focus on security. In keeping with the Microsoft Trustworthy Computing Initiative, the entire documentation set has been rewritten and now includes the following:

- The **Secure Deployment Guide** is a comprehensive source for the latest and most powerful deployment techniques to secure your Host Integration Server environment. This guide is required reading for Administrators, Programmers, and End Users.
- **Understanding Windows Security** offers a broad overview of computer security today, describes the STRIDE model for threat analysis, and lists the most common security threats and how to mitigate them.
- Numerous **Security Tips** placed throughout the conceptual, procedural, and developer material offer current best practices when and where you need them.
- General **prescriptive guidance** appears wherever appropriate in the documentation to help you increase system security, mitigate security threats, and decrease attack surfaces.

What’s New in this Documentation Update

This update of the Host Integration Server 2004 online documentation includes expanded material about the subjects below. This new material can be found in the Network Integration User's Guide.

Configuring IP-DLC Link Service for IBM Enterprise Extender

Host Integration Server 2004 offers an efficient means to integrate Systems Network Architecture (SNA) within data centers, across wide area networks (WANs) and in branch offices through a new link service, IP-DLC (Internet Protocol – Data Link Control), also known as IBM Enterprise Extender. The IP-DLC link service provides SNA connectivity for applications using dependent and independent sessions over a native IP network. This section will assist mainframe programmers and Host Integration Server 2004 administrators in configuring the IP-DLC link service.

Deploying Microsoft Host Integration Server 2004 in a TCP/IP Wide Area Network

This section describes how the IP-DLC (Internet Protocol–Data Link Control) link service of Microsoft Host Integration Server 2004 makes it possible to integrate vital mainframe data and business rules with new e-commerce solutions developed with Microsoft Windows-based programs. The IP-DLC link service of Host Integration Server 2004 enables you to connect directly to IBM mainframe computers through a pure TCP/IP wide area network or local area network. This section contains three detailed scenarios for deployment. Two of these scenarios describe migration from Host Integration Server 2000 to Host Integration Server 2004, and the third describes a new implementation based on Host Integration Server 2004.

Integrating Enterprise Business Processes with Microsoft Windows Using Host-Initiated Processing

This section uses the example of communication between a central data center and multiple branch offices to describe how the Host-Initiated Processing (HIP) feature of Microsoft Host Integration Server 2004 enables such communication. It assumes that the external (branch office) sources of data are likely to be based on Windows-based computing solutions, while the central data center likely relies on legacy data storage systems. HIP makes it possible to bring data from external sources into the legacy batch processing flow without disrupting pre-defined automated processing schedules.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Welcome to Host Integration Server 2004

This section contains an overview of the entire Microsoft® Host Integration Server 2004 product, as well as tips to help you start using the online Help.

This introductory section contains:

Product Overview

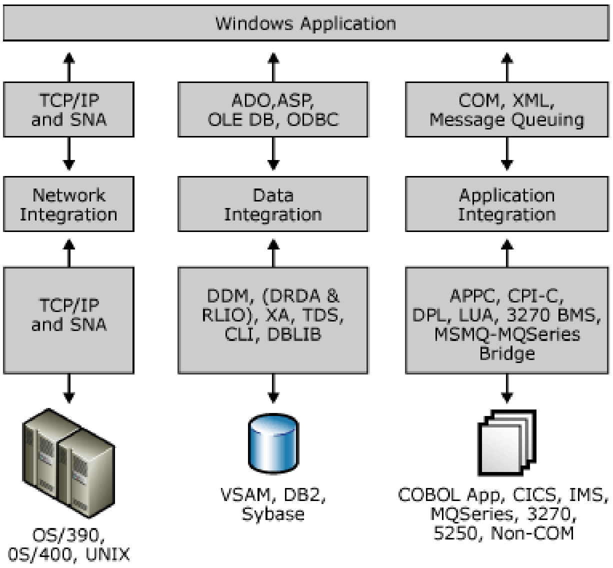
Documentation and Support

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Product Overview

Microsoft Host Integration Server 2004 provides the key enabling technologies that allow customers to integrate their mission-critical host applications, data sources, messaging and security systems with new solutions developed using the Microsoft Windows® platform.

The following diagram shows an overview of the major features provided by Host Integration Server 2004.


Windows Application
TCP/IP and SNA
ADO,ASP, OLE DB, ODBC
COM, XML, Message Queuing
Network Integration
Data Integration
Application Integration
TCP/IP and SNA
DDM, (DRDA & RLIO), XA, TDS, CLI, DBLIB
APPC, CPI-C, DPL, LUA, 3270 BMS, MSMQ-MQSeries Bridge
OS/390, OS/400, UNIX
VSAM, DB2, Sybase
COBOL App, CICS, IMS, MQSeries, 3270, 5250, Non-COM

One goal of Host Integration Server 2004 is to enable enterprise developers to move towards a services-oriented architecture (SOA) using the .NET Framework. Transaction Integrator (formerly COMTI) allows Windows developers to publish business rules in mainframe CICS and IMS applications as XML Web Services. The new TI Designer runs within Visual Studio® .NET, providing a more efficient developer experience. At the same time, TI has been extended to support AS/400 applications by offering an RPG Import Wizard and distributed program call runtime across a TCP/IP network connection. To directly publish vital data stored in IBM DB2, Host Integration Server 2004 offers a Microsoft Managed Provider for DB2 that is based on an improved Microsoft network client for DB2.

Host Integration Server 2004 includes innovative technologies, such as TI Host-Initiated Processing (HIP) that offers TCP/IP and SNA listeners that allow a Windows Server computer to function as a peer to IBM mainframe and AS/400 computers. For example, CICS programmers can call into Windows COM+ or .NET server components, just as if they were another CICS transaction program, by using familiar programming models such as CICS DPL (distributed program link). HIP allows enterprises to more effectively move portions of their application logic or data onto the more cost-effective Windows Server and SQL Server platforms, while ensuring logical and secure bi-directional application communication.

Finally, Host Integration Server 2004 offers industry-standard technologies allowing the network administrator to move towards pure TCP/IP WANs and datacenters. Transaction Integrator supports the CICS enhanced TCP/IP listener and persistent TCP/IP connections. The DB2 data providers support reliable 2-phase commit distributed transactions over TCP/IP to DB2 running on most popular computing platforms. The new IP-DLC Link Service supports the industry-standard SNA over IP routing so that branch-deployed and centrally-deployed Host Integration Server computers can connect directly to z900 mainframes via high-speed IP networks. No longer do enterprises have to remotely administer branch cluster controllers, utilize expensive data link switching (DLSw) capable routers, or maintain costly front end processors (FEPs). With Host Integration Server 2004, enterprises can continue to consolidate their network infrastructure, while supporting the same level of SNA-compatible applications and services.

This section contains:

- Transaction Integrator
- Security Integration
- Data Integration
- Network Integration
- Messaging
- Software Development Kit

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Transaction Integrator

Transaction Integrator (TI) enables you to integrate mainframe-based transaction programs (TPs) with component-based Microsoft Windows applications and enables the Microsoft Windows Server™ to function as a peer to IBM mainframe and AS/400 computers. These capabilities enable you to leverage existing COBOL and RPG applications for client/server or Web-service applications.

Running on Windows 2000 Server or Windows Server 2003, TI components appear as simple Automation or .NET servers that developers can easily add to their application. Behind the scenes, TI functions as a proxy that communicates with an application program running on IBM's Multiple Virtual Storage (MVS) or AS/400 operating systems. This means that you can invoke a legacy application on the host and return values to a Web-based client without rewriting the host application. You do not need any knowledge of COBOL or RPG programming to use Transaction Integrator.

See Also

Application Integration User's Guide

Product Overview

Security Integration

This release of Host Integration Server 2004 ships with Enterprise Single Sign-On (SSO), enabling single sign-on to end users for enterprise application integration (EAI) solutions. SSO is comprised of two main elements:

- Windows Initiated SSO maps Microsoft Windows accounts to back-end systems
- Host Initiated SSO allows host requests to access Windows accounts

SSO simplifies the management of user IDs and passwords, both for users and administrators, by enabling users on host and Windows accounts to access systems more efficiently than before.

See Also

Product Overview

Data Integration

Data services included with Host Integration Server 2004 enable you to interact with host data sources, including VSAM and DB2 systems.

> **Note** If you are using TCP/IP to connect to the mainframe or AS/400, you do not need to install or configure the Network Integration Services. You can use the Application and Data Integration Services over TCP/IP.

The following services are available:

- Managed Provider for DB2
- OLE DB Provider for AS/400
- OLE DB Provider for VSAM
- OLE DB Provider for DB2
- ODBC Driver for DB2

Managed Provider for DB2

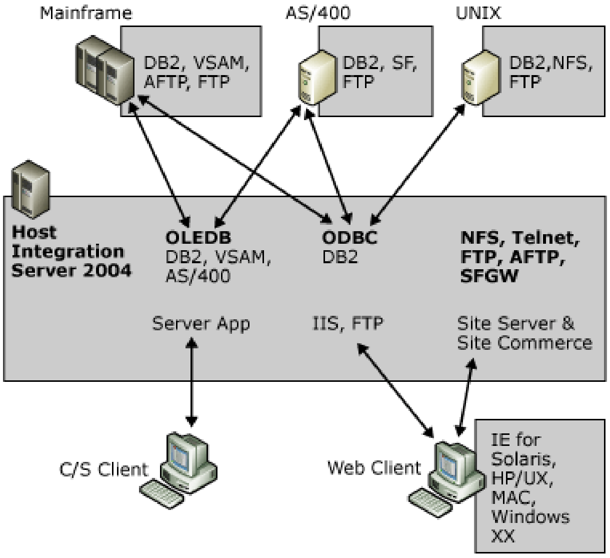
Host Integration Server 2004 includes a Managed Provider to access data from a loosely coupled data source; in this case, a DB2 database. The Managed Provider for DB2 uses two central .NET components to implement this capability: the ADO.NET DataSet and the Managed Provider for DB2 itself.

For more information, see the Managed Provider for DB2 Programmer's Guide.

OLE DB Provider for AS/400

The new Data Access Tool simplifies configuration and access to AS/400 systems.

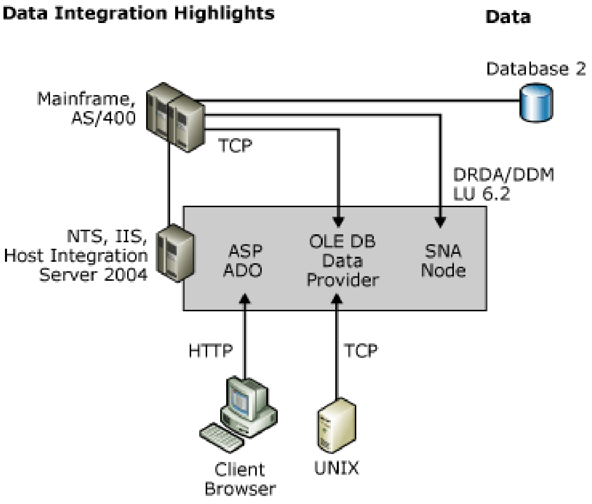
The following diagram shows an overview of the OLE DB Provider for AS/400.


Mainframe
DB2, VSAM, AFTP, FTP
AS/400
DB2, SF, FTP
UNIX
DB2,NFS, FTP
Host Integration Server 2004
OLEDB
DB2, VSAM, AS/400
ODBC
DB2
NFS, Telnet, FTP, AFTP, SFGW
Server App
IIS, FTP
Site Server & Site Commerce
C/S Client
Web Client
IE for Solaris, HP/UX, MAC, Windows XX

OLE DB Provider for VSAM

The new Data Access Tool simplifies configuration and access to VSAM systems.

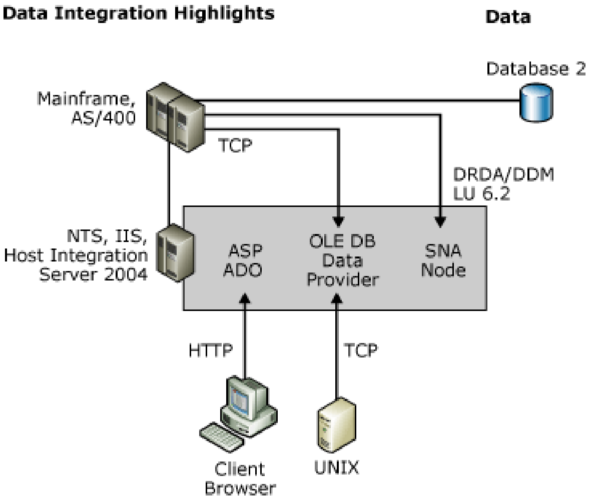
The following diagram shows an overview of the OLE DB Provider for VSAM.


Data Integration Highlights
Data
Database 2
Mainframe, AS/400
TCP
DRDA/DDM LU 6.2
NTS, IIS, Host Integration Server 2004
ASP ADO
OLE DB Data Provider
SNA Node
HTTP
TCP
Client Browser
UNIX

OLE DB Provider for DB2

The new Data Access Tool simplifies configuration and access to DB2 systems.

The following diagram shows an overview of the OLE DB Provider for DB2.

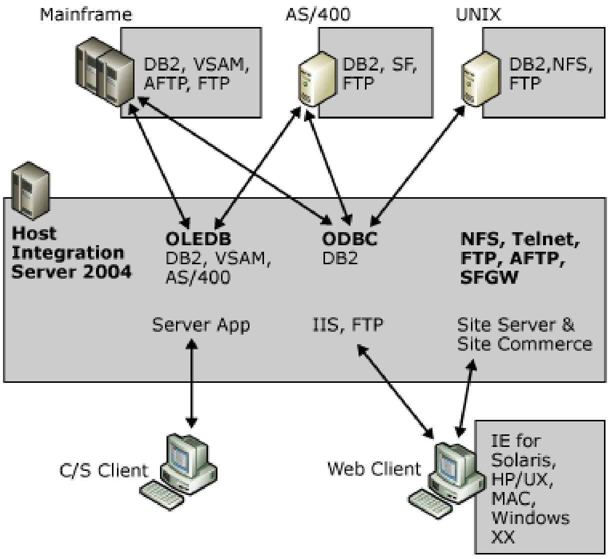

Data Integration Highlights
Data
Database 2
Mainframe, AS/400
TCP
DRDA/DDM LU 6.2
NTS, IIS, Host Integration Server 2004
ASP ADO
OLE DB Data Provider
SNA Node
HTTP
TCP
Client Browser
UNIX

ODBC Driver for DB2

Microsoft ODBC Driver for DB2 enables access over SNA LU 6.2 and TCP/IP networks to remote DB2 databases. This driver is implemented as an IBM Distributed Relational Database Architecture (DRDA) application requester that can connect to most DRDA-compliant DB2 systems, including MVS, VSE, VM, OS/400, AIX RS/6000, Sun Solaris, HP-UX, Digital/Compaq UNIX, OS/2, and Microsoft Windows 2000.

The driver can be used interactively or from an application program to issue SQL statements and execute DB2 stored procedures. Microsoft Excel users can import DB2 tables into worksheets and use Excel graphing tools to analyze the data. Microsoft Access users can import from and export to DB2. Using Microsoft Internet Information Server (IIS) on Windows 2000, developers can publish DB2-stored information to users through a Web browser interface.

The following diagram shows an overview of the ODBC Driver for DB2.


Mainframe
DB2, VSAM, AFTP, FTP
AS/400
DB2, SF, FTP
UNIX
DB2,NFS, FTP
Host Integration Server 2004
OLEDB
DB2, VSAM, AS/400
ODBC
DB2
NFS, Telnet, FTP, AFTP, SFGW
Server App
IIS, FTP
Site Server & Site Commerce
C/S Client
Web Client
IE for Solaris, HP/UX, MAC, Windows XX

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Network Integration

The new IP-DLC link service is a Host Integration Server 2004 feature that provides SNA connectivity for applications using dependent and independent sessions over a native IP network. It implements the HPR/IP protocol, which is also known as HPR over IP or Enterprise Extender. Each SNA packet is transmitted natively across the IP network as a UDP datagram.

Host Integration Server 2004 supports the following physical connection methods to your host system:

- 802.2 DLC (for supported OSA adapters)
- SDLC
- Channel (ESCON and Bus & Tag)

Physical connections to a host system are provided through the use of link services that support a variety of third-party adapters. A list of supported third-party adapters can be found in the online Help.

Host Integration Server 2004 supports the following standard SNA protocols for communications:

- LU 1 and LU 3 (for host printing)
- LU 2 (for 3270 displays)
- LU 6.2 (for APPC)
- LU 0
- LUA

Note If you are using TCP/IP to connect to the mainframe or AS/400, you do not need to install or configure the Network Integration Services. You can use the Application and Data Integration Services over TCP/IP.

Host Services

Host Integration Server 2004 provides a range of services that extend mainframe services to LAN users. These include the TN3270 Service for mainframe environments, the TN5250 Service for AS/400 environments, and Host Print Service and Host Integration (SNA) Remote Access Service for both mainframe and AS/400 environments.

Administrative Services

Host Integration Server 2004 provides network administrators with tools and services to monitor and manage host resources in your enterprise. These services are available for both the hierarchical and peer environments.

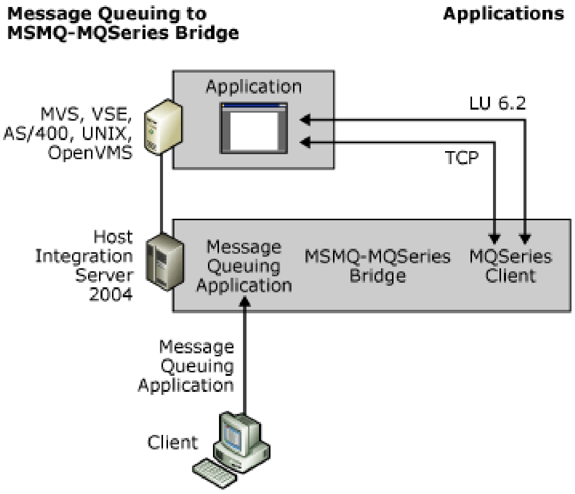
See Also

Product Overview

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Messaging

MSMQ-MQSeries Bridge enables your applications to exchange messages between IBM MQSeries and Microsoft Message Queue Server (MSMQ) easily and efficiently. MSMQ-MQSeries Bridge provides connectionless, store-and-forward messaging across messaging systems and computing platforms throughout your network. The diagram below shows an overview of the major features of MSMQ-MQSeries Bridge.


Message Queuing to MSMQ-MQSeries Bridge
Applications
MVS, VSE, AS/400, UNIX, OpenVMS
Application
LU 6.2
TCP
Host Integration Server 2004
Message Queuing Application
MSMQ-MQSeries Bridge
MQSeries Client
Message Queuing Application
Client

See Also

Product Overview

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Software Development Kit

This product includes a software development kit (SDK) which allows you to create custom applications, run samples, and use tutorials to learn more about Host Integration Server 2004.

See Also

Programmer's Guide

Programmer's Reference

Samples

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Documentation and Support

The new, redesigned Host Integration Server 2004 documentation set is now entirely online. In addition to the documentation which ships with the product, you can download a fully updated documentation set over the Web on a quarterly basis.

The following topics describe how you can make best use of the product documentation and technical support.

This section contains:

- Accessing the Latest Documentation
- Documentation Roadmap

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Accessing the Latest Documentation

A new, fully-updated documentation set is now available over the Web on a quarterly basis. Each quarterly release, which you download to your desktop, includes more in-depth information, updates, and new topics.

As the new documentation will replace your current set, you will need to close all instances of Host Integration Server 2004 Help for the update to install correctly. Downloading the new Help will not affect your Host Integration Server 2004 product installation or performance in any way.

You can download the latest documentation from the following location:

http://go.microsoft.com/fwlink/?LinkId=29507

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Documentation Roadmap

The Host Integration Server 2004 documentation has been expanded and reorganized to maximize usability. The text is fully searchable, and is organized into the groups below. This list contains documents that are included on your product CD, as well as documents that are available only on the Web.

- **Introduction: What's New for 2004** provides overview and What's New material.
- **Planning** contains important considerations for planning an effective deployment.
- **Secure Deployment Guide** contains information to help reduce the risk of attack on your system.
- **Installation and Configuration** guides you through setup and establishing a connection.
- **Operations** contains User's Guides for Transaction Integrator, Data Integration, Security Integration, Network Integration, and Messaging.
- **Technical Reference** contains reference material, user-interface help, and a glossary.
- **Programmer's Guide** provides conceptual material and programming considerations.
- **Programmer's Reference** contains reference material and tools for developers.
- **Samples** are sample code designed to help you learn and use Host Integration Server more effectively.

See Also

Documentation and Support

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Planning

This section summarizes the key points of planning a Host Integration Server 2004 deployment.

This section contains:

- Planning Your Hardware
- Planning 3270 Connectivity
- Planning APPC Connectivity
- Planning for Transaction Integrator

Planning Your Hardware

Because Host Integration Server 2004 can be used in a wide variety of situations, there is no simple formula for the amount of processing power a specific computer needs. The information provided in this topic can help you evaluate your hardware requirements, including:

- A list of elements that reduce or increase demands on hardware. This helps you estimate the general level of your processing requirements. For example, a Host Integration Server 2004 computer can serve as many as 1500 to 2500 users. This indicates a need for large amounts of processing power, perhaps a Pentium processor with 64 or 128 megabytes (MB) of RAM. However, if your servers each support 500 users and most of those users connect briefly and at random times during the day, less processing power is needed.
- Ways to evaluate the current demand on an existing Host Integration Server 2004 computer, and the ability of the existing hardware to support that demand. This gives you a valuable baseline from which to work.

This section contains:

- Variables Affecting Hardware
- Estimating Hardware Demands
- Best Practices

Variables Affecting Hardware

Many factors affect the amount of memory and processing power required by a particular Host Integration Server 2004 computer. The major variables are:

- Number of clients served.

  This is the most important variable affecting hardware requirements. If you support large numbers of client computers, you need not only servers that have ample memory and processing capacity, but also fast, powerful LAN adapters. Such LAN adapters include their own processor and memory, and can use direct memory access (DMA). Without such adapters, the network interface can become the bottleneck when many clients are being supported. Similarly, SNA adapters must be powerful enough to keep pace with the communications load.

- Demand generated by the clients (constant, intermittent, heavy, light).
- Number of Host Integration Server 2004 computers configured to work together within a particular subdomain.

  This is affected by the configuration of the Host Integration Server 2004 installation: centralized, branch, or distributed. Host Integration Server 2004 computers in a centralized or a distributed configuration can provide load balancing; they can each take a share of the connection load. Server computers in a branch configuration are separated by wide area network (WAN) links, and cannot readily provide load balancing because of the communication delays involved.

- Use of data encryption between clients and servers.

  Data encryption is not dependent on the number of clients being served but on the number of messages that are encrypted. As the number of transactions per second increases, the load on the CPU increases. Using 128-bit encryption instead of 40-bit encryption also increases the load on the CPU.

- Additional network services (file sharing, database access, mail service, and so on) provided by each server computer.

  It is difficult to predict exactly how much processing power is required to run multiple server applications. In many cases, your own requirements to meet a certain level of response time or transaction rate will indicate the specific hardware requirements for your environment.

See Also

Estimating Hardware Demands

Best Practices

Estimating Hardware Demands

Use the information in the following table to estimate the amount of processing power required for your Host Integration Server 2004 computers.

Installation category	**Hardware guidelines**
Approximately 1500–5000 users for each server, with up to 15,000 sessions for each server	A multiprocessor system with at least 128 megabytes (MB) of RAM. Connections (such as DLC 802.2 or channel) that are fast enough to avoid bottlenecks (recommended). Multiple SNA adapters, except for channel. Multiple LAN adapters to avoid LAN bottlenecks. Optionally, dedicated Host Integration Server 2004 computers that do not provide file sharing or other LAN services (this depends on the load created by other LAN services).
Up to 600 users for each server (heavy use) or up to 1500 users for each server (light or intermittent use)	A Pentium computer, with at least 128 MB of RAM. Connections (such as DLC 802.2 or channel) that are fast enough to avoid bottlenecks (recommended). Multiple SNA adapters may be needed, except for channel connections. Multiple LAN adapters may be needed to avoid LAN bottlenecks. A more powerful CPU and more RAM may be needed if Host Integration Server 2004 computers must support significant additional loads, such as file sharing.
Up to 200 users for each server (heavy use) or up to 500 users for each server (light or intermittent use)	A Pentium computer, with at least 128 MB of RAM. A more powerful CPU and more RAM may be needed if Host Integration Server 2004 computers must support significant additional loads, such as file sharing.
Up to 25 users for each server	A Pentium computer, with at least 128 MB of RAM. A more powerful CPU and more RAM may be needed if Host Integration Server 2004 computers must support significant additional loads, such as file sharing.

See Also

Variables Affecting Hardware

Best Practices

Best Practices

Several rules of thumb can be applied when selecting your Host Integration Server 2004 hardware:

- Try to avoid memory paging.

  It is useful to increase the amount of physical memory in a Host Integration Server 2004 computer to avoid paging. This guideline is true for any Windows Server that performs communications-related functions.

- Increase memory when using Host Print service.

  When using Print service, you may need more memory on the Host Integration Server 2004 computer if large files or many print jobs are submitted. You also need adequate disk space to temporarily store the spooled print jobs.

- Use TCP/IP instead of Microsoft Networking.

  The Windows Sockets (Winsock) and TCP/IP combination uses less memory on the Host Integration Server 2004 computer than Microsoft Networking or other named socket solutions. TCP/IP also provides better performance than Microsoft Networking because of its lower network overhead.

See Also

Variables Affecting Hardware

Estimating Hardware Demands

Planning 3270 Connectivity

In the hierarchical SNA network model most frequently associated with a mainframe computer, you access centralized applications from remote terminals across a network.

This network model uses the information display protocol for IBM mainframe computers known as 3270. This protocol facilitates conversations between the mainframe and devices such as terminals, printers, and controllers. Through the definition and assignment of 3270 logical units (LUs), Host Integration Server 2004 provides access to these mainframe resources.

Once you establish the physical connection from the Host Integration Server 2004 computer to the mainframe, you need to determine the type of 3270 connectivity your users need. The topics in this section detail the networking services Host Integration Server 2004 can provide to your users and offers information on ways to set up these services.

This section contains:

- 3270 Access
- TN3270 Access
- Downstream Connections

3270 Access

Host Integration Server 2004 provides 3270 connectivity through 3270 logical units (LUs). A 3270 LU is known as a dependent LU because it requires a mainframe to function. Each 3270 LU defined within Host Integration Server 2004 is configured to use an existing connection to the mainframe system. Each 3270 LU corresponds to a matching LU resource allocated on the host computer, usually specified within VTAM. The 3270 LU definition in Host Integration Server 2004 is identified by a number that matches the number of the corresponding LU resource on the mainframe, and by a user-specified name.

The 3270 LU is further classified by the type of service provided over the connection. Like physical units (PUs) physical units, LU types are designated by numbers. For example, 3270 display data streams are known as LU 2 streams. Within Host Integration Server 2004, a 3270 LU can be configured as one of the following types:

- Display (LU 2)
- Printer (LU 1 or LU 3)
- Application (LUA)
- Downstream

Once configured, these LUs are accessed from an end-user applications using Host Integration Server 2004 client software that is installed on the client workstation. The client software manages communications between a 3270 application (like a terminal emulator) and the Host Integration Server 2004 computer. Applications designed for the Host Integration Server 2004 client API use the LUs defined within Host Integration Server 2004 to establish a communications link from the client personal computer to the mainframe via Host Integration Server 2004.

The link between the LU definition in Host Integration Server 2004 and the host LU resource is called a *session*. Sessions can be permanent and automatically started during initialization, or established on an as-needed basis. Concurrent sessions can share the same physical devices and communications links.

See Also

Using LU Pools

Assigning LUs to Workstations

Providing Hot Backup and Load Balancing

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

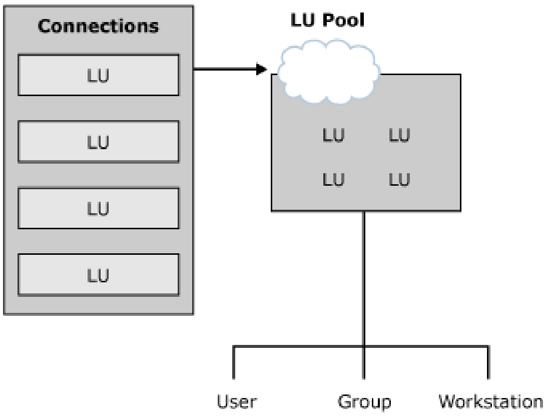
Deployment Strategies

This section describes deployment strategies that can be applied if you are providing 3270 connectivity services including:

- Using LU Pools
- Assigning LUs to Workstations
- Providing Hot Backup and Load Balancing

Using LU Pools

Although you can create individual LUs and assign them to users and groups, using LU pools to manage and deploy a large number of LUs is a more efficient method of administering these resources. LU pools are groupings of LUs that allow you to maximize access to these LUs. As shown in the following illustration, a user, an application, or a downstream system can access the LUs as long as any LU assigned to the pool is free. If any one of the pooled LUs ceases to function, another free LU in the pool is automatically used.



Creating and assigning LU pools

LU pools also allow groups of intermittent users to use a limited number of host resources more efficiently. Dedicating LUs to specific users who occasionally require host access wastes host resources. Using a pool, you can assign a smaller number of LUs to a group of users who require sporadic access. For example, if a group of 100 users require host access 25 percent of the time, assigning a pool of 25 LUs to the group may fulfill their needs.

See Also

Assigning LUs to Workstations

Providing Hot Backup and Load Balancing

Assigning LUs to Workstations

LUs and LU pools can also be assigned to workstations rather than users, effectively locking LUs to a specific machine. Assigning LUs to a workstation makes it easier for users to find and access different resources. For example, 200 hospital employees can share 50 workstations, each of which has a printer attached. Employees may want to access any of the 50 workstations and 50 printers. Instead of assigning 50 printer LUs to a pool and making the pool available to each user, each of the workstations can be added to Host Integration Server 2004 and a printer LU can be assigned to each workstation. Now, when a user logs onto any of the 50 workstations, the printer that is attached to the workstation will be available in the list of LUs.

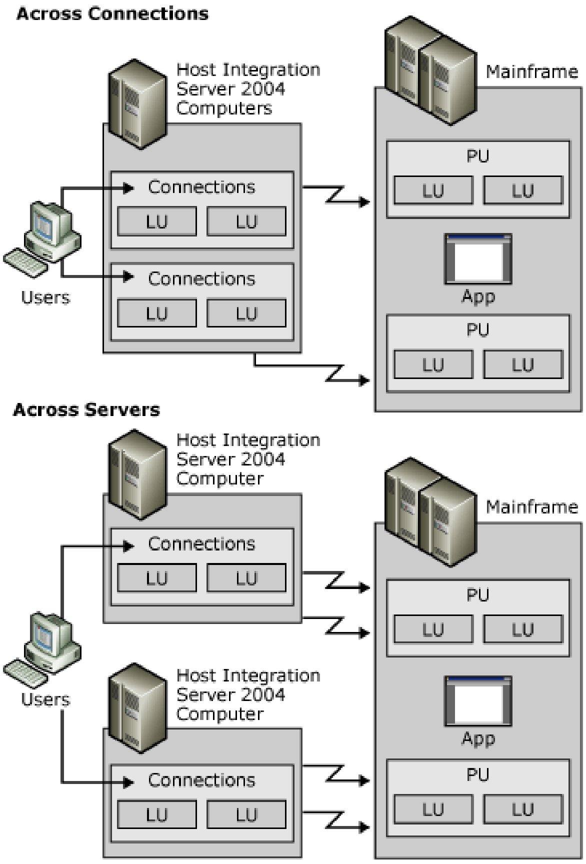
See Also

Using LU Pools

Providing Hot Backup and Load Balancing

Providing Hot Backup and Load Balancing

The following diagram shows hot backup across host connections on the same server and across servers.


Across Connections
Host Integration Server 2004 Computers
Mainframe
Connections
LU
LU
Connections
LU
LU
Users
PU
LU
LU
App
PU
LU
LU
Across Servers
Host Integration Server 2004 Computer
Mainframe
Connections
LU
LU
Users
Host Integration Server 2004 Computer
Connections
LU
LU
PU
LU
LU
App
PU
LU
LU

To recover from situations where a particular host connection has failed, the Host Integration Server 2004 hot backup feature can be configured to allow for similarly configured resources to automatically fill in and support functions dependent on the failed connection. When a failure occurs, a user can simply reconnect to a given resource using an alternate connection or server without reconfiguring client software. Hot backup can be implemented across host connections on the same server, or across several servers in a domain using LU pools as shown in the preceding figure. Implementing fault-tolerant connections is a recommended strategy for enterprises of any size, and helps to provide reliable host access to your users.

Related to hot backup is a feature called load balancing. Load balancing evenly distributes sessions across multiple host connections and multiple servers using 3270 LU pooling. Instead of explicitly requesting specific LUs, users request the first available LU in a pool and Host Integration Server 2004 randomly assigns the user a free LU in the pool. Because each LU can be configured using different connections or servers, the server load can be spread out across all configured resources. Load balancing is implemented automatically when a pool is configured with LUs from multiple servers or connections.

See Also

Using LU Pools

Assigning LUs to Workstations

TN3270 Access

TN3270 is a type of Telnet service that allows access to mainframe computers over a TCP/IP network. Users can connect to mainframes using a TN3270 client and the TN3270 service provided with Host Integration Server 2004.

The TN3270 service supports these protocols:

- TN3270, for display sessions
- TN3287, for printer sessions
- TN3270E, for extended display and print sessions

The TN3270 service uses Host Integration Server 2004 features to provide mainframe access and to address issues such as security and redundancy when the data communications path between the client and server contains one or more nonsecured segments.

TN3270 Service

The TN3270 service communicates with Host Integration Server 2004 using the LUA (Logical Unit for Applications) API. Because of this, LUA-type connections and LUs must be configured on the server. Once configured, LUA LUs and LU pools can be assigned to the TN3270 service and made available for use by TN3270 clients requesting mainframe access.

See Also

Setting Port Numbers

Deploying Hot Backup and Load Balancing

Assigning LUs to an IP Address

Deployment Strategies

This section describes deployment strategies that can be applied if you are providing TN3270 connectivity services including:

- Setting Port Numbers
- Deploying Hot Backup and Load Balancing
- Assigning LUs to an IP Address

Setting Port Numbers

As with all TCP/IP services, TN3270 requires a free TCP port in which clients can locate the TN3270 service. By default, the TN3270 service defaults to port 23, the same port as standard Telnet services. Because no two services can share the same TCP port, it is recommended that you change the TN3270 service to use TCP port 24 or some other unused TCP port. When attempting to connect to the TN3270 service from a client application, you must also specify the new TCP port within the application connection settings.

See Also

Deploying Hot Backup and Load Balancing

Assigning LUs to an IP Address

Deploying Hot Backup and Load Balancing

A Windows domain can contain one or more Host Integration Server 2004 subdomains. Like 3270 LUs, LUA LUs from multiple servers in different subdomains can be assigned to the TN3270 service. This lets you distribute client sessions among the participating servers in the subdomain, thereby balancing the load.

Creating redundant connections to the mainframe and assigning them to a TN3270 service increases service availability. If one server goes down, a client can still access LUA LUs on a different server. Similarly, a single server can be configured with redundant host links to increase hot backup and bandwidth if no other Host Integration Server 2004 computers are available.

See Also

Setting Port Numbers

Assigning LUs to an IP Address

Assigning LUs to an IP Address

In the same way that you assign 3270 LUs to a user or workstation, you can restrict access to LUA LUs or pools by specifying an IP address or subnet mask for clients that must access the resource. If a workstation has a name that can be resolved using name resolution services like DHCP or WINS, the name can be associated with the resource instead.

Restricting access to clients with specific IP addresses or workstation names increases the security of the LUA resources.

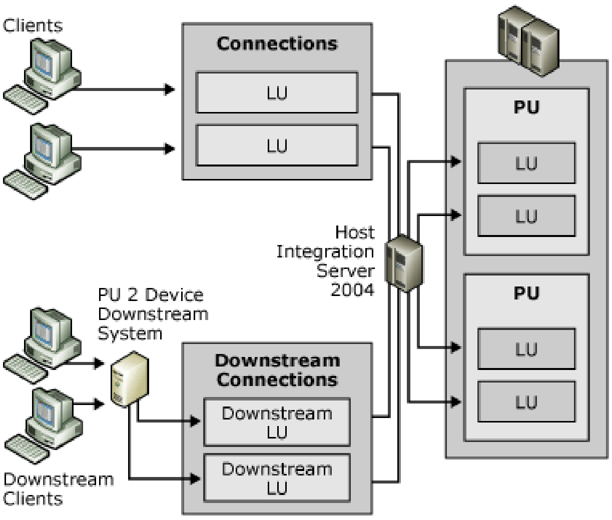
See Also

Setting Port Numbers

Deploying Hot Backup and Load Balancing

Downstream Connections

In a hierarchical SNA environment, you configure 3270 communications between SNA nodes using SNA protocols. Usually those nodes are Host Integration Server 2004 computers and mainframes. A downstream system, however, is an SNA node that uses Host Integration Server 2004 as a physical unit (PU) gateway. To the downstream system, the Host Integration Server 2004 computer appears to be the actual mainframe providing the PUs and 3270 LUs. The following figure illustrates a downstream system.


Clients
Connections
LU
LU
Host Integration Server 2004
PU 2 Device Downstream System
Downstream Connections
Downstream LU
Downstream LU
Downstream Clients
PU
LU
LU
PU
LU
LU

A downstream system in this type of environment must be a PU 2 device, for instance, a cluster controller like an IBM 3745, or a client personal computer running a terminal emulator that emulates a PU 2 and acquires LU sessions from the Host Integration Server 2004 computer.

On the Host Integration Server 2004 computer, two connections are required to support downstream systems:

- A host connection between the server and the mainframe. This can be any standard physical connection method supported by the mainframe.
- A downstream connection between the server and the downstream system. This physical connection can be a DLC 802.2, SDLC, or X.25 connection.

Once configured, Host Integration Server 2004 can manage the downstream LUs in a manner similar to other LUs, including assigning them to LU pools.

See Also

Deployment Strategies

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Deployment Strategies

This type of configuration is useful in environments in which the downstream system may be unable to communicate directly with the mainframe because of hardware or network incompatibilities that the intermediate Host Integration Server 2004 computer can resolve.

Using Host Integration Server 2004 as a PU concentrator can also help reduce host configuration requirements. LUs from one or more physical units (PUs) can be shared with multiple downstream devices, alleviating the need to configure each downstream device in VTAM on the mainframe system. The result is more efficient use of host resources.

See Also

Downstream Connections

Planning APPC Connectivity

A peer-oriented SNA network, using the Advanced Program-to-Program Communications (APPC) protocol, relies on each device in the network to communicate directly with the others. Each computer depends primarily on its own intelligence and does not require constant access to a centrally located host computer.

APPC supports display and other application services across an SNA network. Although peer-oriented SNA networks are usually associated with an AS/400 host system, mainframe systems can also support peer-to-peer networking.

Once you establish the physical connection from Host Integration Server 2004 to the AS/400, you need to determine the types of APPC services required by your users. This section discusses the APPC services that Host Integration Server 2004 can provide to your users and tells how to set up these services.

This section contains:

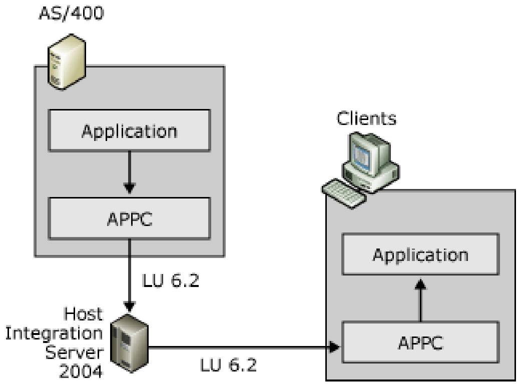
- Understanding Peer-to-Peer Networking
- APPC Applications
- APPC Deployment Strategies

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Understanding Peer-to-Peer Networking

Devices in peer-oriented SNA networks participate in Advanced-Peer-to-Peer Networking (APPN). Each device, known as a type 2.1 physical unit (PU 2.1), handles all network routing functions, as well as normal computing activities and applications.

LU 6.2 logical units are associated with PU 2.1 devices. Devices in an APPN network appear as LU 6.2 (also called APPC LU) entities. Programs that are executed on these devices are called transaction programs (TPs).

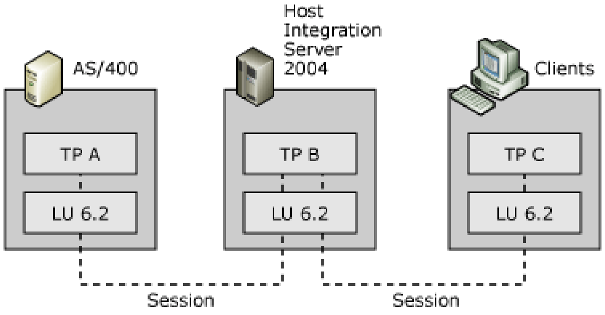


APPC enables TPs on different APPN systems to communicate directly with each other across an APPN network. In APPN networks, Host Integration Server 2004 provides support for the APPC protocol and emulates a PU 2.1 low-entry networking (LEN) node.

In the AS/400 environment, APPC is used for a variety of applications, including:

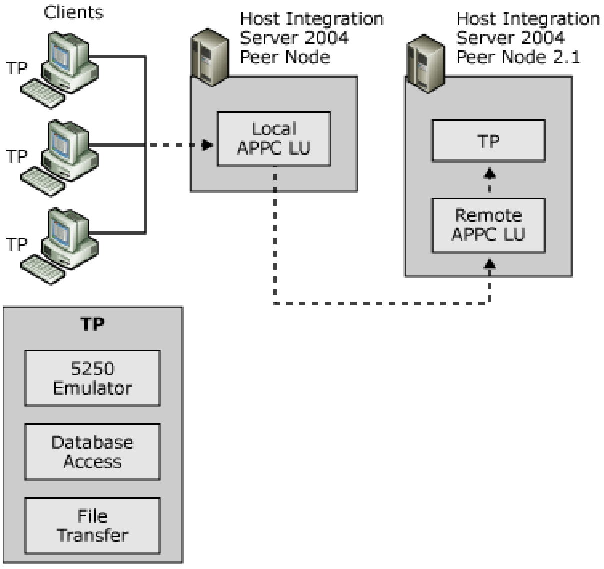
- 5250 access
- TN5250 access
- File transfer

TPs use LU 6.2 names to access other systems and other transaction programs as shown inthe following figure. With Host Integration Server 2004, a transaction program, such as a 5250 terminal emulator, can also use an APPC LU alias to access another TP. In this case, the LU alias maps to an LU name that is actually used to access the other system's TP.



APPC uses pairs of LUs to facilitate simultaneous, bi-directional communication between transaction programs. To achieve this, a local LU and a remote LU are defined on each device in the APPN network.

The perception of local and remote LUs is dependent on the system that you are configuring. When configuring Host Integration Server 2004, the local APPC LU corresponds to the Host Integration Server 2004 computer and the remote LU corresponds to the AS/400. Local LUs on one system communicate with remote LUs on another system. If you view the configuration from the AS/400 perspective, the Host Integration Server 2004 computer is the remote system and the AS/400 is the local system.


Clients
TP
TP
TP
Host Integration Server 2004 Peer Node
Local APPC LU
Host Integration Server 2004 Peer Node 2.1
TP
Remote APPC LU
TP
5250 Emulator
Database Access
File Transfer

When a client/server network TP, such as a 5250 terminal emulator, requests a conversation with a TP on the AS/400 (remote system), the server (local system) acts on behalf of the client request and negotiates an LU 6.2 - LU 6.2 session to the AS/400. The data sent or received from the AS/400 TP is handled by the server and sent to the client TP over the selected client/server protocol. This is illustrated in the preceding figure.

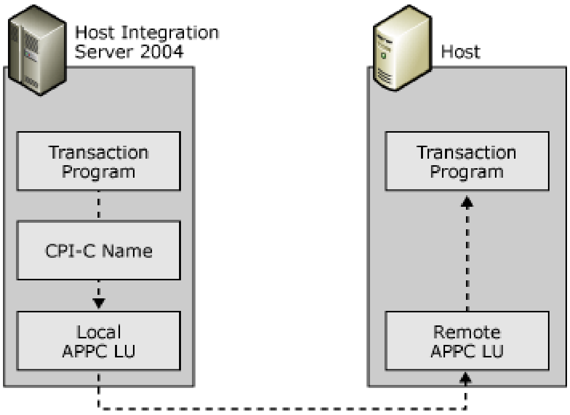
See Also

Understanding CPI-C

Understanding CPI-C

Common Programming Interface for Communications (CPI-C) is an application programming interface (API) that uses the LU 6.2 communications architecture. CPI-C comprises a set of C programming language routines that allow applications on computers to communicate with one another to accomplish a processing task, such as copying a file or accessing a remote database.

CPI-C programming provides a mechanism called client-side information that associates a set of parameters with a specified CPI-C symbolic destination name. The CPI-C program uses the symbolic destination name to initialize a conversation using APPC LUs that are associated with the CPI-C symbolic name.



Host Integration Server 2004 supports the CPI-C API and provides for configuration of CPI-C parameters. These parameters allow applications on the Host Integration Server 2004 systems to communicate with applications on any platform that supports APPC communications and CPI-C including mainframes, AS/400s, Windows systems, and UNIX systems.

See Also

Understanding Peer-to-Peer Networking

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

APPC Applications

Advanced Program-to-Program Communications (APPC) can be used to support a wide range of applications. This section describes how Host Integration Server 2004 is used to support the following services:

- 5250 terminal access
- TN5250 terminal access
- APPC file transfers

See Also

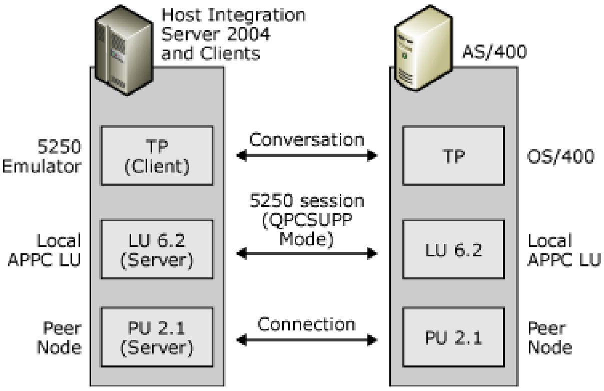
5250 Access

TN5250 Access

5250 Access

If your enterprise contains AS/400 systems, display sessions are provided through APPC using the 5250 data stream. Host Integration Server 2004 computers provide APPC access to an AS/400 using 5250 emulation clients. Clients can only communicate with AS/400s using APPC.

For 5250 services, the local APPC LU acts as an identifier for local Host Integration Server 2004 clients; the remote APPC LU identifies the AS/400 system. The following figure shows the local and remote LUs used for this configuration.


Host Integration Server 2004 and Clients
AS/400
5250 Emulator
TP (Client)
Conversation
TP
OS/400
Local APPC LU
LU 6.2 (Server)
5250 session (QPCSUPP Mode)
LU 6.2
Local APPC LU
Peer Node
PU 2.1 (Server)
Connection
PU 2.1
Peer Node

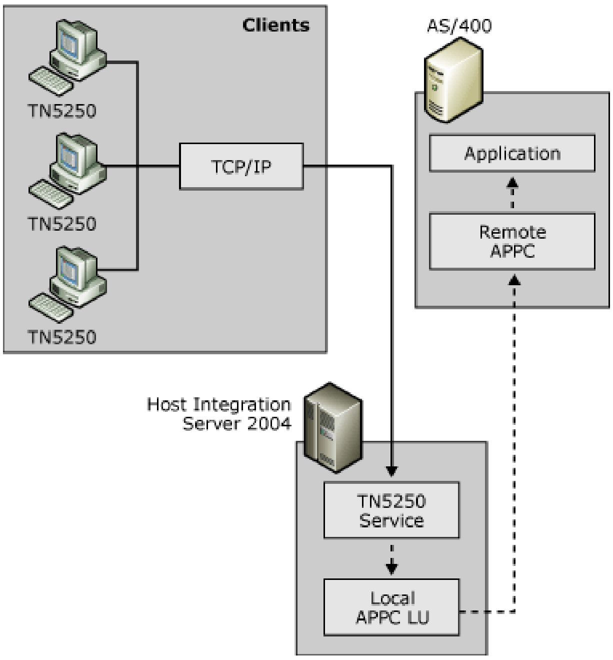
See Also

APPC Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

TN5250 Access

TN5250 is a protocol that allows users to access AS/400 systems over a TCP/IP network using an appropriate TN5250 client terminal emulator. The TN5250 service provided with Host Integration Server 2004 enables any TN5250 client to connect to the AS/400 by means of Host Integration Server 2004 without installing or configuring TCP/IP on the AS/400. Full 5250 terminal emulation functions are supported by the service, as well as hot backup and security features similar to those provided with the TN3270 service.


Clients
TN5250
TN5250
TN5250
TCP/IP
AS/400
Application
Remote APPC
Host Integration Server 2004
TN5250 Service
Local APPC LU

To provide TN5250 access, you need to define local and remote APPC LUs, a mode, an AS/400 user name and password, a terminal type, and, optionally, an IP address and subnet mask.

See Also

APPC Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

APPC Deployment Strategies

In most cases, deployment strategies are effective for APPC LUs, regardless of the application that the LUs support. This section describes the factors that you should consider when deploying APPC connections with Host Integration Server 2004. This section contains:

- Using Independent APPC LUs
- Using Dependent APPC LUs
- Choosing Modes
- Using LU Pools
- Configuring LUs
- Providing Hot Backup
- Choosing IP Settings

Using Independent APPC LUs

An independent LU can communicate directly with a peer system and does not need the support of a host computer. Independent APPC LUs, as used in AS/400 APPN networks, provide the ability to run multiple, concurrent, parallel sessions between a local and remote LU pair.

When configuring independent APPC LUs, you should note that when Host Integration Server 2004 is used to communicate with a transaction program (TP) on a mainframe over an independent APPC LU, the host system must be running VTAM version 3, release 2 (V3R2) or later. The version of Network Control Program (NCP) required on the mainframe depends on the type of front-end processor (FEP) used. For 3725 systems, NCP V4R3 or later is required. For 3745 systems, NCP V5R2 or later is required.

See Also

APPC Deployment Strategies

Using Dependent APPC LUs

A dependent local APPC LU requires the support of a mainframe in order to communicate with a remote TP. Dependent APPC LUs cannot be used to communicate with AS/400s. Unlike independent APPC LUs, dependent APPC LUs only allow a single session per LU.

Dependent APPC LUs are helpful when configuring Host Integration Server 2004 to communicate with a mainframe using a version of VTAM earlier than V3R2. Independent LUs are not supported in earlier VTAM versions. Support for dependent APPC LUs is provided with Host Integration Server 2004 for compatibility with older VTAM versions. If possible, use independent LUs.

When configuring APPC dependent LUs, you should specify the network name and LU name. Even though they are not required, they are used by software running on the Host Integration Server 2004 computer, such as the Windows Event Log. For example, if a remote APPC LU will be partnered with a dependent local APPC LU, naming the remote APPC LU helps to identify any events associated with the LU in the Windows Event Log.

See Also

APPC Deployment Strategies

Choosing Modes

Each LU-LU pair has a mode associated with it that determines session properties for that pair. For independent APPC LU sessions, the Parallel Session Limit parameter is of particular importance because this limit determines the number of simultaneous conversations that a session can support. If you plan to use a remote APPC LU that supports parallel sessions, it can only be used with a mode whose parallel session limit has a value greater than 1.

The following table lists the modes supplied with Host Integration Server 2004 and describes the scenarios in which each mode can be used.

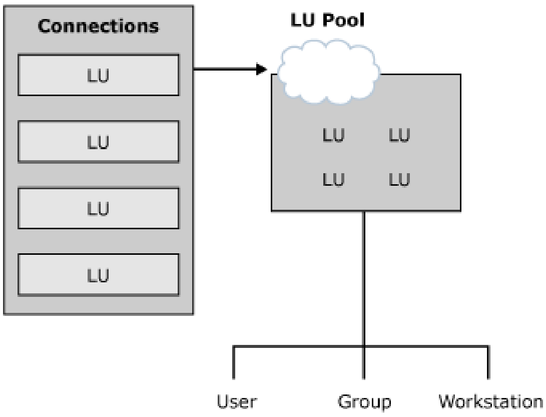
Mode Name	Suitability
#BATCH	Batch-oriented sessions
#BATCHSC	Batch-oriented sessions that employ a minimal level of routing security
BLANK	Sessions using a default node name, encoded as eight blank EBCDIC spaces in a BIND APPC command
#INTER	Interactive sessions
#INTERSC	Interactive sessions that employ a minimal level of routing security
QPCSUPP	All sessions with an AS/400 computer
QSERVER	Database connectivity with an ODBC driver

See Also

APPC Deployment Strategies

Using LU Pools

Although you can create individual LUs and assign them to users and groups, using LU pools to manage and deploy a large number of LUs lets you administer these resources more efficiently. An LU pool is a grouping of LUs that allows you to maximize access to these LUs as shown in the following figure. A user, an application, or a downstream system can access the LUs as long as any LU assigned to the pool is free. If any one of the pooled LUs ceases to function, another available LU in the LU pool is automatically used.



LU pools also allow groups of intermittent users to use a limited number of host resources more efficiently. Dedicating LUs to specific users who occasionally require host access wastes host resources. Using a pool, you can assign a smaller number of LUs to a group of users who require sporadic access. For example, if a group of 100 users require host access 25 percent of the time, assigning a pool of 25 LUs to the group may fulfill their needs.

See Also

APPC Deployment Strategies

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring LUs

When a user configures a 5250 emulator to access an AS/400, the emulator is configured with the local and remote APPC LU alias names. The LU alias names are mapped to LU names that are used for the conversation with the AS/400.

Host Integration Server 2004 allows you to define a default local and remote APPC LU for each user group accessing the AS/400. Setting default values relieves the user from having to remember APPC LU names; these values should be specified, if possible.

When creating local APPC LUs, it is recommended that you use the name of a user or group as the local LU alias. When the session from a particular user or group is active, the LU alias name is displayed in SNA Manager. Matching local LU alias names with user names allows you to tell which 5250 users are connected to the AS/400. This also makes it easy to keep track of which local LU a particular user should use.

To use this method, create a separate local APPC LU with an LU alias that matches the user name of each person or group being added to the SNA subdomain. After the LU is created, assign the LU to the user as the default local APPC LU along with a default remote APPC LU.

In Host Integration Server 2004, you can also specify an implicit incoming remote LU that defines the properties to use when Host Integration Server 2004 receives a request to start a session with a local LU, and the remote LU named in the request is not recognized by Host Integration Server 2004. You can also specify an implicit incoming mode that defines the session characteristics when a mode is not recognized by Host Integration Server 2004.

If you want to accept an incoming request that can arrive by many different remote LUs without explicitly defining each remote LU, you can specify implicit incoming remote LU pairs, along with their mode. When the implicit incoming remote LU and mode are specified, the remote LU does not need to be recognized by the server. As long as the local LU specified in the session request is recognized, the connection can be initiated.

See Also

APPC Deployment Strategies

Providing Hot Backup

In the AS/400 environment, Host Integration Server 2004 uses a combination of LU names and LU aliases over one or more servers to achieve transparent connections with hot backup to an AS/400.

Hot backup connections to an AS/400

A single Host Integration Server 2004 computer can use multiple connections to provide hot backup. To use this method, two or more APPC connections to the same AS/400 are configured and appropriate LUs are grouped into a pool. If one of the connections fails, the clients can reconnect to the AS/400 without reconfiguration.

Host Integration Server 2004 can also use multiple Host Integration Server 2004 computers as backups to one another. If one of the servers fails, the clients are shifted from the failed server to a working server. Use a combination of connections and servers with hot backup to maintain a high level of host availability in your enterprise.

See Also

APPC Deployment Strategies

Choosing IP Settings

IP settings assigned to the TN5250 definitions allow TN5250 clients to connect to the AS/400. By default, the TN5250 definition is not assigned an IP address or a subnet mask. This allows any TN5250 client to connect to the AS/400.

You can restrict access to the TN5250 service by specifying the IP address or subnet mask of the client workstation(s). When these values are specified, only clients whose IP and/or subnet mask match those specified in the TN5250 configuration are allowed access to the AS/400 through the TN5250 service. You can also specify the workstation name in place of the IP, and use a WINS, DHCP, or other name-resolution service to resolve a friendly name to an IP address.

See Also

Host Integration Server 2004 (SNA) Remote Access Service

Deployment Strategies

Host Integration Server 2004 (SNA) Remote Access Service

SNA Remote Access Service integrates the LU 6.2 transport of Host Integration Server 2004 with Windows Remote Access Service, allowing administrators to create virtual LAN connections between Windows systems across an existing SNA network. Using SNA Remote Access Service, the SNA network acts as a network backbone, passing network traffic between the Windows systems that are bridged with the host system.

The functions available with SNA Remote Access Service are the same as those for Remote Access Service over ISDN or X.25, except for the dial-back connection feature, which is not supported by SNA Remote Access Service. The SNA Remote Access Service supports the either the Windows Remote Access Service Server or Windows Remote Access Service client, depending on whether the machine to which SNA Remote Access Service is installed is a Host Integration Server 2004 client or server. In addition, a Windows Workstation computer running Host Integration Server 2004 client software and SNA Remote Access Service can dial out through the Host Integration Server 2004 computer that is also running SNA Remote Access Service.

SNA Remote Access Services is configured using local and remote APPC LUs that are assigned to clients using SNA Remote Access Service to connect to mainframe and AS/400 computers. After SNA Remote Access Service is installed, a SNA Remote Access Service port must be specified for each client or server connection that the computer will support. For example, to support one client and four server connections, a total of five ports must be specified. Each port must be added and configured before it can be used by SNA Remote Access Service.

See Also

Choosing IP Settings

Deployment Strategies

Since legacy SNA networks may include smaller-bandwidth links like SDLC, and LAN traffic typically generates more network traffic that can be effectively handled by slower connections, care should be taken to resolve bandwidth needs before deploying SNA Remote Access Service in your enterprise.

Before Windows Remote Access Service clients can connect through SNA Remote Access Service, Host Integration Server 2004 must be configured to provide the following items for each client system:

- A peer incoming connection
- A remote APPC LU for each client

Each Host Integration Server 2004 computer must also be configured with at least one local APPC LU that can be used by SNA Remote Access Service when communicating with the client system. One local LU is required for each SNA Remote Access Service port that is used. For each connection that you set up for use by SNA Remote Access Service, a corresponding remote APPC LU must be configured. This remote LU defines the local LU on the Remote Access Service client that will be used to connect to the server via SNA Remote Access Service. Once the LUs are configured, each remote user must be given permission to dial in to the server.

If you create a SNA Remote Access Service connection between a client and a server that are also connected by a LAN, you must disable the bindings between the Remote Access Server Service and the network adapter to prevent Windows Remote Access Service from attempting to insert the Remote Access Service client into the LAN. This scenario usually occurs when testing a Remote Access Service connection over a network.

After the APPC LUs are configured, the final step is to create a phone book entry for each connection. If you have configured more than one port for use by SNA Remote Access Service, you can create an additional set of phone book entries by associating the same connection with the additional Remote Access Service ports.

A common use of SNA Remote Access Service is to enable an administrator to manage Host Integration Server 2004 computers remotely via the SNA network itself. An administrator working at a Windows Workstation running SNA client software and SNA Remote Access Service can use the service to connect to and administer servers at branch locations connected to SNA network.

See Also

Choosing IP Settings

Planning for Transaction Integrator

Before installing and using Transaction Integrator (TI), determine whether your mainframe-based transaction programs (TPs) can be used with TI and whether any of them need modification. Answer the following three questions to find out whether TI can invoke your TP:

- Is the TP irretrievably terminal-oriented, or can you expose a request-response interface?
- What programming model does the TP need?
- Does the TP use data types that TI supports?

To use TI to invoke a mainframe-based transaction program (TP), you must separate the business logic from the presentation logic in the TP. TI uses the request-response model; it does not support conversational or pseudo-conversational transactions. The TP must support the so-called ping-pong request-reply mode.

Although TI does not support screen scraping, it does support eight other communication models. Some CICS and most IMS transactions that expose terminal interface can also be invoked using one of the eight supported models. For example, a CICS transaction might be terminal-oriented but still have the business logic partitioned in a separate link model transaction for load balancing or maintainability.

See Also

Communication Models

Data Types

Host and Automation Data

Communication Models

Transaction Integrator (TI) supports the following communication protocols for interacting with the host computer. These protocols are limited to single request/single response. However, the request and response can consist of multiple data segments in the case of unbounded recordsets.

- **CICS TCP Transaction Request Message Link**
  The host transaction must be IBM DPL-enabled. In other words, the mainframe transaction must be designed to be invoked by EXEC CICS LINK.
- **CICS TCP Transaction Request Message User Data**
  The host transaction must use explicit TCP SEND/RECEIVE.
- **CICS LU 6.2 Link**
  The host transaction must be IBM DPL-enabled (Distributed Program Link), that is, the mainframe transaction must be designed to be invoked by EXEC CICS LINK.
- **CICS LU 6.2 User Data**
  The host transaction must use explicit APPC SEND/RECEIVE.
- **IMS Connect**
  Enables you to use TCP/IP with your IMS-based TP without recompiling it. By using IMS Connect or OTMA, you can connect to existing IMS transactions without linking listeners to the TPs.
- **IMS Implicit**
  The IMS program must use implicit message queue and IMS library CBLADLI (rather than CBLTDLI).
- **IMS Explicit**
  The host transaction must use explicit TCP SEND/RECEIVE.
- **IMS LU 6.2 User Data**
  The IMS program must use an implicit message queue (the common design model).
- **OS/400 Distributed Program Calls**

See Also

Planning for Transaction Integrator

Secure Deployment Guide

The information in this guide outlines and explains ways to secure your Microsoft® Host Integration Server 2004 environment.

This section contains:

- Securing Your Environment
- Deploying Host Integration Server 2004

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Securing Your Environment

The information contained in the following sections details securing your Microsoft® Host Integration Server 2004 environment, including Enterprise Single Sign-On.

This section contains:

- Understanding Windows Security
- Maximizing Product Security
- Resource Security
- Transaction Integrator Security

For information about Single Sign-On, see Understanding Enterprise Single Sign-On.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Understanding Windows Security

This section presents general security information.

This section contains:

- About Security
- File System Choices and Security
- Securing Host Integration Server 2004 Files and Directories
- About Authentication
- Domain Authentication
- Workstation Authentication
- Client Logon
- Denying Access to Host Integration Server 2004
- Security Audit
- Viewing and Interpreting Audited Events
- Firewall Support Overview
- Screening Routers and Internet Firewalls
- Data Encryption

About Security

As corporate networks become increasingly integrated with the Internet and other external networks, the threat of unauthorized access to your corporate resources grows significantly. When you plan your networking environment, you must strike a balance between protecting your resources and allowing users unobstructed access to data.

Following are some of the questions that must be answered as you prepare to secure your Host Integration Server 2004 environment:

- How can I authenticate users who require host resources?
- How can I control access to host resources?
- How can I control sensitive data flowing between workstations and host applications?
- How can I maintain security while connecting my host network to external sources like the Internet?
- How can I make host resources easier to access for authenticated users, yet maintain a secure and easy-to-administer host environment?

This section helps answer these questions and describes how to implement the security features to create a secure LAN-to-host environment.

See Also

Understanding Windows Security

File System Choices and Security

One of the keys to controlling security on Host Integration Server 2004 computers is the configuration file. To maintain good security with this file, be sure to install the Host Integration Server 2004 server software on an NTFS (NT File System) partition. With NTFS, you can assign permissions on a file-by-file basis. With the FAT (File Allocation Table) file system or HPFS (High Performance File System), this is not possible. Installing Host Integration Server 2004 software on an NTFS partition is especially important for the primary server because this computer contains the master copy of the configuration file used by all Host Integration Server 2004 computers in the subdomain.

If you must install Host Integration Server 2004 on a non-NTFS partition, you can limit a user's ability to view or change a Host Integration Server 2004 configuration file through the Host Integration Server 2004 SNA Manager, but you will not be able to set file permissions on the configuration file itself.

In addition, if you choose to install the software for one or more servers on a FAT or HPFS partition, you can set appropriate Read and Change permissions on the share, which gives servers access to the configuration file. (This is unnecessary for Host Integration Server 2004 software installed on an NTFS partition, because file permissions established through the Host Integration Server 2004 SNA Manager place tighter control on the configuration file than can be established by controlling the share.)

Securing Host Integration Server 2004 Files and Directories

If you install Host Integration Server 2004 onto an NTFS volume, you can control which SNA subdomain users can modify the Host Integration Server 2004 configuration file. A Host Integration Server 2004 administrator can control access to the configuration using the Host Integration Server 2004 SNA Manager. By specifying access permissions for users, you can control who has the ability to administer, change, or view a configuration.

When you install Host Integration Server 2004, you create a single directory tree that contains the files needed to configure and use Host Integration Server 2004. To control access to the configuration files in these shares, use the following guidelines:

- Create domain user accounts to run the SnaBase and SnaServer services. A domain user account is one that is allowed to log on to the network.
- Disable the Windows domain guest account.

At least one domain user or group must have Full Control permissions over all the shares, preferably a trusted group such as Administrators. If no user or group has Full Control permissions, the only person who can change the share permissions is the owner of the share. If necessary, this individual can change his or her permissions to Full Control as needed.

See Also

Understanding Windows Security

About Authentication

When Host Integration Server 2004 receives a request to access a host resource, such as an LU for a terminal session, the server must have some way to verify the request.

User validation is a fundamental security issue that you can address using one of two methods: Domain Authentication and Workstation Authentication. The method you choose depends upon the type of service being requested.

Domain Authentication

A *domain*, as it pertains to Windows, is a group of computers that share a network resource database and have a common security policy. A Windows domain contains a *primary domain controller* (PDC) computer that acts as the resource and user manager for the entire domain. One or more computers in the domain can be configured to act as a *backup domain controller* (BDC). The BDC can take over for the PDC should any problems arise. The remaining computers in the domain are user workstations or servers that provide resources to domain users.

Within a Windows domain, Host Integration Server 2004 computers are logically grouped into an entity called a *subdomain*. Each SNA subdomain can contain up to 15 Host Integration Server 2004 computers, and a Windows domain can contain an unlimited number of subdomains. It is common to have multiple domains that manage user accounts independently of one another.

The domain model provides two key advantages over peer-to-peer networks with regards to security:

- You can manage user accounts from a central location.
- You can set up one unified security system for all user accounts in the domain.

Host Integration Server 2004 relies on the PDC or BDC to provide authentication services to users requesting access to host resources. Only users who have been validated by the PDC or BDC can gain access to resources provided by servers in the subdomain.

You can use domain authentication to verify users who request resources provided by these services:

- 3270 or 5250 terminal access from workstations using Host Integration Server 2004 client software
- APPC, CPI-C, or LUA applications built using Host Integration Server 2004 APIs

See Also

About Authentication

Workstation Authentication

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Workstation Authentication

When you receive a request from a source that is external to the corporate network containing the SNA subdomain, or if you are not using a domain-type network, domain authentication is usually difficult to implement.

In this case, Host Integration Server 2004 performs workstation authentication on the following services:

- TN3270 terminal access
- TN5250 terminal access
- 3270 access from terminal emulators connecting through Host Integration Server 2004 client software

For these services, you can specify a list of allowed client workstation IP addresses for defined resources. When Host Integration Server 2004 receives a session request, it determines whether the requesting IP (or workstation name for TN3270E connections) matches that specified for the requested resource. Once verified, Host Integration Server 2004 allows the request to proceed.

> **Note** This type of authentication is not as secure as domain security because workstation names and the IP address are transmitted in clear text over the network.

See Also

About Authentication

Domain Authentication

Client Logon

The logon process conducted by a user on a client system performs the essential task of identifying the user to the Windows domain and to Host Integration Server 2004 computers in the domain. The way that Host Integration Server 2004 handles the logon process depends on the network software on the client system.

For any type of client computer, once the client's logon process for one Host Integration Server 2004 computer has been completed, additional servers can provide services without another interactive user logon. Servers can repeat the logon verification without the user being involved.

If you maintain tight security with the logon to a mainframe, it may make sense to keep access open-ended on the Host Integration Server 2004 computer.

See Also

Understanding Windows Security

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Denying Access to Host Integration Server 2004

You can use one of two methods to deny a user or group the ability to use Host Integration Server 2004. Either remove the user or group from the list of those who have permissions, or assign No Access to the user or group.

When removing a user or group from the list of those who have been granted permissions, be sure to consider all groups to which a particular user belongs. To deny access to that user, either remove the applicable groups from the list of those with permissions, or remove the user account from these groups. Otherwise, the user can receive access through one of the groups (unless the second method, assigning No Access, is used).

You can deny all access to a user or group by assigning No Access, which overrides any other permissions that may apply to a user. For example, if a user belongs to a group that has Read permission, but the user has No Access, the user is not permitted administrative access. Likewise, if a user belongs to Group1 and Group2, and Group1 has Read permission while Group2 has No Access, the user is not permitted administrative access.

The following table provides recommendations for using the two methods of denying access.

Method of denying access	Recommended situations for use
Remove from list of those granted permissions	Use when you want to deny access to a medium or large group. If you then want to grant access to specific users in that group, add those users to the list of those with permissions. In contrast, if you assign No Access to a large group, none of the members of the group will be allowed access, even if explicit access is assigned to them through other accounts.
Assign No Access	Use when you want to deny access to an individual user or a small group. If you then want to grant access to other groups to which the affected users belong, you can do so. The No Access permission overrides the other permissions for the affected users. In contrast, if you attempt to deny an individual user access by removing the user from the list of those granted permissions, a group to which the user belongs might be left in the list. The permissions assigned to that group would be given to the user.

See Also

Understanding Windows Security

Security Audit

When you set up security auditing, you specify events for which the system will create event log entries.

You can monitor system events using the Host Integration Server 2004 SNA Manager. When you configure the properties, you can view a detailed problem analysis, significant system events or general information messages, or you can disable audit logging.

You can cause the system to create an entry every time a member of the Administrators group changes the configuration file. The entry would include the time, the user and process IDs, and other information.

When you set up auditing with Host Integration Server 2004, you are able to record not only access to the configuration file, but the running of Host Integration Server 2004 processes. However, using a file system other than NTFS limits the possibilities for auditing, just as it limits the possibilities for setting permissions. When Host Integration Server 2004 is not installed on NTFS, the only event that will actually result in log entries is the starting of the Host Integration Server 2004 SNA Manager. However, auditing information for this event is useful, if limited.

Auditing is an important way of collecting security-related information. However, there is a small performance overhead for each audit check the system performs. In addition, if you record a wide variety of events, the event log can grow very quickly. For these reasons, you may want to be selective when specifying events to be audited. You may want to focus on such events as Read Domain (Success), Write Domain (Success), and Manage Domain (Success). This list of events is a suggestion only. All the events offered for auditing through Host Integration Server 2004 can be useful, depending on the situation.

Among the events recorded when you enable auditing are the actions of Host Integration Server 2004 itself. For more information about event logs, the Event Viewer, and strategies for auditing, see your Windows documentation.

See Also

Understanding Windows Security

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Viewing and Interpreting Audited Events

Events audited by Host Integration Server 2004 are recorded on the server in which they occur. They are not stored centrally, in contrast with other records generated through Host Integration Server 2004.

The records generated through auditing are stored in the security section of the event log. In contrast, other Host Integration Server 2004 events are recorded in the application section of the log.

> **Note** When you view log entries for audited events related to Host Integration Server 2004, you will see a record of actions carried out by Host Integration Server 2004 itself, as well as actions carried out by users. The source of the actions carried out by Host Integration Server 2004 is the account under which the service is running.

The event details for some events will list an item called **Accesses** in the **Description** box. Unusual information may be shown here for events related to Host Integration Server 2004.

Use the following table for interpreting this information.

Information shown for Accesses (under Description)	Meaning
Unknown specific access (bit 0)	Read Domain access. This access applies when someone starts or attempts to start the Host Integration Server 2004 SNA Manager. (Host Integration Server 2004 must read the configuration file in order to function.)
Unknown specific access (bit 1)	Write Domain access. This access applies when someone starts the Host Integration Server 2004 SNA Manager in write mode — that is, when someone starts Host Integration Server 2004 and the primary Host Integration Server 2004 computer is available.
Unknown specific access (bit 2)	Manage Domain access. This access applies when someone starts or attempts to start the Host Integration Server 2004 SNA Manager.

See Also

Understanding Windows Security

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Firewall Support Overview

Host Integration Server 2004 client computers and servers can interoperate with screening routers, where the client computer knows the address of the Host Integration Server 2004 computer. Host Integration Server 2004 client computers and servers can also interoperate with full-blown Internet firewalls, where the end user is not allowed to know the IP address of the Host Integration Server 2004 computers.

A firewall is a network security device that restricts access to network resources by allowing traffic only through specified port numbers. These port numbers are commonly defined in software components to allow Internet firewalls to filter packets based on port number, thereby denying or accepting their propagation to the private network. In many instances, the services of a firewall are provided in conjunction with a network router that bridges two network segments together.

Host Integration Server 2004 can be configured to use specific software port numbers, allowing administrators of Internet firewalls to filter packets based on port number. By assigning specific destination port numbers to Host Integration Server 2004 components, Host Integration Server 2004 can inter-operate with screening routers and full-blown firewalls.

If the Host Integration Server 2004 address is known, the client workstation configures the appropriate port and destination IP of the Host Integration Server 2004 computer in the client software, e.g. 1477 and 128.124.1.2. Alternatively, the Host Integration Server 2004 computer's service port numbers can be changed to the port number requested by the client.

You can configure destination port numbers in Host Integration Server 2004 for end-user and Administrator clients using TCP/IP, IPX/SPX.

Each network transport has the following three components for which you can assign destination ports.

DatagramPort
This port is used for datagram (mostly broadcast or multicast) traffic. Use the **Server Broadcasts** dialog box in the Host Integration Server 2004 SNA Manager to control which transport is used for server-to-server communication.

SnaBasePort
This is the port to which the server SnaBase listens for new client sponsor connections. Sponsor connections are used by the Host Integration Server 2004 client to learn about the SNA subdomain in which it participates.

SnaServerPort
This is the port where the SNASERVR.EXE waits for new application session requests.

If the Host Integration Server 2004 address is not known, the Host Integration Server 2004 IP transport replaces the real destination IP address with the address of a firewall. The firewall then maps the connection request to the actual Host Integration Server 2004 computer. This takes place when the transport opens a connection to a Host Integration Server 2004-based computer for application sessions or a sponsor connection.

Host Integration Server 2004 supports firewalls primarily on TCP/IP networks. It may also be possible to implement firewalls on IPX/SPX. For more information on configuring a firewall, consult your network documentation.

> **Note** The clients obtain the Host Integration Server 2004 ports through the sponsor connection. On IPX/SPX, the clients get the SnaBase ports from the NetWare bindery and VINES StreetTalk, respectively. There is no need to configure any port numbers on these two client network types.

It is also possible to create IP mappings which, by overriding service table entries, replace a specified IP address with a firewall address. To create a mapping, add an IPMapping key under the SnaTcp key, and then add a REG_SZ value for each mapping. An example is shown below:

```
IPMapping
xxx.xxx.x.xxx = yyy.yy.yy.yyy
```

With this mapping, any attempts at establishing a connection with xxx.xxx.x.xxx will instead connect to yyy.yy.yy.yyy.

For additional information on firewall support, including client-side registry settings and the use of DLS with firewalls, see the following Knowledge Base articles: Q139508, Q164590, Q224303, and Q215838.

See Also

Understanding Windows Security

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Screening Routers and Internet Firewalls

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SnaServerPort

This is the port where the SNASERVR.EXE waits for new application session requests.

See Also

Understanding Windows Security

Data Encryption

Data Encryption secures traffic between the client computer and Host Integration Server 2004 on a per-user basis. There is a client component and a server component. The data encryption is implemented transparently to any application that is written to the Host Integration Server 2004 APIs (application program interfaces). Any software, such as a third-party emulator, that is written to use the Host Integration Server 2004 client APIs will automatically benefit from the encryption.

Host Integration Server 2004 lets you encrypt data for client-to-server and server-to-server communications.

Client-to-server encryption prevents information from being sent in clear text between Host Integration Server 2004 client workstations and Host Integration Server 2004 computers. Data encryption enhances network security on the client-to-server communications path for all applications using Host Integration Server 2004 client connections, including 3270/5250 emulators and APPC logon IDs and passwords. Data encryption is enabled by default.

Server-to-server encryption can be used to provide secure communications across your network, the Internet, or any other wide area network. If a user enables data encryption, information transferred through Distributed Link Service (DLS) is automatically secure.

Data encryption is also supported in the distributed deployment of SNA Open Gateway Architecture (SOGA), which uses Host Integration Server 2004 to provide secure server-to-server communications across the Internet, intranets, and other WANs.

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Server-to-server encryption can be used to provide secure communications across your network, the Internet, or any other wide area network. If a user enables data encryption, information transferred through the Distributed Link Service (DLS) is automatically secure.

Data encryption is enabled for Distributed Link Service by adding the domain user account under which Host Integration Server 2004 services such as SnaBase or SnaServer are running to the SNA subdomain. The actual encryption is implemented in the transport provider's layer of the Host Integration Server 2004 architecture. You can then enable data encryption settings for the user account, as described above.

See Also

Understanding Windows Security

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Maximizing Product Security

In addition to the general guidelines elsewhere in this section, the following specific recommendations can help you increase the security of your Host Integration Server 2004 deployment. Since all of these actions are performed during deployment or configuration, procedures are located in the appropriate sections of this documentation.

> **Note** While these recommendations apply across the entire product, the Transaction Integrator Threat Mitigation section also offers information specifically for TI users.

The most effective action you can take is to utilize integrated security by using the Host Integration Server 2004 Single Sign-on (SSO) feature. It is especially important to use SSO because certain data used by the product is impossible or unwise to encrypt, making it potentially vulnerable. The SSO feature reduces or eliminates this vulnerability.

When accessing a SQL Server database:

- Since the Resync service will access this database -- and the database may service multiple, unsecured domains -- you should always use a local SQL Server database and never grant remote access to it.
- Use only Windows NT integrated security, and restrict access to only privileged Windows NT accounts.
- Use only Host Integration Server 2004 security groups which were created with the Host Integration Server 2004 Configuration Wizard.

When connecting via SNA Protocol:

- When connecting to an upstream Host Integration Server 2004 computer, use client/server encryption.
- When implementing SNA Open Gateway Architecture (SOGA) Distributed Link Service (DLS) across wide area networks, use server-to-server encryption.
- Locate upstream Host Integration Server 2004 computers within the data center using secure Token Ring, Ethernet, Bus and Tag Channel, or ESCON fiber channel attachments.

When connecting via TCP/IP protocol:

- Use upstream Windows software router computers or hardware routers to encrypt the TCP/IP traffic.
- Locate the upstream router within the data center using either secure Token Ring or Ethernet connections to the host.
- Since DRDA AR sometimes stores data in plain text:
- Use direct network connections over a private segment, with static IP or SNA addresses.
- Use IPSec where supported for IP communications between host and Windows servers.
- When connecting an SNA LU6.2 network to a mainframe or AS/400, with the Host Integration Server 2004 computer deployed as the SNA gateway to the a downstream Host Integration Server 2004 computer, use Host Integration Server 2004 server-to-server data encryption.
- For SNA LU6.2 network connections to mainframe, use the IP-DLC Link Service in conjunction with IPSec.
- Use encryption that is part of the Host Integration Server 2004 server-to-server and client-to-server connections.
- When connecting to a mainframe DB2 for z/OS, use IPSec on an IP-DLC, and also use NNS on the target system to utilize direct connections to DLUS and APPN Peer resources.
- When accessing DB2 DUW over the IP Resync Service:
- Increase the level of security access rights to the SQL Server database which stores the UOWID mapping tables.
- Use the (default) separate SQL Server database, as opposed to one shared with other applications.
- To protect unencrypted data and credentials in the com.cfg file:
- Implement IPSec.
- Deploy the Host Integration Server 2004 computer in an isolated network segment.
- Increase security settings on the host account used for session security.
- When using the TN3270 Server
- Stop and restart the TN3270 Server whenever a new CRL is downloaded. Otherwise, you will be using an out of date CRL, which could permit unwanted access to the host.

The following actions will increase server-to-host security, especially on an APPN Network or UDP sockets for HPR/IP Protocol Traffic:

- Deploy Host Integration Server 2004 in a secure network segment, and use encryption that is part of the Host Integration Server 2004 server-to-server and client-to-server connections.

- Use IPSec on the IP-DLC connection.
- Use NNS on the target system to utilize direct connections to DLUS and APPN Peer resources.
- Use a direct IP-DLC Connection to CS/390 (DLUS) and NNS, or a direct IP-DLC Connection to a peer APPN node.

Finally, as in the following recommendations, be vigilant about access to every file, connection, or other product component:

- In general, use System or User DSN's rather than file DSN's, as System and User DSN's are more secure.
- When using the OLE DB Provider for AS/400 and VSAM, store your HCD files in a secure local folder or share that can only be accessed by the developer and the runtime application.
- When using Transaction Integrator, place any objects going to CICS or IMS in a remote environment that requires Enterprise Single Sign-On.
- Be vigilant about your access control list (ACL). Although it is possible to install Host Integration Server 2004 and "inherit" a previous ACL, you should remove any existing ACLs and replace them with new ones.
- Store Printer Definition Tables (PDTs) and Printer Definition Files (PDFs) in a secure location to prevent their being replaced with a rogue file.
- Since trace files may contain non-encrypted data, always store them in a secure location, and delete them as soon as trace analysis is complete.
- Minimize unwanted access to the Resync Service by running it on the same computer as the application it services.
- Enable LUA Security for TN3270 access to the host, and then add the service account to the Configured Users folder. Among other things, this provides encryption if the TN3270 service uses LUs on another server.
- Enable LUA Security for TN5250 access to the host. This increases security by requiring explicit assignment of LUs to user records.
- When using the printing feature associated with the TN3270 Server, reconfigure the display and printer to use the same port. This is necessary because, since these two items are configured separately, they are often inadvertently configured to different ports, and subsequently different security settings.
- Always use IPSec when using the TN3270 or TN5250 Servers. Although data may be safe between the client and server without IPSec, that same data may become vulnerable between the server and the host. Using IPSec reduces the attack surface, ensures data encryption, and makes access available only to authorized users.

See Also

Securing Your Environment

Understanding Windows Security

Resource Security

This section describes accessing Host Integration Server 2004 resources, including Display LUs, Printer LUs, and LU pools.

This section contains:

- 3270 Terminal Access
- 5250 Terminal Access and APPC Access
- Securing the TN3270 and TN5250 Services

3270 Terminal Access

Users or groups who require access to 3270 sessions from workstations using Host Integration Server 2004 client applications must be members of the SNA subdomain. Therefore, they are also members of the Windows domain of which the subdomain is a part.

Once enrolled in the SNA subdomain, you can assign specific 3270 (LU type 2) resources to the appropriate accounts. The users can access only the specific resources you allocate to them.

The preferred method for maintaining security in your environment is by using domain security to authenticate users, and then limiting their access by assigning them only specified resources.

See Also

Resource Security

5250 Terminal Access and APPC Access

Users who want Advanced Program-to-Program Communications (APPC) access need not be defined in the SNA subdomain, but they must be members of a Windows domain.

For 5250 terminal access using a Host Integration Server 2004 client computer within the network, the AS/400 supplies the required security for logon to the AS/400.

For APPC access programmed into specific applications, you maintain security through the actual programmatic conversation, if required.

See Also

Resource Security

Securing the TN3270 and TN5250 Services

You can secure TN3270 and TN5250 services by specifying client workstation IP addresses that have permission to use the resources provided. In the case of TN3270E clients, you can specify a workstation name in place of the client IP address.

The method employed for verifying workstations can also be used to allow only specified IPs to request resources allocated to them.

See Also

Resource Security

Transaction Integrator Security

Security affects TI in two ways. First, TI components can be assigned security attributes in the same way as other COM+ components. This requires no TI development. Second, the TI run-time environment needs to deal with the security mechanisms of the remote environment (RE). TI provides two security options with an optional override for each:

- Package-level (also known as application-level)
- User-level
- Optional explicit-level override

When configured for user-level credentials, TI makes use of the APPC Privileged Proxy feature for single sign on. This requires that the user context that the APPC application (TI, in this case) is running under be a member of the **HSDomain_Proxy** group. (The **HSDomain_Proxy** group is one of the two groups created when the host security domain is created.) By default, the **HSDomain_Proxy** group contains the **Domain Admins** group. If TI is not running under the context of a user in the **Domain Admins** group, you will need to add the user to the **HSDomain_Proxy** group.

When deploying a TI component, the administrator must choose either package-level security or user-level security as the default. The optional explicit-level security override is a separate option that the administrator can enable or disable; the override applies regardless of which security option (package-level or user-level) is in place. If the explicit-level override is disabled, base applications will not be permitted to use the callback to provide user credentials. The administrator can also turn on the optional Already Verified settings.

This section contains:

- Application-Level Security
- User-Level Security
- Single Sign-On in Transaction Integrator
- Special Security Settings for TCP/IP
- Mainframe Authentication for CICS LINK
- AS/400 Security
- Limitations of User Access Level Sign On

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Application-Level Security

When using application-level (or package-level) security, the TI run-time environment uses the single sign-on support in Host Integration Server 2004 to authenticate itself to the host by using the Windows® 2000 security identity of the COM+ application. The COM+ application containing the TI component must be configured in COM+ to run under a Windows account that maps to valid mainframe credentials.

When a TI component is deployed in a COM+ Application which itself is configured as a Library application or package (instead of a Server application or package) on the **Activation** tab of its property page, the choice of security level (Package-level or User-level) for a TI remote environment (RE) is ignored. A Library application (or package) runs in the Windows user credentials of the process that invoked it, and TI attempts to map this name to a corresponding host user ID.

Although the TI security level is ignored in Library COM+ applications, both of the following security options on the RE property page are accepted by both Library and Server COM+ applications:

- Allow application to override selected authentication
- Use Already Verified or Persistent Verification authentication

The Library application deployment model is supported by COM+. It offers better performance than the Server application deployment model in certain situations. TI supports both models. For example, Internet Information Services (IIS) documentation recommends that COM+ Automation servers that will be invoked from an active server page (ASP) be deployed in a COM+ Library application rather than a COM+ Server application. This way, IIS can control the level of multitasking on a system and kick off new Windows processes to support very high hit rates. By deploying in a Library Application, each IIS process gets its own set of TI components. Also, as a developer debugging a new application, you might prefer to debug a Library COM+ application instead of a Server COM+ application because the Library application simplifies debugging. All the breakpoints come up in one Windows process, and you can more easily see the flow of control.

To set the security level

1. Start TI Manager, and double-click **COM Transaction Integrator** for the computer.
2. Double-click **Remote Environments**.
3. Right-click the specific remote environment (RE) that you want to set, and then click the **Security** tab.
4. Select the **Set security on** check box.
5. Click **Authenticate with package credentials**, or click **Authenticate with User credentials**.

See Also

Transaction Integrator Security

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User-Level Security

If user-level security is enabled, the TI run-time environment provides the client identity to the single sign-on support of Host Integration Server 2004 before allocating the LU 6.2 conversation or connecting to the remote TCP/IP end point. This allows TI to use the client's identity (the identity of the client that invoked the COM+ component that resulted in the invocation of the TI component) to map to a mainframe credential by using the Host Integration Server 2004 single sign-on capability to authenticate itself with the mainframe.

When a TI component is deployed in a COM+ Application which itself is configured as a Library application or package (instead of a Server application or package) on the **Activation** tab of its property page, the choice of security level (Package-level or User-level) for a TI remote environment (RE) is ignored. A Library application (or package) runs in the Windows user credentials of the process that invoked it, and TI attempts to map this name to a corresponding host user ID.

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See Also

Transaction Integrator Security

Single Sign-On in Transaction Integrator

Single sign-on (SSO) is a mechanism that enables a user to enter a user name and password once to access multiple applications. It provides users with simplified logon and maintenance of the many passwords needed to access Windows and back end systems and/or applications. It enables applications to integrate by automating the process of logging on to the host/backend system.

In general, there are three types of single sign-on services:

- **Common authentication single sign-on:** These services enable you to connect to multiple applications within your computer. Your credentials are requested and verified once when you log into the computer, and these credentials are used to determine what actions you can perform based on your permissions. An example of this type of single sign-on is Exchange Server, which uses Windows Integrated Security. Once the user has logged on to Windows, they do not need to provide additional credentials to access their email.
- **Internet single sign-on:** These services enable you to access resources over the internet by using a single set of user credentials. The user provides a set of credentials to log on to different websites that belong to different organizations. An example of this type of single sign-on is Microsoft® .NET Passport.
- **Intranet single sign-on:** These services enable you to connect to multiple heterogeneous applications and systems within the enterprise environment in your company. An example of this type of single sign-on is Enterprise Single Sign-On, which provides a framework for Windows applications to integrate with non-Windows applications to enable single sign-on.

SSO facilitates the translation of credentials by the Security Policy Wizard. SSO provides the means to define and manage the relationship between foreign host user ID and password credentials to Windows credentials. The basis for managing these relationships is the SSO Affiliated Application.

An Affiliated Application is a grouping of well defined host user identities under a logical entity that reflects the host administrator’s view of application processing systems in the non-Windows environments.

When SSO is handed a set of host credentials (user ID and password) along with a valid SSO Affiliated Application, SSO returns a Windows Access Token that represents the Windows credentials. HIP uses this Access Token when setting up the execution thread for methods on server object.

To facilitate this process, the Security Policy must know which SSO Affiliated Applications are to be queried in an attempt to gain access to the Windows credentials (access token) needed to execute methods on the server object. The wizard pane allows the user to select from a list of valid SSO Affiliated Applications and add them to the Security Policy being defined. The wizard pane also allows the user to remove SSO Affiliated Applications previously defined to the Security Policy.

See Also

About Programming Single Sign-On

Special Security Settings for TCP/IP

Two special security settings are available for the TCP/IP protocol for CICS and IMS:

- Link and Concurrent Server

  Mainframe authentication for the TCP/IP CICS MS Link and Concurrent server must have a user exit, EZACIC06, coded on the mainframe to validate the user ID and password supplied by TI. The user ID and password are part of the CICS transaction request message that is formatted by TI and used to initiate the TCP/IP server application in CICS. Refer to the IBM TCP/IP and CICS documentation for further detail.

- For TCP/IP IMS Explicit, IMS Implicit, and IMS Connect or OTMA

  Mainframe authentication for TCP/IP IMS Explicit, IMS Implicit, and IMS Connect or OTMA must have a user exit, IMSLSECX, coded on the mainframe to validate the user ID and password supplied by TI. The user ID and password are part of the IMS transaction request message that is formatted by TI and used to initiate the TCP/IP server application in IMS. Refer to the IBM TCP/IP and IMS documentation for further detail.

See Also

Transaction Integrator Security

Mainframe Authentication for CICS LINK

Resource-level authentication is recommended in the CICS region. Due to a restriction imposed by the IBM Distributed Program Link (DPL) protocol, a user ID and password transmitted from the workstation by TI are ignored and not used for transaction-level authentication. The target CICS region expects, under the circumstances, that authentication has been completed by the application that executes the IBM DPL; for example, a TI application on the PC. (Traditionally, the application that executes an IBM DPL has been another CICS region.) Instead, for transaction-level authentication, the target CICS region associates the default user ID for the region with the transaction ID of the CICS (mirror transaction) task and the user ID from the sender is ignored. Unless this is taken into consideration, attempts to secure the mirror transaction can cause an application malfunction because of the failure to authenticate.

See Also

Transaction Integrator Security

AS/400 Security

The support for AS/400 security is the same as for other Windows-initiated operations against the mainframe, with the following adjustments:

- No support for RACF, AFC/2, Kerberos, or Top Secret.
- Integrate with AS/400 native security system only.
- Support Single Sign-On via SSO.

See Also

Transaction Integrator Security

Limitations of User Access Level Sign On

When you sign on with only user access permissions, you have restricted capabilities for using Transaction Integrator. For TI Manager, user access:

- Allows you to view COM+ applications
- Does not allow you to open TI Manager
- Does not allow you to export a COM+ application.

For TI Designer, user access:

- Allows you to open TI Designer
- Allows you to create and save new type libraries
- Allows you to open and save existing type libraries.

See Also

Transaction Integrator Security

Transaction Integrator Threat Mitigation

Product security is a top priority across Microsoft. Beginning with the Windows Security Push in 2002, Microsoft has invested additional time and resources to developing secure code and detailed instructions for deploying and securing your computing environment. The increased attention to security issues has made Host Integration Server 2004 the most secure version in the history of the product. The Host Integration Server 2004 product team conducted a complete threat modeling analyses to identify and mitigate potential areas of concern. A threat model is a security-based analysis that helps you determine the highest-level security risks posed to a product or application and how attacks can manifest themselves.

Although Microsoft has mitigated all possible internal security threats to Host Integration Server 2004 , there are steps you should take to mitigate threats from elsewhere in your network environment. Threat modeling helps you evaluate the threats to the applications you are writing or running, and thereby reduce the overall risk to your computer system. For more information on threat model analysis, see Chapter 4 “Threat Modeling” in Michael Howard and David LeBlanc, *Writing Secure Code 2nd Edition*, Redmond, WA: Microsoft Press. 2003.

Howard and LeBlanc summarize six categories of possible security threats to your computing environment:

- **Spoofing identity**. Spoofing threats allow an attacker to pose as another user or allow a rogue server to pose as a valid server. An example of user identity spoofing is illegally accessing and then using another user’s authentication information, such as username and password.
- **Tampering with data**. Data tampering involves malicious modification of data. Examples include unauthorized changes made to persistent data, such as that held in a database, and the alteration of data as it flows between two computers over an open network, such as the Internet.
- **Repudiation**. Repudiation threats are associated with users who deny performing an action without other parties having any way to prove otherwise—for example, a user performing an illegal operation in a system that lacks the ability to trace the prohibited operations.
- **Information disclosure**. Information disclosure threats involve the exposure of information to individuals who are not supposed to have access to it—for example, a user’s ability to read a file that she was not granted access to and an intruder’s ability to read data in transit between two computers.
- **Denial of service**. Denial of service (DoS) attacks deny service to valid users— for example, by making a Web server temporarily unavailable or unusable. You must protect against certain types of DoS threats simply to improve system availability and reliability.
- **Elevation of privileges**. In this type of threat, an unprivileged user gains privileged access and thereby has sufficient access to compromise or destroy the entire system. Elevation of privilege threats include those situations in which an attacker has effectively penetrated all system defenses and become part of the trusted system itself, a dangerous situation indeed.

Howard and LeBlanc also point out that some threat types can interrelate. For example, it is possible for information disclosure threats to lead to spoofing threats if the user’s credentials are not secured. Similarly, elevation of privilege threats are by far the worst because if someone can become an administrator or root on the target computer, every other threat category becomes a reality. Conversely, spoofing threats might lead to a situation where escalation is no longer needed for an attacker to achieve his goal.

To mitigate threats that originate outside Transaction Integrator but which can negatively affect TI components and your application, Microsoft recommends that you:

- Protect the MSHIS60_HIP Database and SQL Server Stored Procedures
- Protect the TI DCGen COM+ Application and TCP/IP Listeners
- Protect the COM+ and .NET Servers
- Protect the Raw User Data
- Protect the HIP Listener
- Protect the Local File System, Database, and Registry
- Protect the Client Proxy
- Protect the Remoting Session
- Protect TI from Unauthorized Mainframe or AS/400 Access
- Protect the TI Runtime Environment
- Protect Mainframe Security Credentials from Being Overridden
- Protect the TI Runtime and Host Environments from Data Overflows

Protect the MSHIS60_HIP Database and SQL Server Stored Procedures

To prevent an attacker from spoofing their identity or tampering with the data or stored procedures in the HIP database, you should:

- Run the HIP Service in a valid Windows privileged account and use Windows integrated security to access the HIP SQL Server database.
- Allow only privileged accounts access to the HIP SQL Server database.
- Use a local SQL Server database and do not allow remote access.
- Use only Windows integrated security and restrict access to only privileged Windows accounts.

You can also help mitigate this threat with the following deployment scenarios:

- Service-based Security
- Host-initiated single sign-on (SSO).

You can learn more about this threat by reading about:

- How to secure remote access to SQL Server (for example, integrated Windows security).

See Also

Database Configurations Page

Windows Service Configurations Screen

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Protect the TI DCGen COM+ Application and TCP/IP Listeners

To prevent an attacker from spoofing their identity, tampering with the data on the host, elevating their privileges, or denying service, you should:

- Use ASP.NET Admin to set the level of user or role-based security for Application Directory
- Tighten COM+ Application Security on the TI DCGen package
- Use TI Manager to set the security level for a remote environment
- Move the TI Designer-generated .dll to the remoting client computer.

You can also help mitigate this threat with the following deployment scenario:

- ASP.NET web client

You can learn more about this threat by reading about:

- ASP.NET application and IIS security
- Multiple levels of authorized users.

See Also

New Security Policy Wizard

Protect the COM+ and .NET Servers

To prevent an attacker from spoofing their identity, tampering with the data on the host, elevating their privileges, accessing restricted data, or denying service, you should:

- Use bounded recordsets
- Use static IP addresses on the host
- Run server components in-process with a HIP Service account.

You can also help mitigate this threat with the following deployment scenario:

- Send properly-formatted messages (for example, ELM, TRM, DPL, SNA, IP)
- Service-based security

See Also

Bounded Recordsets

Windows Service Configurations Screen

Protect the Raw User Data

To prevent an attacker from reading data packets on the network and either tampering with the data or disclosing the data, or to prevent an attacker from denying service, you should:

- Place the computer running Transaction Integrator (TI) and the host in a secure location.
- Use direct network connections over a private segment
- Use IPSec, where supported, for IP communications between host and Windows servers
- For SNA LU6.2 network connections to mainframe or AS/400 computers, use Host Integration Server 2004 server-to-server data encryption when deploying upstream an Host Integration Server 2004 computer as a SNA gateway to a downstream TI HIP computer
- For SNA LU6.2 network connections to mainframe, use Host Integration Server 2004 IP-DLC Link Service in conjunction with IPSec.

See Also

Configuring an IP-DLC Link Service

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Protect the HIP Listener

To prevent an attacker from spoofing their identity, tampering with the data, or denying service, you should run the HIP services in valid Windows privileged account.

1. Click **Start**, click **Control Panel**, double-click **Administrative Tools**, and then double-click **Services**.
2. In the details pane, right-click **HIPService**, and then click **Properties**.
3. Click **This account**, and then specify a valid Windows privileged account.
4. Type the password for the user account in **Password** and in **Confirm password**, and then click **OK**. If you select the **Network Service** account, the password must be blank.

You can also help mitigate this threat with the following deployment scenario:

- Service-based security

See Also

Services Account Screen

Protect the Local File System, Database, and Registry

To prevent an attacker from spoofing their identity, accessing restricted data, or tampering with the data, you should:

- Place the computer running Transaction Integrator (TI) in a secure location.
- Confirm that the access permissions to TI programs, TI components, and the registry are set correctly.
- Use host-initiated single sign-on (SSO) in conjunction with valid host UID and PWD passed in the initial connection flows. You should not run the COM Server program in context of the default COM+ security context. Using both UID and PWD causes the HIP application to validate both items when calling SSO.
- Not use DCOM to remote calls from HIP Application server to a second Windows Server hosting COM+ server application.
- Use secure network connection (for example, CICS TRM over IPSec-protected TCP/IP network connection).

You can also help mitigate this threat with the following deployment scenarios:

- Service-based security
- Host-initiated SSO

You can learn more about this threat by reading about:

- How to secure remote access to SQL Server (for example, integrated Windows security)
- How to send a valid host user ID
- How to send a valid host password

See Also

Single Sign-On in Transaction Integrator

New Security Policy Wizard

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Protect the Client Proxy

To prevent an attacker from tampering with a properly formatted message (for example, a TRM, DPL, SNA, or IP) sent by the client computer to the TI runtime or to prevent an attacker from sending a malformed message to the TI runtime, you should:

- Move the .NET assembly DLL generated by TI Designer to the remote client computer.

You can learn more about this threat by reading about:

- .NET remoting
- ASP .NET web clients.

See Also

Transaction Integrator Threat Mitigation

Protect the Remoting Session

To prevent an attacker from tampering with the remote session or denying service, you should:

- Use HTTPS between the remoting client and the server
- Use separate ASP.NET application contexts for various levels of privileged users, thereby preventing lower-privileged users from affecting sessions belonging to higher-privileged users.

You can also help mitigate this threat with the following deployment scenarios:

- ASP.NET web client.

You can learn more about this threat by reading about:

- Multiple levels of authorized users
- ASP.NET application and IIS security
- Properly-formatted TRM, DPL, SNA, IP, and other messages
- Valid host user ID and password
- Valid Windows user ID for single sign-on (SSO).

See Also

Transaction Integrator Threat Mitigation

Protect TI from Unauthorized Mainframe or AS/400 Access

To prevent an attacker from using the mainframe or AS/400 connection to access the server running Transaction Integrator, you should:

- Utilize direct network connections over private segment.
- Use IPSec, where supported, for IP communications between the host and Windows servers.
- For SNA LU6.2 network connections to mainframe or AS/400 computers, use Host Integration Server 2004 server-to-server data encryption when deploying upstream Host Integration Server 2004 computer as SNA gateway to downstream TI HIP computer.
- For SNA LU6.2 network connections to mainframe, use Host Integration Server 2004 IP-DLC Link Service in conjunction with IPSec.

See Also

Introduction to the IP-DLC Link Service

Secure Deployment of the IP-DLC Link Service

Protect the TI Runtime Environment

To prevent an attacker from instantiating multiple Transaction Integrator (TI) components to launch a denial of service attack on the TI runtime environment, you should:

- Store all TI component type libraries and .NET assemblies in a secure directory.
- Confirm that the access permissions on all type libraries and .NET assemblies are set correctly.
- Confirm that the access permissions on the directory where the type libraries and .NET assemblies are stored are set correctly.

See Also

Transaction Integrator Threat Mitigation

Protect Mainframe Security Credentials from Being Overridden

To prevent an attacker from gaining control over security credentials used to access a mainframe host, you should:

- Use host-initiated single sign-on (SSO) in conjunction with valid host UID and PWD passed in the initial connection flows.
- Set the ClientContext to not allow security credentials to be overridden when using the **SelectionHint** property.

See Also

Use REOverride to Specify RE Programmatically

Protect the TI Runtime and Host Environments from Data Overflows

To prevent an attacker from using inbound, unbounded recordsets to launch a denial of service attack on either the Transaction Integrator (TI) runtime or host environment, you should:

- Store all TI component type libraries and .NET assemblies in a secure directory.
- Confirm that the access permissions on all type libraries and .NET assemblies are set correctly.
- Confirm that the access permissions on the directory where the type libraries and .NET assemblies are stored are set correctly.

See Also

Unbounded Recordsets

Deploying Host Integration Server 2004

This section describes the concepts and considerations necessary for successfully deploying Host Integration Server 2004.

This section contains:

- Deployment Overview
- Connecting Servers
- Understanding Connectivity

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Deployment Overview

This section provides an overview of the SNA Open Gateway Architecture (SOGA) as it applies to Microsoft® Host Integration Server 2004. It outlines the deployment models for Host Integration Server 2004.

This section contains:

- SNA Open Gateway Architecture
- Deploying Host Integration Server 2004

See Also

- IP-DLC Link Service

SNA Open Gateway Architecture

Organizations with IBM mainframe or AS/400 computers are now consolidating their SNA-only and non-SNA networks into single TCP/IP-based wide area networks (WANs). In the past, two parallel networking systems have been deployed in most organizations: the traditional SNA network used to connect computers and hardware controllers with IBM mainframes and AS/400 computers, and local area networks (LANs) used primarily to access files and client/server applications running on local server computers.

Many organizations are seeking a single WAN solution that provides access to all desktops, servers, and host systems across a single networking protocol. At the same time, TCP/IP is emerging as the protocol of choice because of its versatility, openness, and ability to support Internet and intranet connections.

Many organizations cannot integrate their networks because of the need to ensure reliable and secure access to their existing IBM host systems—on which most organizations base their mission-critical daily operations.

SNA Open Gateway Architecture (SOGA) satisfies the requirement for reliable and secure host connectivity in the context of an integrated WAN. SOGA is a scalable framework for SNA enterprise connectivity, offering multiple options for integrating branch offices by means of routed inter-networks with IBM mainframe and AS/400 computers. This framework encompasses components from leading channel attachment and inter-networking vendors while deploying Host Integration Server 2004 computers in both traditional and innovative ways.

SOGA supports industry standards for SNA host access and presents flexible options for integrating host data across open WANs, such as those composed of Data Link Switching (DLSw), Frame Relay (RFC 1490), and Asynchronous Transfer Mode (ATM). Request for Comment (RFC) 1490 specifies methods of encapsulating TCP/IP and SNA within Frame Relay. The SOGA blueprint consists of three core elements:

- Flexible SNA gateway deployment models
- High-performance SNA gateway configurations
- Efficient wide area network utilization

See Also

Deploying Host Integration Server 2004

Deploying Host Integration Server 2004

Whether your enterprise consists of a single office or many branches spread throughout the world, SNA Open Gateway Architecture (SOGA) offers three flexible deployment models to implement Host Integration Server 2004 in your environment.

When planning your deployment strategy, ask the following questions:

- With what type of host systems do I need to connect?
- What kind of performance and host availability do my users expect?
- What kind of networking infrastructure is in place?

By answering these questions and using the information provided in this section, you can determine the best deployment strategy for your enterprise.

See Also

SNA Open Gateway Architecture

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Connecting Servers

This section contains:

- About Connection Methods
- Choosing Server-to-Host Connections
- Choosing Network Protocols for Host Integration Server 2004
- Installing Host Integration Server 2004 Clients

After you have determined a suitable deployment model and subdomain configuration, you must choose how to connect Host Integration Server 2004 computers to the host system, to client workstations, and to other Host Integration Server 2004 computers.

This section explores how to choose:

- Connections between Host Integration Server 2004 computers and the host
- Network protocols for Host Integration Server 2004 computers and clients

To understand the connectivity options, you should first examine the different physical connections and network protocols that Host Integration Server 2004 supports.

See Also

- IP-DLC Link Service

About Connection Methods

This section contains:

- IP-DLC Link Service
- 802.2 Data Link Control (DLC)
- Synchronous Data Link Control (SDLC)
- Channel

Host Integration Server 2004 supports many different connection methods. However, not all may be available in your environment. When you choose a connection method, you should keep in mind:

- Deployment model you are implementing
- Host networking infrastructure that is in place
- Host systems to which you are connecting
- Expected usage level of host resources
- Level of performance and response expected by your users

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802.2 Data Link Control (DLC)

Token Ring, Ethernet, and Fiber Distributed Data Interconnect (FDDI) connections use the IEEE 802.2 DLC protocol to connect to the host. In a mainframe environment, Host Integration Server 2004 usually connects to a front-end processor (FEP) or a communications controller, such as an IBM 3174. Occasionally, you can establish a connection to an adapter within a mainframe. With an AS/400 system, the connection goes directly to a network adapter in the AS/400 computer.

Token Ring connections are typically limited to 4 or 16 megabits per second (Mbps). Token Ring solutions are still found in some mainframe environments. In many scenarios, a Token Ring connection provides good performance at a reasonable cost in equipment.

Ethernet is a common connection type for local area networks (LANs) with workstations or computers. This connection type is also common in peer-type networks.

FDDI connections use fiber cabling to achieve connections reaching 100 Mbps or greater. The FDDI line communicates through an FEP that is channel-attached to the mainframe. This may limit the overall speed of communications. In many cases, this type of connection can provide a reasonably cost-effective solution if you require higher throughput and a channel solution is not possible.

DLC connections are well suited for the centralized and distributed deployment models, because both strategies implement Host Integration Server 2004 computers close to the host. You can also deploy data link control (DLC) in a branch model using routers or bridges that can route traffic between the branch offices and the central host system.

Host Integration Server 2004 supports DLC connections over any network adapter supported by Windows using the Windows-based DLC network transport driver.

See Also

About Connection Methods

Synchronous Data Link Control (SDLC)

Channel

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Synchronous Data Link Control (SDLC)

SDLC connections use a standard phone line (leased, public, point-to-point, or multidrop). An SDLC adapter within the Host Integration Server 2004 computer connects to a modem that uses the phone line to establish a connection with the host system. In a mainframe system, the SDLC connection uses a front end processor (FEP), a communications controller, or an integrated SDLC adapter. In an AS/400 system, the connection goes directly into the AS/400 computer.

SDLC throughput is limited by the medium used for the connection and the capabilities of the SDLC adapter in the Host Integration Server 2004 computer. The cost to implement SDLC grows significantly as faster line types are used. In general, SDLC connections are much slower than 802.2 connections. The following table lists the common line types and their speeds:

Line type	**Typical speed**
Analog (conventional phone line)	9600 to 19200 bits per second (BPS)
Digital Data System (DDS)	56 to 64 kilobits per second (Kbps)
Integrated Services Digital Network (ISDN)	56 to 128 Kbps
T1 carrier system	1.544 megabits per second (Mbps)
T3 carrier system	2.048 Mbps

SDLC connections are useful for wide-area connections between geographically disparate locations or when bandwidth and usage requirements are low. Because of these factors, SDLC is ideally suited for branch-type deployment strategies.

Host Integration Server 2004 supports SDLC connections using the link support included with Host Integration Server 2004 or through an SDLC link service available through various third-party vendors. Not all supported SDLC adapters support all link speeds listed in the previous table.

See Also

About Connection Methods

802.2 Data Link Control (DLC)

Channel

Channel

Channel connections provide direct channel attachment to a mainframe. There are two types of channel connections: older Bus & Tag channel connections, which can reach speeds of up to 4.5 megabytes per second (MBps), and newer ESCON connections, which can reach speeds approaching 17 MBps. Support for channel connections is limited to adapters supported natively through Host Integration Server 2004.

Enterprise System Connection (ESCON) channel attachments use standard fiber cable and increase throughput significantly.

ESCON is an ideal connection method in centralized or distributed deployments where high performance and responsiveness are required.

The following table summarizes all common connection methods that can be used with Host Integration Server 2004.

Method	Throughput	Characteristics
Token Ring	4 or 16 MBps	Midrange performance using data link control (DLC) protocol Supports multiple host connections using a single adapter Uncomplicated and inexpensive to implement Suitable for a wide range of purposes
Ethernet	10 GBps	Midrange performance using DLC protocol Supports multiple host connections using a single adapter Uncomplicated and inexpensive to implement Suitable for light to medium network traffic conditions
FDDI	100 MBps	High performance using DLC protocol Supports multiple host connections using a single adapter Relatively expensive to implement Suitable for higher-performance connections
SDLC	9600–19200 bits per second (BPS)	Low performance using SDLC protocol Supports 256 sessions over a single host connection Uncomplicated and inexpensive to implement Suitable for low-traffic WAN connections
Channel: Bus & Tag	4.5 MBps	High performance Supports a high number of host connections. More expensive Suitable for high-performance connections
Channel: ESCON	17 MBps	Highest performance Supports a high number of host connections More expensive Suitable for conditions where maximum throughput is required

See Also

About Connection Methods

802.2 Data Link Control (DLC)

Synchronous Data Link Control (SDLC)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to

http://go.microsoft.com/fwlink/?linkid=29507.

Choosing Server-to-Host Connections

This section contains:

- Mainframe Connection Summary
- AS/400 Connection Summary

In Host Integration Server 2004 terms, a host connection is the data communications path between Host Integration Server 2004 and a host system. For a mainframe, the connection corresponds to a physical unit (PU) definition in Virtual Telecommunications Access Method (VTAM). On the AS/400 computer, the connection corresponds to an Advanced Program-to-Program Communications (APPC) controller definition.

For each physical adapter or connection, you install and configure an appropriate link service within Host Integration Server 2004. A link service is a Windows-based service or device driver that is used to control server-to-host communication adapters supported by Host Integration Server 2004. Once configured, the link service is available for use not only on the configured Host Integration Server 2004 computer, but also on any server in the subdomain using the Distributed Link Service (DLC) feature. See Distributed Link Service for more information.

After you configure the link services, you can configure the connections. Using a host connection, a client computer on a LAN can communicate with the mainframe system. For some link services, it is possible to define multiple connections over a single host link.

In SNA terms, a physical unit (PU) is the combination of a physical connection and the link service it uses. In an SNA network, Host Integration Server 2004 provides PU 2 or PU 2.1 functionality similar to that of an IBM cluster controller.

Several factors should be taken into account when determining a physical connection method to your mainframe:

- Performance requirements
- Expected server loads
- Existing network infrastructure
- Chosen Host Integration Server 2004 deployment model
- Cost

You should plan for enough future capacity to support additional connections to your host system. Ethernet connections are the best choice for an all-purpose connection to a host.

For some link services, multiple host connections are possible using a single adapter, most notably the IP-DLC link service. Host Integration Server 2004 supports up to 250 host connections per server. Up to four instances of Host Integration Server 2004 are supported on a single computer.

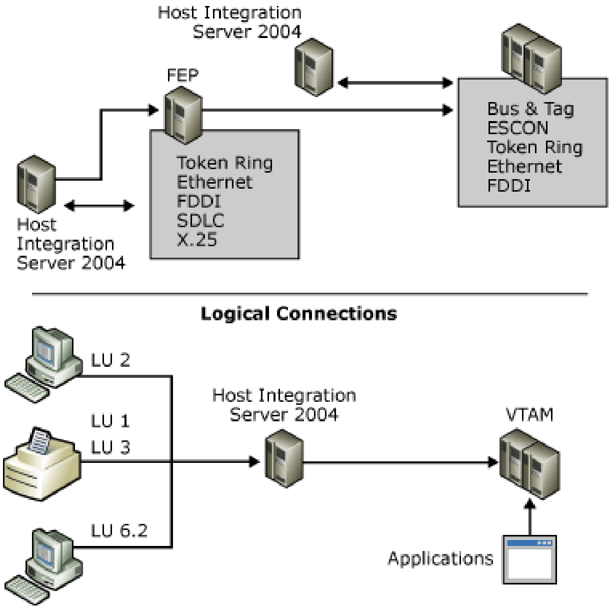
See Also

- IP-DLC Link Service
- Network Integration

Mainframe Connection Summary

The hierarchical SNA network model provides access to a centralized processing resource from elements on the network. This model is most frequently associated with mainframe environments in which centralized applications are accessed from remote terminals across a network.

Devices in a hierarchical SNA network, such as terminals or cluster controllers, are called physical units (PUs). A number designates each class of device. For example, the mainframe is known as a PU 5 device.


Host Integration Server 2004
FEP
Token Ring
Ethernet
FDDI
SDLC
X.25
Bus & Tag
ESCON
Token Ring
Ethernet
FDDI
Host Integration Server 2004
Logical Connections
LU 2
LU 1
LU 3
LU 6.2
Host Integration Server 2004
VTAM
Applications

Host Integration Server 2004 can directly connect to the mainframe if a high-performance connection is required. These physical connection methods are available:

- Open Systems Adapter, supporting Token Ring, Ethernet, and Fiber Distributed Data Interconnect (FDDI) connections
- Bus & Tag channel connection
- Enterprise System Connection (ESCON) channel connection

Connections to a front-end processor (FEP), which is a PU 4 device, are also supported. These types of connections may be easier to implement depending on your existing infrastructure and the physical proximity of the Host Integration Server 2004 to the mainframe. For an FEP, you can use one of the following connection methods:

- Token Ring
- Ethernet
- FDDI
- SDLC

In a hierarchical SNA network, Host Integration Server 2004 emulates a cluster controller and supports all standard protocols:

- LU 2, for 3270 terminal sessions
- LU 1 or 3, for SCS or 3270 printer sessions
- LU 6.2, for Advanced Program-to-Program Communications (APPC) and Common Programming Interface for Communications (CPI-C) applications
- LU 0, 1, 2, or 3, for logical unit application (LUA) RUI/RI general-purpose, customized applications

Any combination of these protocols can be used over a given physical connection.

See Also

Choosing Server-to-Host Connections

AS/400 Connection Summary

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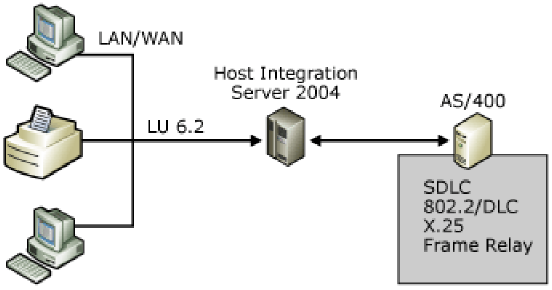
AS/400 Connection Summary

In the peer-oriented SNA network model, all computers on the network can communicate directly with each other. Advanced Peer-to-Peer Networking (APPN) is the architecture developed by IBM that enables distributed data processing. APPN defines how components communicate with each other, and the level of network-related services, like routing sessions, that are supplied by each computer in the network.



In an APPN network, Host Integration Server 2004 emulates a type 2.1 physical unit device (PU 2.1). Host Integration Server 2004 computers can connect to an AS/400 computer using several connection methods:

- Token Ring
- Ethernet
- FDDI
- SDLC

Frame relay or bridging solutions can also be implemented to transport SNA traffic over wide area network (WAN) connections in branch-based deployment models. Host Integration Server 2004 operates as an APPN low-entry networking (LEN) node and communicates with other APPN nodes using the Advanced Program-to-Program Communications (APPC) or LU 6.2 protocol.

See Also

Choosing Server-to-Host Connections

Mainframe Connection Summary

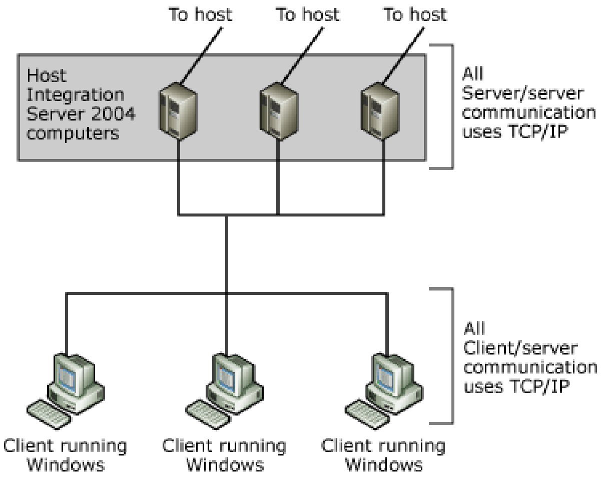
Choosing Network Protocols for Host Integration Server 2004

This section contains:

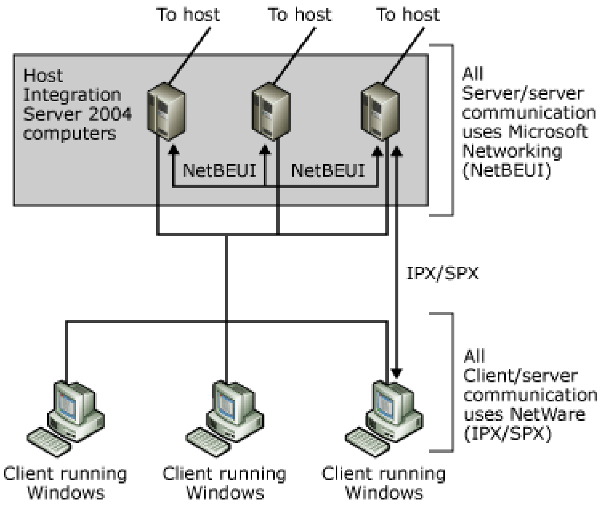
- Choosing Client/Server Network Protocols
- Choosing Server/Server Network Protocols

After you determine the server-to-host connection, you must choose the protocols to use for two additional Host Integration Server 2004 communication paths: client/server communication and server/server communication. You can use one protocol for both, or you can use a combination of different protocols, if all servers share at least one client/server protocol and use it for server/server communication.

Deploying a single protocol across your wide area network (WAN) is the easiest way to manage your communications. The following figure shows a network in which TCP/IP is used for all types of communication involving Host Integration Server 2004 computers and clients.


To host
To host
To host
Host Integration Server 2004 computers
All Server/server communication uses TCP/IP
All Client/server communication uses TCP/IP
Client running Windows
Client running Windows
Client running Windows

You may decide to gradually implement Host Integration Server 2004 throughout your enterprise, in which case you may need to use existing protocols for certain connections. The following figure shows a local area network (LAN) in which two protocols are used. For server/server communication, Microsoft Networking (Named Pipes) is used. For client/server communication, IPX/SPX is used.


To host
To host
To host
Host Integration Server 2004 computers
NetBEUI
NetBEUI
All Server/server communication uses Microsoft Networking (NetBEUI)
IPX/SPX
All Client/server communication uses NetWare (IPX/SPX)
Client running Windows
Client running Windows
Client running Windows

Similarly, other combinations of protocols can be used, if all the Host Integration Server 2004 computers share one protocol and use that protocol for server/server and client/server communication.

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Choosing Client/Server Network Protocols

Host Integration Server 2004 client computers can communicate through a number of different local area APIs or network transports: Microsoft Networking (Named Pipes), IPX/SPX (sockets), or TCP/IP (sockets). The network software and the Host Integration Server 2004 software must be installed correctly on both clients and servers for them to handle different protocols correctly. Correct installation ensures two essential aspects of communication:

- Host Integration Server 2004 computers and client computers are visible to each other on the LAN. This results when the network software is installed correctly on all affected computers.
- Host Integration Server 2004 computers communicate with clients over the correct LAN protocol. Clients direct their communication to the correct subdomain name or (for some clients using Microsoft Networking (Named Pipes) or TCP/IP) to one or more correct server names.

TCP/IP is the standard network protocol for client/server applications. Its high performance and routing ability make it suitable for many wide area network (WAN) environments. In many cases, TCP/IP will be the best protocol choice for your network, especially if TCP/IP is already deployed to some degree in the LAN segment on which the Host Integration Server 2004 computers and clients reside.

See Also

Choosing Network Protocols for Host Integration Server 2004

Choosing Server/Server Network Protocols

Installing Host Integration Server 2004 Clients

Choosing Server/Server Network Protocols

Host Integration Server 2004 computers communicate with each other using mailslot messages or directed datagrams over a network. Host Integration Server 2004 allows you to make choices concerning these broadcasts.

You can select among the following protocols for server broadcasts: Microsoft Networking (Named Pipes), Novell NetWare (IPX/SPX), and TCP/IP.

> **Important** You must make sure that at least one protocol is available on all Host Integration Server 2004 computers in the subdomain, and that this protocol is used for server/server communication and client/server communication.
>
> For example, if all Host Integration Server 2004 computers in a subdomain use TCP/IP, but only some use IPX/SPX, the protocol used for server/server communication must be TCP/IP, and all servers must use TCP/IP for client/server communication as well.

Using multiple server/server transport protocols can add significantly to network overhead. This is because every server broadcast must be sent out through all protocols selected in the Host Integration Server 2004 management console.

For highest efficiency, select only one protocol for broadcasts between Host Integration Server 2004 computers. Remember that the protocol must be available on all Host Integration Server 2004 computers in the subdomain. Where multiple choices are available (multiple protocols are bound to the network adapters on all Host Integration Server 2004 computers), select a protocol other than Microsoft Networking (Named Pipes). This is recommended because of design requirements for mailslot broadcasts. When these broadcasts are sent over Microsoft Networking (Named Pipes), there is the local system cannot determine which protocol the receiving system will be using, so the broadcast is sent over all protocols bound to the local adapter. This causes multiple mailslot broadcasts by means of Microsoft Networking (Named Pipes) for adapters to which several protocols are bound. The multiple broadcasts cause an increase in network traffic.

In subdomains in which all Host Integration Server 2004 adapters can use multiple protocols, selecting one (and only one) of the following protocols is recommended: IPX/SPX or TCP/IP. You may be able to select extra protocols that do not exist in your network. However, selecting these has no effect.

The Host Integration Server 2004 management console also allows you to specify a parameter called Mean Time Between Server Broadcasts. For optimum efficiency, you should specify a value greater than or equal to 60 seconds (the default). The smaller this value, the less the efficiency, but the more likely the broadcasts will compensate for lost messages. It is recommended that you choose a value of 120 seconds or greater initially. If you encounter an increased number of lost messages, this value should be reduced until a low number of messages are lost.

See Also

Choosing Network Protocols for Host Integration Server 2004

Choosing Client/Server Network Protocols

Installing Host Integration Server 2004 Clients

Installing Host Integration Server 2004 Clients

Host Integration Server 2004 client software allows client workstations to communicate with Host Integration Server 2004 computers to access host resources. Client software is installed on each workstation using applications that communicate using any Host Integration Server 2004 programmatic interfaces. Client software is available for the following platforms:

- Microsoft® Windows Server™ 2003
- Windows® 2000 Server

The fastest Host Integration Server 2004 client/server network interface is TCP/IP, although you can use other local area network (LAN) protocols such as Microsoft Networking (Named Pipes) if your LAN supports them. If you select TCP/IP or Microsoft Network, the remote installation option is recommended. Selecting "local" requires the client workstation to be on the same TCP/IP subnet as the Host Integration Server 2004 computer, which is uncommon in routed IP networks.

> **Note** Host Integration Server 2004 client software is not required to use services such as TN3270 and TN5250. Applications, such a TN3270 emulator, communicate directly with these services using TCP/IP and do not use the Host Integration Server 2004 client/server interface.

See Also

Choosing Network Protocols for Host Integration Server 2004

Choosing Server/Server Network Protocols

Choosing Client/Server Network Protocols

Understanding Connectivity

After you have completed Host Integration Server 2004 installation, you are ready to configure your installation. This section provides the concepts and procedures for configuring Host Integration Server 2004.

This section contains:

- Host Integration Server 2004 3270 Connectivity
- Host Integration Server 2004 5250 (AS/400) Connectivity
- Independent APPC LUs
- Dependent APPC LUs
- APPC Mode Definition
- CPI-C Access
- Transaction Programs
- APPC Security
- Optimizing Communications
- APPC Mode
- Notes Section

See Also

- IP-DLC Link Service

Host Integration Server 2004 3270 Connectivity

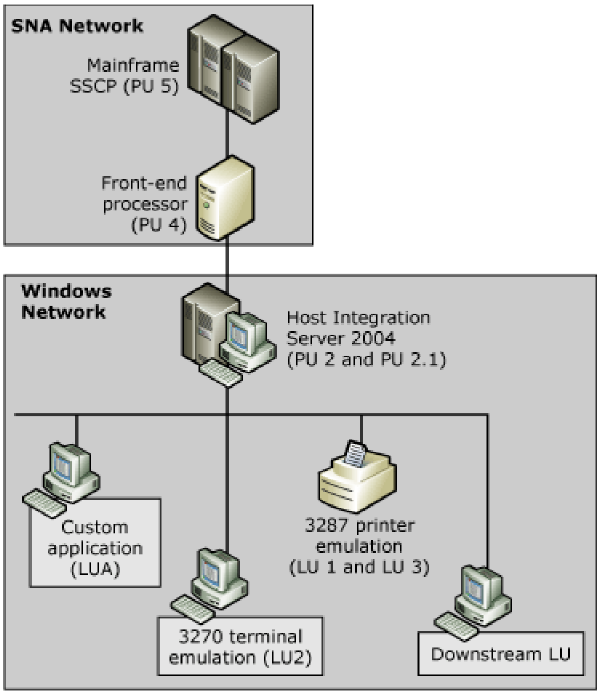
In the hierarchical SNA network model most frequently associated with a mainframe computer, you access centralized applications from remote terminals across a network. This network model uses the information display protocol for IBM mainframe computers known as 3270. This protocol facilitates conversations between the mainframe and devices such as terminals, printers, and controllers. Through the definition and assignment of 3270 logical units (LUs), Host Integration Server 2004 provides access to mainframe resources.

A 3270 LU is known as a dependent LU because it requires a mainframe to function. Each 3270 LU defined within Host Integration Server 2004 is configured to use an existing connection to the mainframe system. Each 3270 LU corresponds to a matching LU resource allocated on the host computer, usually specified within Virtual Telecommunications Access Method (VTAM). The 3270 LU definition in Host Integration Server 2004 is identified by a number that matches the number of the corresponding LU resource on the mainframe, and by a user specified name.

The 3270 LU is further classified by the type of service provided over the connection. Like physical units (PUs), numbers designate LU types. For example, 3270 display data streams are known as LU 2 streams. Within Host Integration Server 2004, a 3270 LU can be configured as one of the following types:

- Display (LU 2)
- Printer (LU 1 or LU 3)
- Application (LUA)
- Downstream

After the LUs are configured, they are accessed from client computers and applications using Host Integration Server 2004 client software that is installed on the client workstation. The client software manages communications between a 3270 application (like a terminal emulator) and the Host Integration Server 2004 computer. Applications designed for the Host Integration Server 2004 client API use the LUs defined within Host Integration Server 2004 to establish a communications link from the client workstation to the mainframe by means of Host Integration Server 2004.


SNA Network
Mainframe SSCP (PU 5)
Front-end processor (PU 4)
Windows Network
Host Integration Server 2004 (PU 2 and PU 2.1)
Custom application (LUA)
3287 printer emulation (LU 1 and LU 3)
3270 terminal emulation (LU2)
Downstream LU

The link between the LU definition in Host Integration Server 2004 and the host LU resource is called a session. Sessions can be permanent and automatically started during initialization, or established on an as-needed basis. Concurrent sessions can share the same physical devices and communications links.

A 3270 user communicating with a host uses a 3270 LU. The 3270 LU has a specific name (recognized by the host), is associated with a specific connection, and supports a specific use (either printing, or terminal emulation of a particular size). A collection of 3270 LUs that will be used by a group of users can be placed in an LU pool, so that whenever a user needs an LU, the next one in the pool will be made available. The connection, the 3270 LU, the 3270 LU pool, and the list of users (or groups) are the basic elements to configure when supporting 3270 users in a Host Integration Server 2004 installation.

See Also

LUA Access

Precedence of Accounts in Determining LU Access

Downstream Connections

LUA Access

Logical unit application (LUA) is an application programming interface (API) that allows you to write customized applications to communicate with the host. LUA LUs enable programmable control over the SNA messages that are sent between the communications software and the host. LUA LUs can be used to communicate with LU types 0, 1, 2, or 3 at the host as long as the application sends the appropriate SNA messages required by the host.

An LUA application uses a local LU, which uses Host Integration Server 2004 to communicate with the host system. When Host Integration Server 2004 connects to the host, there are three progressive sessions:

1. The PU-SSCP between the Host Integration Server 2004 physical unit (PU) and the system services control point (SSCP) on the host.
2. The SSCP-LU session between the LUA LU at the computer running the application and the SSCP.
3. The LU-LU session between the LUA LU at the computer running the application and the host LU.

The LU session's normal flow carries most of the data. The other flows are used only for control purposes.

The Host Integration Server 2004 configuration file contains information that is required for LUA applications to communicate. An LUA LU is configured to use a connection to the host by the link service that is installed. It is then given the LU number that matches that of an LU on the host.

The configuration may include LUA LU pools. A pool is a group of LUs with similar characteristics, and it allows an application to use any free LU from the pool. This feature can be used for allocating LUs on a first-come, first-served basis when there are more applications than LUs available, or for providing a choice of LUs on different connections, as well as providing hot backup and load balancing. For more information see Providing Hot Backup and Load Balancing.

The communications components to be configured include:

- A link service for communicating with the host.
- A connection to the host that uses the link service.
- A Host Integration Server 2004 service which owns the connection. This component is configured automatically.
- An LUA LU on a Host Integration Server 2004 service, configured to use the connections, with an LU number that matches an LU on the host.

You can perform the following actions with LUA LUs:

- Assign an LUA LU, or a range of LUA LUs, to a connection. A range of LUA LUs will allow multiple applications to use LUAs simultaneously. Configure the numbering for a new range of LUA LUs by specifying the lowest LU number and the number of LUs in the range.

  After creating a range of LUs, you can change the numbering of individual LUs in the range.

- Configure properties for a new LUA LU or a new range of LUA LUs. This includes specifying the LU name and LU number for the LUs.
- Group LUA LUs into one or more LUA LU pools. An LUA LU pool contains a number of LUs that are made available as a group to LUA applications. A given application can get LU access as long as one of the pooled LUs is available.
- View or modify an existing LUA LU, regardless of whether it was created as part of a range.
- Copy properties from one LU to another.
- Move an LU from one connection to another.
- Delete an LU.
- Move an LUA LU from one connection to another.

Check with the host administrator to determine the appropriate names and numbers for LUA LUs on your system. The LU Number for LUs on 802.2 or Synchronous Data Link Control (SDLC) connections should match the LOCADDR= parameter of the LU definition in VTAM or in the NCP Gen.

If the number you specify has already been assigned to an LU or an APPC LU-LU pair on the current connection, you must use a different number. The range for LU numbers is from 1 through 254.

The LU Name cannot be the same as any other LU name or pool name (except for APPC LU names) on the server.

If the High Priority LU is assigned to a pool, the priority setting of the pool overwrites the setting of the LU.

On an 802.2 or SDLC connection, you can configure multiple LUs at one time by configuring them as a consecutively numbered range. Multiple LUA LUs will allow multiple applications to access the host simultaneously. After configuring the range of LUs, you can modify the numbering and properties of individual LUs in the range.

See Also

Precedence of Accounts in Determining LU Access

Downstream Connections

Precedence of Accounts in Determining LU Access

When user and group account memberships overlap, the highest-priority account that contains a 3270 LU or pool determines the access the user gets. Accounts are prioritized as follows:

1. User accounts (highest priority)
2. Subdomain groups
3. Local groups
4. Well-known groups such as Everyone (lowest priority)

For example, if a 3270 LU called LU 1 is assigned to a user account (a high-priority account) called JOHND, and at the same time an LU called LU 2 is assigned to a local group (a low-priority account) of which JOHND is a member, JOHND will be given access to LU 1, not LU 2.

See Also

LUA Access

Downstream Connections

Downstream Connections

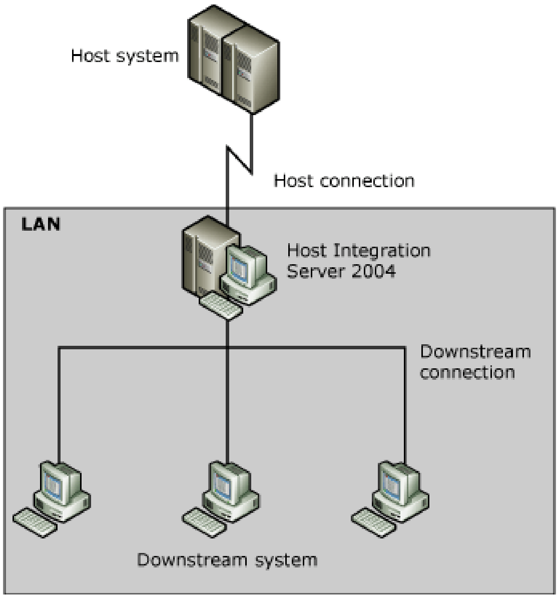
A downstream connection enables a remote computer without a direct connection to the host computer to pass information back and forth using Host Integration Server 2004 as the gateway. To the downstream system, there appears to be a direct connection to the host. Host Integration Server 2004 accomplishes this by passing information back and forth between the downstream system and the host.

Downstream connections and LUs enable Host Integration Server 2004 to support communication between 3270 nodes using SNA protocols. A downstream system is an SNA node (a Host Integration Server 2004 computer or mainframe) that uses Host Integration Server 2004 as a physical unit (PU) gateway. To the downstream system, the Host Integration Server 2004 computer appears to be the 3270 host providing the PUs and LUs. The downstream system may be unable to communicate directly with the 3270 host because of hardware or network incompatibilities that are supported by the intermediate Host Integration Server 2004 computer.

One method of reducing host configuration requirements is to concentrate PUs on the SNA gateway computer and pass the LUs to attached downstream physical units (DSPUs). LUs from one or more PUs can be shared with one or more downstream devices. This allows for more economical use of configured resources and alleviates the need to configure each downstream device in host Virtual Storage Access Method (VSAM).

Communication by means of a downstream connection and downstream LU in Host Integration Server 2004 is always dependent (controlled by a host). Independent communication, including APPC, is not available by means of downstream LUs on Host Integration Server 2004.

The following figure illustrates downstream connections.



The information that Host Integration Server 2004 passes from the downstream system to the host includes LU information. Therefore, Host Integration Server 2004 does not store detailed LU configuration information for downstream LUs. However, Host Integration Server 2004 does require all the usual connection information for the host and downstream connections.

Two connections are needed for a downstream system: a downstream connection (from the downstream system to Host Integration Server 2004) and an upstream connection, which is an ordinary host connection from Host Integration Server 2004 to the host.

You can configure the upstream connection as you would any other connection to the host. After that, you can configure the downstream connections. These must be 802.2 or SDLC.

See Also

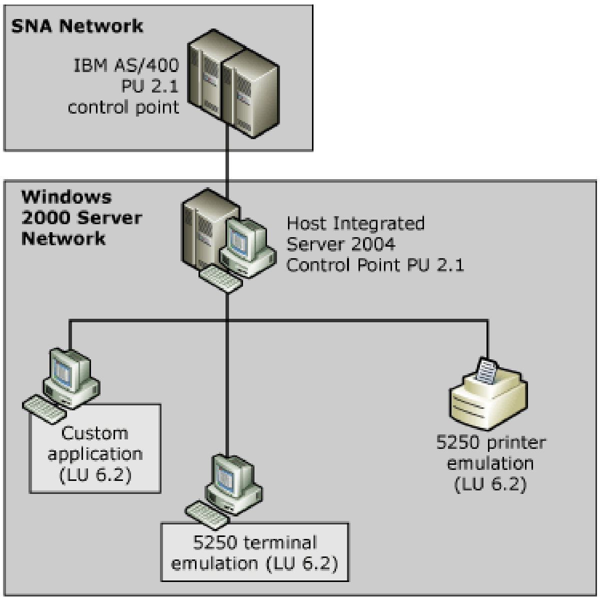
LUA Access

Precedence of Accounts in Determining LU Access

Host Integration Server 2004 5250 (AS/400) Connectivity

In the peer-oriented SNA network model, all computers on the network can communicate directly with each other. Advanced Peer-to-Peer Networking (APPN) enables distributed data processing, defines how components communicate with each other, and determines the level of network-related services that are supplied by each computer in the network. Although peer-oriented SNA networks are usually associated with an AS/400 host system, mainframe systems can also support peer-to-peer networking.

IBM AS/400 computers use the 52xx series of devices. In particular, 5250 describes the terminal display data stream. The Advanced Program-to-Program Communications (APPC) protocol is used to support 5250 terminals and other APPN network computers, devices, and programs to communicate with each other. Each device in an APPN network is known as a type 2.1 physical unit (PU 2.1). In addition, the APPC protocol defines associated logical units as APPC LUs (also called LU 6.2).


SNA Network
IBM AS/400
PU 2.1
control point
Windows 2000 Server Network
Host Integrated Server 2004 Control Point PU 2.1
Custom application (LU 6.2)
5250 terminal emulation (LU 6.2)
5250 printer emulation (LU 6.2)

In an APPN network, Host Integration Server 2004 computers emulate PU 2.1 devices and can connect to an AS/400 using several connection methods:

- Token Ring
- Ethernet
- Fast Ethernet
- FDDI
- SDLC

Frame relay or bridging solutions can also be implemented to transport SNA traffic over wide area network (WAN) connections in branch-based deployment models.

See Also

APPC

Connecting to an AS/400 Using 5250 Terminals

APPC

Advanced Program-to-Program Communications (APPC), or LU 6.2, provides a transport vehicle for programs on peer systems to communicate with each other over the SNA network. APPC is software that enables high-speed communications between programs on different computers.

APPC is a change from the terminal-to-host connections used in many 3270 systems. APPC moves to a distributed transaction programming environment by providing a common set of SNA protocols that brings compatibility at a program communications level.

APPC serves as translator between application programs and the network. When applications on one computer pass information to the APPC software, APPC translates the information and passes it to a network interface. APPC translates the information back into its original format and passes it to the corresponding partner application. APPC can be used across any of the standard types of connections supported by SNA and is not tied to any particular physical connection.

APPC generally uses a local APPC LU (LU 6.2) and one or more remote APPC LUs. A local APPC LU can be independent or dependent. In full peer-oriented APPN networks, typically implemented in an AS/400 environment or under the most modern evolution of mainframe technology, the independent APPC model applies. Dependent APPC is used in older mainframe networks, and its functions are reduced.

Local and remote APPC LUs work together in pairs. The local APPC LU is assigned to a server (unlike other LU types, which are assigned to connections). The remote APPC LU is assigned to the connection. Host Integration Server 2004 uses dynamic partnering to create any possible LU partnership on demand when local and remote LUs and modes recognize each other.

With dynamic APPC partnering, an administrator configures remote LUs, but does not need to partner them with local LUs. Host Integration Server 2004 will automatically partner the LUs when needed.

With dynamic APPC configuration, an administrator does not need to configure remote LUs. If a connection is designated to support dynamic APPC configuration, Host Integration Server 2004 will automatically define a remote LU and partner it with a local LU when needed.

Independent APPC provides the ability to run multiple, concurrent, parallel sessions between a single pair of LUs. Dependent APPC allows only a single session between a given pair of LUs.

Programs that use APPC are referred to as transaction programs (TPs). There are two types of TPs: those that can invoke a conversation, and those that can be invoked. A TP can provide any type of service: terminal emulation, data transfer, database query or update, and so on.

The characteristics that govern the interactions between TPs using an LU 6.2-LU 6.2 connection are determined by the mode associated with the connection. The mode can be associated in a fixed manner with a given LU, or it can be supplied by the invoking TP when a session is first initiated.

See Also

Host Integration Server 2004 5250 (AS/400) Connectivity

Connecting to an AS/400 Using 5250 Terminals

Connecting to an AS/400 Using 5250 Terminals

Host Integration Server 2004 computers provide access to AS/400 computers by emulating 5250 display terminals. A 5250 user communicating with an AS/400 must use a pair of APPC LUs (LU 6.2). This pair contains a local LU and a remote LU (as viewed by the Host Integration Server 2004 computer). Together, these two LUs (along with the mode that they use) contain the configuration information needed for establishing a session with the AS/400 computer.

A local APPC LU can be either independent or dependent. An independent local APPC LU can communicate directly with a peer system. A dependent APPC LU requires the support of a mainframe. These are described in more detail in later sections.

The 5250 user can share this pair of LUs with many other users at the same time, or the 5250 user can have exclusive possession of the LUs (depending on the Host Integration Server 2004 configuration). In addition, Host Integration Server 2004 computers can be configured so that users can start 5250 emulation sessions without knowing the names of LUs to request. This configuration is accomplished with the use of default LUs that are specified for each 5250 user or for groups of users.

See Also

Host Integration Server 2004 5250 (AS/400) Connectivity

APPC

Using Wizards

Using Wizards

You can configure 5250 terminal emulation using the wizard provided with Host Integration Server 2004. Available under the **Tools** menu, the wizard takes you through each step of configuring AS/400 connection properties, creating remote APPC LUs linked to your AS/400 computer, and, if necessary, creating local APPC LUs.

In addition to wizards, several features of Host Integration Server 2004 can simplify configuration for APPC:

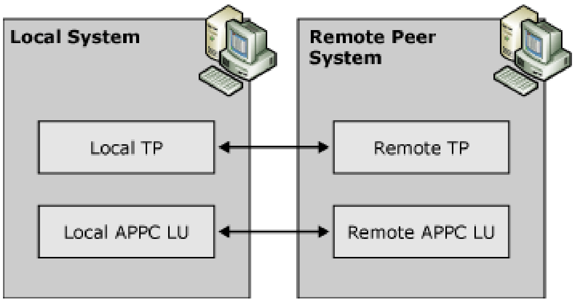
- Implicit Incoming Remote LU and Implicit Incoming Mode, which allow Host Integration Server 2004 to accept requests that arrive by unrecognized remote LUs and modes.
- Default Local APPC LU and the Default Remote APPC LU, which allow LU aliases to be associated with user or group names, simplifying the routing of incoming requests and the configuration of client systems.
- Default Outgoing Local APPC LU Pool, which allows LUs to be allocated dynamically to any invoking TP (transaction program) that does not specify a local LU.
- Single-System APPC, which allows two local APPC LUs residing on the same server to communicate with each other using defined parameters.

Independent APPC LUs

In APPC, an independent LU can communicate directly with a peer system and does not need the support of a host computer.

Independent APPC LUs provide the ability to run multiple, concurrent, parallel sessions between a single pair of LUs. Programs that use independent APPC LUs are referred to as transaction programs (TPs) and may provide any type of service: terminal emulation, data transfer, database query or update, and so on.

The following figure illustrates how an independent local APPC LU can communicate directly with a peer system.



Modes determine the interactions between TPs on an APPC-APPC connection. Modes can be assigned to an LU or supplied when the session is first established. For more information about modes, see APPC Mode Definition later in this section.

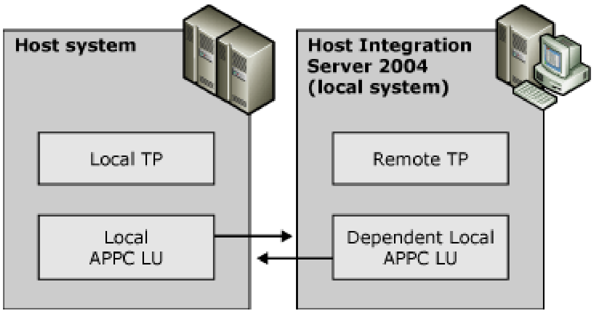
When configuring independent APPC LUs, note the following:

- If the independent local APPC LU communicates with a TP on a mainframe, the host system must be using VTAM version 3, release 2 or later with either NCP version 5, release 2 or later (3745 systems), or NCP version 4, release 3 or later (3725 systems).
- For independent LUs that communicate with a host, the LOCADDR parameter should be set to 0 in VTAM or in the NCP Gen.
- On connections used for independent APPC, the exchange identification (XID) type must be Format 3.
- The Network Name parameter is required. The default is the network name of Host Integration Server 2004.
- An LU Name parameter is required to identify local and remote APPC LUs to other components on the network. In contrast to 3270 LUs, independent APPC LUs do not need an LU number.
- If the remote APPC LU supports parallel sessions, it can only be used with a mode whose parallel session limit has a value greater than 1.

Dependent APPC LUs

A dependent local APPC LU requires the support of a mainframe to communicate with a remote TP. Dependent APPC LUs cannot be used to communicate with an AS/400 computer.

The next figure illustrates how a dependent APPC LU can communicate with the host.



Dependent local LUs have the following characteristics:

- Allow only a single session per LU.
- Use a connection configured with a Remote End of Host, not Peer.
- Only type of APPC LUs that Host Integration Server 2004 supports when communicating with a mainframe using a version of VTAM earlier than version 3, release 2.
- Require the mainframe VTAM to use a value of 1 or greater in the LOCADDR parameter in the NCP Gen.

The Network Name and LU Name are recommended but not required, because they are used only by local software such as the Microsoft® Windows® event log software. The default is the network name specified for the Host Integration Server 2004 computer. If a network name is not specified for the server, the default is APPN.

For a remote APPC LU that will be partnered with a dependent local APPC LU, the LU Name is recommended but not required. It identifies the LU to local software, such as the Windows event log software.

A number identifying the LU on its connection is required and should match the LOCADDR=parameter for the LU definition in VTAM or in the NCP Gen. Check the numbering for any non-APPC LUs on the connection that the remote APPC LU will use because this number must be unique.

The usual range for LU numbers is from 2 through 254.

A dependent APPC LU requires the support of a mainframe. During LU configuration, you need to select a host type of the connection to which the LU will be assigned. Also, the remote LU needs the same name as defined on the remote system services control point (SSCP). This name is required when using dependent APPC.

See Also

Configuring Dependent LUs

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring Dependent LUs

When you configure a dependent LU, make sure you do the following:

- Set up a single session for each dependent LU. (Only one session is allowed for each dependent LU.)
- Specify the remote end, using **Host**.
- Use VTAM 3.2 or later for host-to-APPC LU communication.

Set the host VTAM to a value of 1 or greater in the *LOCADDR*= parameter of the LU definition.

SeeAlso

Dependent APPC LUs

APPC Mode Definition

A mode is associated with an LU-LU pair, and determines the session properties for that pair. One of the key mode properties is the Parallel Session Limit. This limit determines whether an LU-LU pair can perform only one interaction at a time or multiple concurrent interactions.

Parallel sessions are used only with independent APPC. If parallel sessions are to be allowed with an LU-LU pair, the local LU must be independent, and the remote LU in the pair must support parallel sessions.

If the LU-LU pair can have multiple parallel sessions, other mode properties, such as Minimum Contention-Winner Limit, determine to what extent each LU can initiate interactions.

The following table lists the modes provided with Host Integration Server 2004.

Mode name	To be used for
#BATCH	Batch-oriented sessions
#BATCHC	Batch-oriented sessions using compression
#BATCHSC	Batch-oriented sessions that employ a minimal level of routing security
BLANK	Sessions using a default mode name, encoded as eight blank EBCDIC spaces in BIND
#INTER	Interactive sessions
#INTERC	Interactive sessions using compression
#INTERSC	Interactive sessions that employ a minimal level of routing security
QPCSUPP	All sessions with an AS/400 computer
QSERVER	The ODBC drivers

The configuration parameters of the modes provided with Host Integration Server 2004 are shown in the following table.

Configuration parameter	#BATCH #BATCHSC and BLANK	#INTER and #INTERSC	QPCSUPP	QSERVER
Parallel Session Limit	8	8	64	8
Minimum Contention Winner Limit	4	4	32	4
Partner Contention Winner Limit	0	0	0	0
Automatic Activation Limit	0	0	0	0
High Priority Mode	No	Yes	Yes	Yes
Pacing Send Count	3	7	7	7
Pacing Receive Count	3	7	7	7
Max Send RU Size	1024	1024	1024	1024
Max Receive RU Size	1024	1024	1024	1024

The mode name and configuration parameters are used for both dependent and independent APPC LUs.

The Parallel Session Limit defines the number of sessions that can be activated. If the local APPC LU is dependent, specify 1 for the parallel session limit. Dependent local APPC LUs cannot have parallel sessions. Independent local APPC LUs can have from 1 through 1024 parallel sessions. The default is 1.

The Minimum Contention Winner Limit is the guaranteed number of sessions the local machine can initiate. The Partner Contention Winner Limit is the guaranteed number of sessions the remote machine can initiate. Each session can be established without permission from the partner LU. The sum of both must be less than or equal to the Parallel Session Limit. The range for each is from 0 through the Parallel Session Limit; the default is 0.

The Automatic Activation Limit specifies the number of Contention Winner sessions to be activated for the local LU whenever the connection for this mode is started. In a Contention Winner session, the LU can initiate conversations without permission from the partner LU. For a single-system APPC (communication between two local LUs), this field is meaningless. The range is from 0 through the Minimum Contention Winner limit.

High Priority Mode defines the priority of the data sent. This is beneficial for segregating batch data from interactive data. Batch data typically has a lower priority than interactive data.

Pacing Send Count and Pacing Receive Count allow you to specify the maximum number of frames without an SNA pacing response from either the local or remote APPC LU. For example, if you specify 0, the local APPC LU can send an unlimited number of frames without receiving a response. In this case, the remote APPC LU can negotiate and set a limit on the count. The range is from 0 through 63; the default is 4.

The request/response unit (RU) sets the size of the data message that can be sent or received. If an application needs to send a file that is larger than the specified size, it needs to break it up before sending the file. The minimum RU size on Host Integration Server 2004 is 256. The range for Max Send RU Size and Max Receive RU Size is from 256 through 16384; the default is 1024.

To add an APPC mode definition

1. In the SNA Manager tree, click **APPC Modes**.
2. On the **Action** menu, point to **New**, and click **Mode Definition**.
3. On each tab, configure the mode properties.
4. On the **Action** menu, click **Save configuration**.

See Also

Implicit Incoming Remote LU and Implicit Incoming Mode

Default Local APPC LU and the Default Remote APPC LU

Default Outgoing Local APPC LU Pool

Single-System APPC

Implicit Incoming Remote LU and Implicit Incoming Mode

An implicit incoming remote LU is a remote APPC LU that defines the properties to use when Host Integration Server 2004 receives a request to start a session with a local LU and when the remote LU named in the request is not recognized by Host Integration Server 2004.

An implicit incoming mode is a mode that defines the properties to use when Host Integration Server 2004 receives a request to start a session and the mode named in the request is not recognized by Host Integration Server 2004.

An implicit incoming remote LU requires an implicit incoming mode. An implicit incoming mode must be configured for any remote LU that will be used as an implicit incoming remote LU. An implicit incoming mode can be (but does not have to be) configured for remote LUs that will only be used explicitly.

You may want to accept incoming requests that arrive by many different remote LUs without having to explicitly define each remote LU on a Host Integration Server 2004 computer. The Implicit Incoming Remote LU and Implicit Incoming Mode allow for flexible acceptance of requests. When these two items have been configured, and an incoming request is received by Host Integration Server 2004, the remote LU need not be recognized, as long as the local LU specified in the request is recognized. In such a situation, Host Integration Server 2004 uses the properties of the Implicit Incoming Remote LU and Implicit Incoming Mode for that LU-LU session.

For a session to be established, the incoming local LU name must be recognized by Host Integration Server 2004. Then the incoming remote LU must either be recognized explicitly or handled implicitly (if an implicit incoming remote LU has been configured). If the remote LU is recognized explicitly, but the mode is not recognized (as part of an LU-LU pair), Host Integration Server 2004 internally creates a new mode definition with the correct name using the properties of the implicit incoming mode. Alternatively, if the remote LU is handled implicitly, Host Integration Server 2004 also handles the mode implicitly, by internally creating a mode, as described.

To use an implicit incoming remote LU

1. In the SNA Manager tree, expand an SNA subdomain, expand the server you want to work with, expand **SNA service**, and then expand **Local APPC LUs**.
2. Right-click the first local LU that you want to configure, and click **Properties**.
3. Click the **Advanced** tab, and specify the **Implicit Incoming Remote LU** for incoming conversations, and then click **OK** to exit.
4. Using steps 2–4, configure each local LU that the remote system will call.
5. Expand **Remote APPC LUs**, right-click the remote LU that you want to configure, and then click **Properties**.
6. Click the **Options** tab, and select the **Implicit Incoming Mode**.
7. On the **Action** menu, click **Save configuration**.

   Note All incoming requests must specify a local LU name that is recognized by Host Integration Server 2004, even when using an implicit incoming remote LU and implicit incoming mode.

See Also

APPC Mode Definition

Default Local APPC LU and the Default Remote APPC LU

Default Outgoing Local APPC LU Pool

Single-System APPC

Default Local APPC LU and the Default Remote APPC LU

If a user or group uses transaction programs, 5250 emulators, or APPC applications, you can assign a default local APPC LU and a default remote APPC LU. These default LUs are accessed when the user or group member starts an APPC program (a TP, 5250 emulator, or APPC application) and the program does not specify LU aliases.

With Host Integration Server 2004, you can assign a default local APPC LU and a default remote APPC LU to each user or group. A user or group member can then start APPC programs (TPs, 5250 emulators, or APPC applications) that do not specify LU aliases. Host Integration Server 2004 will use the default local APPC LU and the default remote APPC LU assigned to that user or group.

There are two steps before assigning default APPC LUs to a user or group:

1. The user or group must have an account on the local area network.
2. The user or group must be added to the list used by Host Integration Server 2004.

If a user is assigned LUs through one or more accounts, such as group accounts and the user's individual account, one account determines the access for that user. The account that determines this access is the account found first when searching is performed in this order:

- User accounts (highest priority)
- Domain groups
- Local groups
- Well-known groups such as Everyone (lowest priority)

For example, suppose a user account (a high-priority account) called JOHND contains LOCLU1 as the default local APPC LU, but no default remote APPC LU. At the same time, suppose a local group (a low-priority account) of which JOHND is a member contains LOCLU2 as the default local APPC LU, and REMLU2 as the default remote APPC LU. For JOHND, the high-priority assignment, the default local APPC LU of LOCLU1 will be combined with the only other available assignment, the default remote APPC LU of REMLU2.

See Also

APPC Mode Definition

Implicit Incoming Remote LU and Implicit Incoming Mode

Default Outgoing Local APPC LU Pool

Single-System APPC

Default Outgoing Local APPC LU Pool

With Host Integration Server 2004, you can set up a pool of local APPC LUs that will be allocated dynamically for any invoking transaction program that does not specify a local LU. This feature is designed to coexist with the default local and remote LUs for users and groups, and does not override these settings.

Both of the default APPC LU features (the default outgoing local APPC LU pool and the default local and remote LUs for users and groups) allow client computers to start a session without specifying an LU name. This helps to simplify administration by eliminating APPC configuration for client computers.

If an application begins the invoking process but does not specify a local APPC LU, Host Integration Server 2004 first tries to determine the default local APPC LU of the associated user or group (the user or group logged on at the system where the application is running). If no such LU can be substituted, Host Integration Server 2004 attempts to assign an LU from the default pool of outgoing local APPC LUs. If no LUs are available from the default pool, the attempt to begin the invoking process is rejected.

The default outgoing local APPC LU pool differs from, and should not be confused with, 3270, LUA, and downstream pools.

See Also

APPC Mode Definition

Implicit Incoming Remote LU and Implicit Incoming Mode

Default Local APPC LU and the Default Remote APPC LU

Single-System APPC

Single-System APPC

Single-system APPC has two local APPC LUs residing on the same server. The LUs communicate with each other using defined parameters. You do not need to define a connection because the LUs are communicating with each other on the same system.

For a single-system APPC, you will need to assign two local APPC LUs to a server, not to a connection. Configuration of the local APPC LUs includes specifying the LU Alias, Network Name, and LU Name. Each of these labels identifies an LU to a particular set of software components.

If Common Programming Interface for Communications (CPI-C) is used, configure one or more CPI-C symbolic destination names. For more information, see CPI-C Access in the next section.

Single-system APPC is generally used for testing transaction programs. The basic steps for configuring single-system APPC are as follows.

To configure single-system APPC

1. Assign two local APPC LUs to a server.
2. Configure the local APPC LUs by specifying the LU Alias, Network Name, and LU Name.
3. If an appropriate mode has not already been configured, configure it.

   Note For single-system APPC, the Automatic Activation Limit specified in the mode is meaningless. Use one of the local LUs for the originator conversation and the other local LU for the destination conversation.

See Also

APPC Mode Definition

Implicit Incoming Remote LU and Implicit Incoming Mode

Default Local APPC LU and the Default Remote APPC LU

Default Outgoing Local APPC LU Pool

CPI-C Access

Common Programming Interface for Communications (CPI-C) provides a consistent application programming interface for network applications. CPI-C is a set of C-language routines that applications distributed across an SNA network can use to communicate as peers and exchange data to accomplish a processing task.

CPI-C programming provides a mechanism, called side information, that associates a set of parameters with a specified symbolic destination name. The CPI-C program then uses the symbolic destination name to initialize a conversation.

If you are using applications based on CPI-C, you configure one or more CPI-C symbolic destination names. A CPI-C symbolic destination name is a name assigned to a set of properties for a CPI-C conversation.

LU partners will need to recognize each other. This is accomplished using fully qualified names and LU aliases. The fully qualified name is a two-part name that identifies the remote LU. The first part of the fully qualified name is the network name and the second part is the remote LU name.

You will also need a mode name. For more information about modes, see the section APPC Mode Definition earlier in this section.

Conversation-level security requires a match between the user ID and password supplied by the invoking TP, and the user ID and password stored on the server where the remote TP resides. If the ID and password do not match, the session is not activated.

Transaction Programs

The part of an application that initiates or responds to APPC communications is called a transaction program (TP). TPs use APPC to exchange data with other TPs on a peer-to-peer basis.

Similar to a conversation when people talk with each other, the communication between two transaction programs is called a conversation. An application running on your computer can have many conversations active at one time, either with one other transaction program or with different transaction programs.

There are two types of TPs: TPs that can invoke (initiate a conversation with) other TPs, and TPs that can be invoked. A TP that can invoke another TP is called an invoking TP, and a TP that can be invoked is called an invokable TP.

If your Host Integration Server 2004 installation contains multiple systems (client computers or Host Integration Server 2004 computers), you can place invokable TPs on more than one system. When an invoking request is received in such an installation, there will (potentially) be a choice of systems on which to run the invokable TP. You can maintain specific control over this choice, or you can allow the choice to be made randomly by Host Integration Server 2004 (to distribute the load).

You can maintain specific control over this choice of system by setting up invokable TPs with unique names, or by setting up each invokable TP to run only with a specific, unique LU alias. With this arrangement, the information provided by the invoking TP (in the ALLOCATE verb) can specify the particular system on which the TP should run.

You can avoid controlling this choice of system, and allow the choice to be made randomly by Host Integration Server 2004, by setting the **DloadMatchLocalFirst** registry entry to **NO**, as described in the *Host Integration Server 2004 Administrator's Reference*. Then use invokable TPs that leave the local LU alias unspecified. When an incoming request is received, it is routed randomly, rather than preferentially, to the local Host Integration Server 2004 computer. In addition, no matter what LU alias is requested for the invokable TP, there cannot be a mismatch. Host Integration Server 2004 will start the TP, choosing randomly among the available systems.

Following are three of the possible ways that TPs can be arranged to run.

This section contains:

- TP Name Unique for Each TP
- TP Name Not Unique; Local LU Alias Unique
- TP Name Not Unique; Local LU Alias Unspecified
- Invoking Transaction Programs
- Invoking TPs and Host Integration Server 2004 Configuration
- Invokable Transaction Programs
- Invokable TPs and the Host Integration Server 2004 Configuration

TP Name Unique for Each TP

If you want to specify the system on which the invokable TP will run, you can use a unique TP name for each invokable TP. In this arrangement, the invoking TP identifies the invokable TP (and system) by naming the TP. This makes it unnecessary for an invokable TP to specify any LU alias in registry or environment variables.

See Also

Transaction Programs

TP Name Not Unique; Local LU Alias Unique

TP Name Not Unique; Local LU Alias Unspecified

Invoking Transaction Programs

Invoking TPs and Host Integration Server 2004 Configuration

Invokable Transaction Programs

Invokable TPs and the Host Integration Server 2004 Configuration

TP Name Not Unique; Local LU Alias Unique

Instead of using a unique TP name to specify the system on which the invokable TP will run, you can give the same name to multiple invokable TPs, but associate each TP with a unique local LU alias. Configure each invokable TP (through registry or environment variables) to use a unique local LU alias. Then set up the invoking TPs so that each one is routed not only to the correct TP name but also to the correct partner LU alias for the intended invokable TP.

See Also

Transaction Programs

TP Name Unique for Each TP

TP Name Not Unique; Local LU Alias Unspecified

Invoking Transaction Programs

Invoking TPs and Host Integration Server 2004 Configuration

Invokable Transaction Programs

Invokable TPs and the Host Integration Server 2004 Configuration

TP Name Not Unique; Local LU Alias Unspecified

If it does not matter on which system an invokable TP runs, use the same name for multiple invokable TPs, but do not specify an LU alias in the registry or environment variables for the TPs. In such a situation, there are no associated aliases in the list of available invokable TP names on a Host Integration Server 2004 computer. Thus, a request received from an invoking TP cannot cause a mismatch on the LU alias, and will match according to the TP name.

If you set the **DloadMatchLocalFirst** registry entry to **NO**, as described in the *Microsoft Host Integration Server 2004 Reference*, the server randomly routes the request to one of the available TPs. This spreads the processing load among multiple systems, and provides hot backup (so that you can take systems online and offline without disrupting service).

See Also

Transaction Programs

TP Name Unique for Each TP

TP Name Not Unique; Local LU Alias Unique

Invoking Transaction Programs

Invoking TPs and Host Integration Server 2004 Configuration

Invokable Transaction Programs

Invokable TPs and the Host Integration Server 2004 Configuration

Invoking Transaction Programs

An invoking TP initiates a conversation with other TPs. An invoking TP can be located on any system on the SNA network.

An invoking TP identifies itself by issuing a TP_STARTED verb. TP_STARTED specifies the name of the invoking TP, and may specify the LU alias that the TP uses (or may leave the LU alias blank).

Next, the invoking TP initiates the invoking process by issuing an ALLOCATE verb. In ALLOCATE, the invoking TP specifies the name of the invokable TP, and may also specify the partner LU alias (the LU alias to be used by the invokable TP).

See Also

Transaction Programs

TP Name Unique for Each TP

TP Name Not Unique; Local LU Alias Unique

TP Name Not Unique; Local LU Alias Unspecified

Invoking TPs and Host Integration Server 2004 Configuration

Invokable Transaction Programs

Invokable TPs and the Host Integration Server 2004 Configuration

Invoking TPs and Host Integration Server 2004 Configuration

For Host Integration Server 2004 to support the beginning of the invoking process (to accept the TP_STARTED and ALLOCATE verbs issued by an invoking TP), the following parameters must be configured correctly:

- If the invoking TP specifies the LU alias that it uses (in TP_STARTED), that LU alias must match a local APPC LU alias on the supporting Host Integration Server 2004 computer.
- If the invoking TP leaves the LU alias blank in TP_STARTED, one of two methods for designating a default LU must be used on the supporting Host Integration Server 2004:
  - Assign a default local APPC LU to the user or group that starts the invoking TP (the user or group logged on at the system from which TP_STARTED is issued).

    – or –

  - Designate one or more LUs as members of the default outgoing local APPC LU pool.

  If the invoking TP leaves the LU alias blank in TP_STARTED, Host Integration Server 2004 first attempts to determine the default local APPC LU of the associated user or group, and then attempts to assign an available LU from the default outgoing local APPC LU pool. If these attempts fail, Host Integration Server 2004 rejects the TP_STARTED request.

- In most situations, the supporting Host Integration Server 2004 must contain an appropriate connection to another system (host or peer). Sometimes, for testing purposes, Host Integration Server 2004 contains two local LUs paired together (for invoking and invokable TPs that are in the same domain). In this situation, a connection to a host or peer is not necessary.
- If the invoking TP specifies the partner LU alias (in ALLOCATE), that LU alias must match a remote LU alias. In addition, that remote LU alias must be paired with the local LU alias specified in TP_STARTED. If the LU alias is left blank in ALLOCATE, a default remote APPC LU must be assigned to the user who started the invoking TP. If the default remote APPC LU is used, it must be paired with the local LU that will be used. Otherwise, the ALLOCATE verb fails.

The preceding parameters support the beginning of the invoking process. For the invoking process to successfully complete, additional parameters must be configured on another Host Integration Server 2004 computer, as described in the next section.

See Also

Transaction Programs

TP Name Unique for Each TP

TP Name Not Unique; Local LU Alias Unique

TP Name Not Unique; Local LU Alias Unspecified

Invoking Transaction Programs

Invokable Transaction Programs

Invokable TPs and the Host Integration Server 2004 Configuration

Invokable Transaction Programs

An invokable TP is a TP that can be invoked by another TP. Invokable TPs are written or configured to supply their names to Host Integration Server 2004 as a notification that they are available for incoming requests. Host Integration Server 2004 invokable TPs can be run on any Host Integration Server 2004 computer or on a Windows Server™ 2003 or Windows 2000 client.

There are two types of invokable TPs:

- **Operator-started invokable TPs**

  An operator-started invokable TP must be started by an operator before the TP can be invoked. When the operator-started invokable TP is started, it notifies Host Integration Server 2004 of its availability by issuing a RECEIVE_ALLOCATE verb. RECEIVE_ALLOCATE provides the name of the invokable TP.

- **Autostarted invokable TPs**

  An autostarted invokable TP can be started by Host Integration Server 2004 when needed. The TP must be registered on its local system, so that it can be identified to Host Integration Server 2004. (For details about how the TP is registered, see *Microsoft Host Integration Server 2004 APPC Applications* or *Microsoft Host Integration Server 2004 CPI-C Applications*.) The registered information defines the TP as autostarted, and must specify the TP name. The registered information may also specify the local LU alias that the invokable TP will use.

  If no local LU alias is registered with autostarted TPs, the resulting Host Integration Server 2004 configuration can be more flexible in responding to invoking requests.

  After an autostarted invokable TP is started by Host Integration Server 2004, the TP issues RECEIVE_ALLOCATE (just as an operator-started TP does). RECEIVE_ALLOCATE must provide the same TP name as was registered for the TP.

Each Host Integration Server 2004 maintains a list of invokable TP names and any LU aliases associated with the TP names. When a request comes in from an invoking TP, Host Integration Server 2004 compares the requested invokable TP name and the associated LU alias to the list of available invokable TPs (which may include associated LU aliases). For details about how this comparison is carried out, see *Microsoft Host Integration Server 2004 APPC Applications* or *Microsoft Host Integration Server 2004 CPI-C Applications*.

If a match is found, Host Integration Server 2004 signals the system containing the requested TP to connect to that Host Integration Server 2004 computer.

If no match is found, Host Integration Server 2004 rejects the incoming request.

See Also

Transaction Programs

TP Name Unique for Each TP

TP Name Not Unique; Local LU Alias Unique

TP Name Not Unique; Local LU Alias Unspecified

Invoking Transaction Programs

Invoking TPs and Host Integration Server 2004 Configuration

Invokable TPs and the Host Integration Server 2004 Configuration

Invokable TPs and the Host Integration Server 2004 Configuration

For Host Integration Server 2004 to receive requests from an invoking TP on another system, and then route those requests to an invokable TP, certain parameters must be configured correctly:

- Host Integration Server 2004 must have a connection to the system from which the invoking TP's request is sent.
- Host Integration Server 2004 must have a remote LU capable of receiving the incoming request. This remote LU can be configured either explicitly or implicitly.

  When configured explicitly, there is an explicit match between a remote LU alias on Host Integration Server 2004 and the alias of the LU that conveys the invoking TP's request.

  When configured implicitly, an Implicit Incoming Remote LU (with its Implicit Incoming Mode) is used. Several items must work together. First, the LU alias specified in the incoming request (the LU alias requested for the invokable TP) must match a local LU alias on the server receiving the request. Second, the local LU on the server must have an Implicit Incoming Remote LU assigned to it. The properties of the Implicit Incoming Remote LU will be used for that LU-LU session. For more details about how an Implicit Incoming Remote LU works, see Implicit Incoming Remote LU and Implicit Incoming Mode, earlier in this section.

- Appropriate local LUs must be defined in the Host Integration Server 2004 configuration file.

APPC Security

Owners of APPC transaction programs may want to allow only a limited set of users to start the program. APPC provides a mechanism, called APPC conversation security, by which the client transaction program identifies its user to the server system.

There are three levels of security for client programs: None, Same, and Program:

- If the level of security is None, the client system sends no security information (user ID or password).
- If the level of security is set to Same, APPC tries to determine a user ID for the client program. If the server system requires a password and the client system permits APPC to retrieve one for the user ID, APPC will also send the password to the server system. If no user ID is available, or if the server requires a password but the client system does not allow APPC to retrieve the password, no security information is sent to the server. This is sometimes referred to as downgraded to security NONE.
- If the security level is set to Program, the client transaction program will override any security information that the local system may provide. The client program must supply both a user ID and a password. CPI-C programs may get the user ID and password by either prompting the user to enter the information or by checking the CPI-C side information. Not all systems allow this option.

If the client program uses SECURITY=SAME or SECURITY=PROGRAM, APPC on the server must check the user ID and password regardless of the server transaction's security requirements. This requirement can cause unexpected problems and is not recommended.

To configure session security for remote LUs

1. In the SNA Manager tree, expand an SNA subdomain, expand the server you want to work with, expand **SNA service**, and then expand **Remote APPC LUs**.
2. Right-click the LU that you want to configure, and click **Properties**.
3. Click the **Options** tab. Under **Session-Level Security**, select an option.
4. Click **OK**.
5. On the **Action** menu, click **Save configuration**.
6. To put the changes into effect, you must restart the server.

   Note Setting the security for remote LU sessions is optional.

See Also

Transaction Programs

Optimizing Communications

Servers used primarily for communications need to provide fast throughput, but they do not need to provide fast file access (as a file server would). Faster throughput will result if portions of memory are set aside for communications programs (such as Host Integration Server 2004 or Microsoft® SQL Server™).

Such dedicated memory includes nonpaged memory, or portions of memory that are never swapped to disk, but remain available for immediate use at all times. If more memory is dedicated to Host Integration Server 2004 or similar programs, less memory is available for file sharing.

Windows Server 2003 or Windows 2000 Server allow you to view or change network throughput options. However, Host Integration Server 2004 installation automatically sets the option to maximize throughput for network applications.

Servers used primarily for communications run many important background processes (processes not related to user actions in the current window). These servers generally do not need to run foreground processes at maximum speed. Host Integration Server 2004 throughput can be increased by making the operating system more responsive to background processes and less responsive to foreground processes.

A server that is less responsive to foreground processes will run local applications such as word-processing software, spreadsheets, or SNA Manager more slowly. Tasking is most appropriate for servers used primarily to support client systems, and not for servers used locally as desktop computers.

To optimize background processing for a computer running Windows Server 2003 or Windows 2000 Server

1. Click **Start**, point to **Settings**, click **Control Panel**, and then double-click **System**.
2. Select the **Advanced** tab.
3. In the **Performance** box, click **Performance Options**.
4. In the **Application response** box, **select Applications or Background services**.
5. Click **OK**, and then click **OK** again.

See Also

Transaction Programs

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

APPC Mode

A mode is associated with an LU-LU pair, and determines the session properties for that pair. One of the key mode properties is the Parallel Session Limit. This limit determines whether an LU-LU pair can perform only one interaction at a time or multiple concurrent interactions.

Parallel sessions are used only with independent APPC. If parallel sessions are to be allowed with an LU-LU pair, the local LU must be independent, and the remote LU in the pair must support parallel sessions.

If the LU-LU pair can have multiple parallel sessions, other mode properties, such as Minimum Contention-Winner Limit, determine to what extent each LU can initiate interactions.

The following table lists the modes provided with Host Integration Server 2004.

Mode name	To be used for
#BATCH	Batch-oriented sessions
#BATCHC	Batch-oriented sessions using compression
#BATCHSC	Batch-oriented sessions that employ a minimal level of routing security
BLANK	Sessions using a default mode name, encoded as eight blank EBCDIC spaces in BIND
#INTER	Interactive sessions
#INTERC	Interactive sessions using compression
#INTERSC	Interactive sessions that employ a minimal level of routing security
QPCSUPP	All sessions with an AS/400 computer
QSERVER	ODBC drivers

See Also

APPC Mode Definition.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Notes Section

This section contains notes about AS/400 computers, local and remote names, time-outs for 802.2 connections, and adapter and adapter addresses.

Note About AS/400 Computers

To connect to an AS/400 computer, supply both local node and remote node parameters for the Network Name and the Control Point Name. These properties are configured in separate dialog boxes:

- **Local node (server) properties.** In the **Server Properties** dialog box of the computer running Host Integration Server 2004, type the **Control Point Name** and the **Network Name**. The server Network Name must correspond to the RMTNETID parameter in the AS/400 APPC controller description. (The default for the AS/400 computer network ID is typically APPN.) If this value is set to ***SAME**, refer to the Local Network ID parameter in the AS/400 Network Attributes screen (using the **dspneta** command). The server Control Point Name must match the RMTCPNAME parameter in the AS/400 APPC controller description. For 802.2 connections, the AS/400 computer can be configured to automatically create the APPC controller description when the computer running Host Integration Server 2004 first connects to the AS/400 computer, by setting the AUTOCRTCTL parameter to ***YES** in the AS/400 Token-Ring or Ethernet line description. However, for SDLC connections, the APPC controller description must be manually created.

  If you specify a CPNAME in **Connection Properties**, it overrides the CPNAME in the **Server Properties** dialog box. The CPNAME in **Server Properties** is the default and will be used unless it is changed in **Connections Properties**.

- **Remote node (connection) properties.** In the **Properties** dialog box for an 802.2 or SDLC connection, type the **Network Name** and **Control Point Name (CP name)** of the AS/400 computer into the **Network Name (Remote Node)** and **Control Point Name (Remote Node)** fields. The AS/400 Network Name and Local Control Point Name can be found on the AS/400 Network Attributes screen using the DSPNETA. For more information about these fields, click Help on the **Properties** dialog box for the connection.

  On an AS/400 computer, the Network Name is specified in the Local network ID parameter in the Network Attributes screen and in the RMTNETID parameter on the APPC controller description. For more information, see your APPN documentation.

Using Remote Node Identifiers

You can use several types of parameters to specify the remote node with which a connection should connect:

Remote address (802.2 connections only)

This parameter is required for 802.2 connections. For outgoing calls, it is used to specify the remote host, peer, or downstream system being called. This parameter is the **Remote Network Address**.

Network Name (Remote Node) and Control Point Name (Remote Node)

As a general guideline, use these parameters if the administrator of the remote host, peer, or downstream system uses them.

These two parameters work together; if either parameter is supplied, the other should also be supplied. These parameters are used only for Format 3 exchange identifications (XIDs), one of two types of exchange identification. Format 3 XIDs are generally used for APPC. If a connection does not use Format 3 XIDs, there is no need to specify these parameters. For information about how these parameters are checked on incoming calls (as identifiers for the remote system making the call), see Identifiers in Incoming XIDs.

See Also

Note About Local and Remote Names

Remote Node ID

As a general guideline, use this parameter if the administrator of the remote host, peer, or downstream system uses it. This parameter can be used in Format 0 XIDs or Format 3 XIDs, the two types of identification exchange. **Format 0 XID**s are generally used for 3270 communication and for LUA; **Format 3 XID**s are generally used for APPC. For information about how the Remote Node ID is checked on incoming calls (as an identifier for the remote system making the call), see Identifiers in Incoming XIDs.

See Also

- Guidelines for Identifiers for 802.2 Connections

- Guidelines for Identifiers for SDLC Connections
- Identifiers in Incoming XIDs

Note About Local and Remote Names

The **Network Name** and **Control Point Name** for the remote node are different from the **Network Name** and **Control Point Name** for the local node. The remote **Network Name** and **Control Point Name** are specified in the **Connection Properties** dialog box. The local **Network Name** and **Control Point Name** are specified in the **Server Properties** dialog box.

Configuring Multidrop Connections

In a multidrop connection, one primary computer communicates simultaneously with multiple secondary computers. Host Integration Server 2004 supports multidrop connections used for downstream systems on leased SDLC lines.

You can configure up to four multidrop connections on each line, with a computer running Host Integration Server 2004 as the primary server on each.

Configure each connection to be used in the multidrop configuration according to the instructions that follow.

To configure multidrop connections

1. Configure a link service for an SDLC line with the **Constant RTS** option not selected.
2. Configure each connection to be used in the multidrop configuration as follows:
    - In the **SDLC Properties** dialog box, select the same link service for each connection.
    - In the **SDLC Properties** dialog box, under **Remote End**, select **Downstream**.
    - Make all the parameters identical for each configuration, except for **Poll Address**, and possibly the **Local Node ID** and **Remote Node ID**. For these parameters, obtain values from the downstream system administrators. Make the **Poll Address** unique for each station.
3. For the primary connection in the multidrop configuration, on the SDLC page of the **SDLC Properties** dialog box, select the **Multidrop Primary** box.

For information about using the configuration dialog boxes, click **Help** in the **SDLC Properties** dialog box.

Note About Time-outs for 802.2

The time-outs for 802.2 (**t1**, **t2**, and **ti**) are derived from basic timer values that are set in the Windows registry. Host Integration Server 2004 is designed with the assumption that these registry values will not be changed after they have been set by the DLC (802.2) driver. If these registry values are changed, the choices displayed in the **Response Timeout**, **Receive ACK Timeout**, or **Inactivity Timeout** fields may no longer reflect the actual amounts of time that Host Integration Server 2004 waits.

Simplified Facility Data Example

The following simplified example shows how identifiers allow each facility request to be distinguished from the ones that follow:

40AAAA20BB

The example contains two requests. The first request begins with a 4, indicating that after the two-character identifier there are four characters (in this case, four occurrences of the A character). The second request follows, beginning with a 2, indicating that after the two-character identifier there are two characters (two occurrences of the B character).

Standard Facility Data Example

The facility data string in this example initiates a connection using 256-byte packets, a sending window of 7, a receive window of 4, and charges reversed. The facility requests that do this are as follows:

- 42 08 08 for Packet Size
- 43 04 07 for Window Size
- 01 01 for reverse charging

When these requests are concatenated, the following facility data string is created:

4208084304070101

Common Identifier Table

The following table shows commonly used identifiers for facility requests.

Facility	Identifier	Parameters	Meaning
Reverse charging	01	00 01	Reverse charging NOT requested Reverse charging requested
Packet Size	42	0r0s	r = Receive Packet Size s = Send Packet Size
			r and s can have the following values:
			6 for 64-byte packets 7 for 128-byte packets 8 for 256-byte packets 9 for 512-byte packets A for 1024-byte packets
Window Size	43	0r0s	r = Receive Window Size s = Send Window Size r and s can be from 1 through 7. They are usually set equal, making the send and receive windows the same size.

In this table, send and receive operate from the view of the initiator of the connection.

Note About Local Adapter Address

When communicating with the administrator of a remote host, peer, or downstream system, you may need to tell that administrator the address of your local adapter.

To determine the local address of an 802.2 adapter, at the command prompt, type:

net config server

In the resulting display, the address of the local adapter appears in the line labeled **Server is Active On**.

Primary Configuration Server

The primary configuration server is the Host Integration Server 2004 computer designated to contain the domain-wide configuration file. The configuration file reflects the Host Integration Server 2004 resources for the SNA subdomain, including all Host Integration Server 2004 computers, link services, LUs, 3270 users, and so on. There can be only one primary server in the subdomain.

Backup Configuration Server

The backup configuration server is a Host Integration Server 2004 computer on which the configuration file is replicated by Host Integration Server 2004. There can be more than one backup server in an SNA subdomain. Host Integration Server 2004 will load the copy of the configuration file located on a backup Host Integration Server 2004 computer if the primary Host Integration Server 2004 computer goes down. In this case, servers and connections can be started and stopped, but the configuration cannot be changed or saved.

Identifiers in Incoming XIDs

When deciding which type of remote node identifier to specify for a connection that accepts incoming calls, it may be helpful to understand how Host Integration Server 2004 uses exchange identifications (XIDs) from incoming calls.

When Host Integration Server 2004 receives an XID from an incoming call, it looks at the XID for some type of identifier of the remote system that made the call. It compares this identifier, in the order shown in the following list, against identifiers stored in the Host Integration Server 2004 configuration. If it finds a match, it accepts the call. If it finds that identifiers are left unspecified (in the configuration or the XID), and the connection is an SDLC connection, Host Integration Server 2004 accepts the call, pending further exchange of information. In other cases—when every comparison yields a mismatch, or when identifiers are left unspecified but the connection is 802.2—Host Integration Server 2004 rejects the incoming call.

Identifiers are compared in the following order:

1. If the incoming XID is Format 3, Host Integration Server 2004 examines the XID for a remote node Network Name and Control Point Name. If these parameters are present in both the Incoming XID and in the Host Integration Server 2004 configuration, and they match, the call is accepted. If the parameters are present and do not match, the call is rejected.
2. If the parameters were not available for the preceding step, Remote Node IDs are examined next. (Remote Node IDs may be used in either Format 0 or Format 3 XIDs.) If a Remote Node ID is present in both the Incoming XID and in the Host Integration Server 2004 configuration, and they match, the call is accepted. If the parameters are present and do not match, the call is rejected.
3. If the parameters were not available for the preceding steps, for 802.2 connections, remote addresses are examined:

   For 802.2 connections, the Remote Network Address in the Host Integration Server 2004 configuration is compared to the address from which the XID was received. If the addresses match, the call is accepted; if not, the call is rejected.

4. For 802.2 connections, if no match is found in any of the preceding steps, the incoming call is rejected.

   For SDLC connections, if no match is found in the preceding steps, but identifiers were left unspecified in the configuration or the XID, the call is accepted, pending further exchange of identifiers. However, if identifiers were not left unspecified and no identifiers match, the call is rejected.

Guidelines for Identifiers for 802.2 Connections

The following table lists guidelines for identifiers for 802.2 connections.

Conn. type	Allowed call directions	Guidelines for identifiers for remote node
802.2	Outgoing	Use Remote Network Address
802.2	Incoming	Match the identifiers used on the remote system: Remote node Network Name and Control Point Name or Remote Node ID or Remote Network Address
802.2	Both	Use a combination of outgoing plus incoming identifiers

Guidelines for Identifiers for SDLC Connections

The following table lists guidelines for identifiers for SDLC connections.

Conn. type	Allowed call directions	Guidelines for identifiers for remote node
SDLC	Outgoing	If Host Integration Server 2004 supplies the phone number to the modem, specify Dial Data (phone number of remote system)
SDLC	Incoming	Match the identifiers used on the remote system: Remote node Network Name and Control Point Name or Remote Node ID
SDLC	Both	Use a combination of outgoing plus incoming identifiers

Installation and Configuration

This section provides instructions for installing and configuring Microsoft® Host Integration Server 2004. This includes how to test and verify connections with the mainframe or AS/400 computer.

This section contains:

- Installation
- Making and Testing a Connection
- Configuring Your Enterprise

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Installation

This document contains information about the basic installation process for Host Integration Server 2004.

It is important to read the entire document before beginning installation, as it contains hardware and software requirements, correct installation procedures, and other information necessary for successful installation.

It is also important to read the Readme.htm before beginning installation. The Readme.htm is located on your product CD, and contains late-breaking information and known issues you should understand before installation.

This section contains:

- Hardware and Software Requirements
- New Security Model
- Installing the Product

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Hardware and Software Requirements

In the following sections, the version numbers listed are minimum requirements. Versions later than those listed here are supported unless otherwise noted.

Hardware prerequisites

The minimum hardware requirements for a complete installation of Host Integration Server 2004 are:

- 450 megahertz (MHz) or higher Intel Pentium-compatible CPU
- 512 megabytes (MB) of RAM
- 6-gigabyte (GB) hard disk
- CD-ROM or DVD-ROM drive
- Super VGA monitor (800 x 600) or higher resolution monitor with 256 color
- For TI Designer only: Display Super VGA (1024x768) or higher resolution with 256 colors
- Microsoft Mouse or compatible pointing device

Software prerequisites

Typical Installation

In order to install Host Integration Server 2004 you must be running one of the following operating systems:

- Windows 2000 Service Pack 4 or later, along with Update for Microsoft Windows 2000 KB821887 hotfix, which you can download from the following location:

  http://go.microsoft.com/fwlink/?LinkId=29480

- Windows XP Professional with Service Pack 1 or later
- Windows Server 2003

Custom Installation

If you choose to install only selected features of Host Integration Server 2004, the tables below outline which software prerequisites you will need.

Server Installation

Feature	Requirement	Location
Data Access Tool	.NET Framework v. 1.1	http://go.microsoft.com/fwlink/?LinkId=22828
Managed Provider for DB2	.NET Framework v. 1.1	http://go.microsoft.com/fwlink/?LinkId=22828
Transaction Integrator	.NET Framework v. 1.1	http://go.microsoft.com/fwlink/?LinkId=22828
TI Designer	.NET Framework v. 1.1 Visual Studio .NET 2003	http://go.microsoft.com/fwlink/?LinkId=22828 http://go.microsoft.com/fwlink/?LinkId=22837
TI Runtime	ASP.NET (only required when using TI WIP .NET components)	http://go.microsoft.com/fwlink/?LinkId=30968
TI Manager	ASP.NET (only required when using TI WIP .NET components)	http://go.microsoft.com/fwlink/?LinkId=30968
MSMQ-MQSeries Bridge	MSMQ with routing support	http://go.microsoft.com/fwlink/?LinkId=30969
Enterprise Single Sign-On	SQL Server 2000 with Service Pack 3a	http://go.microsoft.com/fwlink/?LinkId=22838 http://go.microsoft.com/fwlink/?LinkId=22839

Client Installation

Feature	Requirement	

Data Access Tool	.NET Framework v. 1.1	http://go.microsoft.com/fwlink/?LinkId=22828
Managed Provider for DB2	.NET Framework v. 1.1	http://go.microsoft.com/fwlink/?LinkId=22828
TI Designer	.NET Framework v. 1.1 Visual Studio .NET 2003	http://go.microsoft.com/fwlink/?LinkId=22828 http://go.microsoft.com/fwlink/?LinkId=22837

Configuration Wizard after Server setup

It is possible to install the Server software without running the Configuration Wizard, and then run the Configuration Wizard later. Eventually, however, you must run the Configuration Wizard. To do this, you will need the software listed in the table below. It can either be installed on the local Host Integration Server or a remote computer.

Feature	Requirement	
DB2 Distributed Transactions	SQL Server 2000 with Service Pack 3a	http://go.microsoft.com/fwlink/?LinkId=22838 http://go.microsoft.com/fwlink/?LinkId=22839
Transaction Integrator	SQL Server 2000 with Service Pack 3a	http://go.microsoft.com/fwlink/?LinkId=22838 http://go.microsoft.com/fwlink/?LinkId=22839

Special Considerations when installing Enterprise Single Sign-On

The following sections contain information regarding installation of the Enterprise Single Sign-On feature. Because of this feature's complex relationships to other features and systems, and because of its importance to system security, it is recommended that you read these sections carefully before installing Enterprise Single Sign-On.

Installing SSO and creating the Master Secret Server

Initial installation of Enterprise Single Sign-On must be done on the server that you will use as the Master Secret Server. This is also the only Master Secret Server allowed in the entire SSO system.

To install Enterprise Single Sign-On, run the Host Integration Server 2004 setup program and select **Custom Installation**. Under the **Security Integration** feature, select **Enterprise Single Sign-On** and continue installation.

After installation is complete, the **Configuration Wizard** launches. Since this is the Master Secret Server, when prompted with the question, Do you want to create a new SSO system or Join an existing SSO system? select **Create**. This will create the Master Secret Server and the SSO Credential Database.

> **Note** As soon as the configuration is complete, make sure you back up the Master Secret to a safe location. To do this, open a command prompt and navigate to the SSO directory located at Program Files\Common Files\Enterprise Single Sign-On, and run ssoconfig -backupsecret <backup file>.

It is recommended that you install only the Master Secret Server on this computer. It should not be used as a processing server.

Processing Servers for Enterprise Single Sign-On

In a multi-box environment, after the Master Secret Server and Credential database have been created, you can install Enterprise Single Sign-On on subsequent computers. These are typically the computers on which Host Integration Server 2004 is installed as well.

The initial installation process is the same as on the first computer. Configuration, however, becomes slightly different. Since the Master Secret Server and the SSO credential database are already in place, select **Join** when the Configuration Wizard asks, Do you want to create a new SSO system or Join an existing SSO system?

ENTSSO Administration install only

It is possible to install just the Enterprise Single Sign-On Administration feature. To do this, when you run the install program, select **Custom Installation**. Under the **Security Integration** feature, select only the **Enterprise SSO Administration** sub-feature.

Only SSO administrative components will be installed. The hardware and software requirements are the same as for a typical ESSO installation.

> **Note** While the SSO Administration feature in Host Integration Server 2004 is compatible with the server version of SSO in BizTalk Server 2004, the administrative components of Enterprise SSO in BizTalk Server 2004 are not compatible with the server version of Enterprise SSO in Host Integration Server 2004.

Installing the SSO administrative utility (ssomanage.exe) does not create shortcuts on the Start menu to access the command line utilities. To run the SSO administrative utilities after installation, you must open a command prompt and navigate to the SSO directory located at Program Files\Common Files\Enterprise Single Sign-On. You can use the ssomanage.exe to specify the SSO Server you want to use for management. To do this, open a command prompt and navigate to the SSO directory located at Program Files\Common Files\Enterprise Single Sign-On, and run ssomanage -serverall <SSO server name>.

SSO Client install

The stand-alone SSO client utility (ssoclient.exe) allows end users to configure their client mappings in the credential database. You can install the client utility from a self-extracting file (SSOClientInstall.exe) which is installed with the SSO administration feature.

To install the SSO client utility, you must be running one of the following operating systems on the client computer:

- Windows Server 2003
- Windows 2000 Server with Service Pack 4, or Windows XP Professional with Service Pack 1
- .NET Framework 1.1 (only necessary for the managed interoperability component of the SSO client utility)

Installing the SSO client utility does not create shortcuts on the Start menu to access the command line utilities. To run the SSO client utility after installation, you must open a command prompt and navigate to the SSO directory located at Program Files\Common Files\Enterprise Single Sign-On.

Password Synchronization

To install the password synchronization feature, run the install program and select **Custom Installation**. Under the **Security Integration** feature, select the **Enterprise Single Sign-On Password Synchronization** sub feature.

To addition to this, Password synchronization adapters are necessary to send and receive password changes to the external system. You can view a list of currently available adapters at the following location: http://go.microsoft.com/fwlink/?LinkId=30101

You can also contact support aliases to obtain information on these Password synchronization adapters.

There are 3 types of password synchronization sub-features supported in this release to simplify administration of the SSO credential database and to keep passwords across user directories in sync.

The first type is **Windows to External** (for example, Active Directory to RACF). A Windows user's password change is captured and sent to the Enterprise SSO Server assigned to receive password changes from domain controllers. This then forwards the password change to an external system and the mapping in the SSO credential database is kept in sync with the change made on the external system.

To capture password changes made in Active Directory, in addition to installing the ENTSSO Password Sync feature, components need to be installed on the domain controllers to capture password changes.

Both the Windows Password Capture component and Password Change Notification Service (PCNS) must be installed on all domain controllers from which you will be capturing passwords. You can find these components in the following location:

<HIS CD ROOT>\Platform\PCNS

Read the accompanying documentation (also located in the folder above) before you proceed with the installation on the domain controller.

The second type is **External to Windows - Full synchronization**. A password is captured on the External system and sent to the Enterprise Single Sign-On server assigned for Password Synchronization which then updates the password in the SSO credential database, and also updates the Windows user's password in Active Directory.

The third type is **External to Windows - Partial synchronization**. A password is captured on the External system and sent to the Enterprise Single Sign-On server assigned for Password Synchronization which then updates the password in the SSO credential database.

Upgrading from a previous version of SSO

If you are installing the Enterprise Single Sign-on feature and you already have a previous version deployed on your computer (for example, from Host Integration Server 2004 Beta, or Microsoft BizTalk® Server 2004), you must complete the steps below.

- Back up the SSODB to a secure location
- Back up the Master Secret Key on the Master Secret Server
- Update the Master Secret Server by running Host Integration Server 2004 setup, choosing **Custom Installation**, and then selecting **Enterprise Single Sign-On**. Select **Reuse** when the Configuration Wizard prompts you with the question: Do you want to reuse the existing configuration?

It is not necessary to update the other SSO Servers (non-Master Secret Servers) from your BizTalk Server 2004 installation. However, if you want the new Enterprise Single Sign-On features to be available on those servers, you must update them by using the same procedures outlined above.

If you have a Beta version of Enterprise SSO installed as part of a Host Integration Server 2004 Beta release, you can use the same mechanism to upgrade those servers.

> **Note** These considerations also apply if you are installing Microsoft BizTalk Server 2004 on a computer with an existing installation of Host Integration Server 2004 Enterprise Single Sign-On, and wish to update the servers.

Using Host Initiated SSO functionality in Enterprise Single Sign-On

Host Initiated Single Sign-On uses the protocol transition feature of Windows Server 2003 to perform Single Sign-On for the non-Windows user. This feature requires Windows Server 2003 and must be in a domain that has its **Domain Functional Level** set to **Windows Server 2003**.

Compatibility with earlier Host Integration Server products

SNA Server 2.0-SNA Server 3.0

Host Integration Server 2004 supports neither upgrade nor interoperability with SNA Server versions 2.0 – 3.0 inclusive.

SNA Server 4.0 and Host Integration Server 2000

Interoperability

Host Integration Server 2004 supports limited interoperability with SNA Server 4.0 and Host Integration Server 2000.

Host Integration Server 2004 clients will connect through SNA Server 4.0 servers and Host Integration Server 2000 servers.

SNA Server 4.0 clients will connect through Host Integration Server 2004 servers and Host Integration Server 2000 servers.

Neither SNA Server 4.0 servers nor Host Integration Server 2000 servers can act in the role of member or backup to a primary Host Integration Server 2004 server. Instead, you must upgrade the servers to Host Integration Server 2004 while running against the older SNA Server 4.0 or Host Integration Server 2000 primary server. Once all backup computers are upgraded to Host Integration Server 2004 , the remaining primary server computer can be upgraded to Host Integration Server 2004.

To deploy Host Integration Server 2004 as a backup in an existing Host Integration Server 2000 or SNA Server 4.0 domain, it is necessary to make the following configuration changes:

- Create a COMLOGS share pointing to <installdir>\system. Grant the service account and HIS Administrators group Read access. This share is used by the SNA Manager when creating link services on remote computers.
- Add any users who need to perform administrative tasks to the local Host Integration Server Administrators group on the Host Integration Server 2004 computer.
- Add any users who will create link services to the Local Administrators group on the computer where the link services will be created.
- Use the same service account for the Host Integration Server 2004 server that was used for the Host Integration Server 2000 or SNA Server 4.0 servers. This ensures that all components have the appropriate rights to perform their necessary functions.

> **Note** New features on Host Integration Server 2004 will not be available until all servers in the subdomain have been upgraded.

Upgrade

This release supports the upgrade of Host Integration Server 2000 Service Pack 1 and SNA Server 4.0 Service Pack 4.

Note that when you upgrade from SNA Server 4.0 to Host Integration Server 2004, it is necessary to reboot your computer. After the reboot has completed, you must then finish the installation by running the Configuration Wizard. The tables below outline possibilities in upgrading from previous versions.

Server Upgrades

This version	Can be upgraded to this version
SNA Server 4.0 SP4	HIS 2004 Enterprise Edition HIS 2004 Standard Edition HIS 2004 Evaluation Version HIS 2004 Developer Edition
HIS 2000 SP1	HIS 2004 Enterprise Edition HIS 2004 Standard Edition HIS 2004 Evaluation Version HIS 2004 Developer Edition
HIS 2004 Standard Edition	HIS 2004 Enterprise Edition
HIS 2004 Evaluation Version	HIS 2004 Standard Edition HIS 2004 Enterprise Edition

Client Upgrades

This version	Can be upgraded to this version
SNA Server 4.0 SP4 (Windows 9x)	HIS 2004 Client
SNA Server 4.0 SP4 (Windows NT)	HIS 2004 Client
HIS 2000 SP1 (End User)	HIS 2004 Client
HIS 2000 SP1 (Admin)	HIS 2004 Client

Client to Server Upgrades

This version	Can be upgraded to this version
SNA Server 4.0 SP4 (Windows NT)	HIS 2004 Enterprise Edition HIS 2004 Standard Edition HIS 2004 Evaluation Version HIS 2004 Developer Edition
HIS 2000 SP1 (Admin)	HIS 2004 Enterprise Edition HIS 2004 Standard Edition HIS 2004 Evaluation Version HIS 2004 Developer Edition

Build-to-Build Upgrades

For build-to-build upgrades, use the same backup and restore procedures as you would in preparing for Backup and Disaster Recovery. These procedures are listed below.

Back up your SNA Server configuration

1. Right click the SNA domain name in the SNA Manager and choose **Backup configuration…**.
2. Record the settings for the installed link services.

Back up your configuration using the Configuration Wizard

1. Re-run the Configuration Wizard from Start menu.
2. Proceed through the wizard screens to the Summary screen.
3. Choose **Save…**. to save your configuration.

Back up your Transaction Integrator configuration

1. Back up the HIP configuration by backing up the HIP database.
2. Backup the Remote Environments by saving a copy of the following registry key:

   ```
   HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Cedar
   ```

3. Export COM+ applications (Right-click application/Export…/Server Application).
4. Save Web Site or virtual directories individually to an XML file (Right-click Web Site or VD/All tasks/Save configuration to a file).
5. Back up the web site/virtual directory files/structure.

Back up your Data Integration Configuration

1. Backup any UDLs, HCDs or File DSNs. User and System DSNs can be converted to UDLs with the Data Access Tool and backed up.

Upgrade and restore your configuration

1. Launch the unattended setup using the XML file created in Step 3 of **Back up your configuration using the Configuration Wizard**.

   ```
   Setup.exe /Product HIS /InstallPlatform /L c:\HISInstall.log /S c:\ HISServerConfig.xml /INSTALLDIR C:\HIS
   ```

2. Restore the HIP database which you saved in Step 1 of **Back up your Transaction Integrator configuration**.
3. Launch the unattended configuration using the XML file created in Step 3 of **Back up your configuration using the Configuration Wizard**. This file will need to be updated with the service account password.

   ```
   ConfigFramework.exe /L c:\ConfigFramework.Log /F /S c:\HISServerConfig.xml
   ```

4. Launch SNA Manager.
5. Re-create your link services using the information recorded in Step 2 of **Back up your SNA Server configuration**.
6. Right click the SNA domain name in the SNA Manager and choose **Restore configuration…**.
7. Start TI Manager. This will automatically recreate the HIP application from the database.
8. Restore TI and Data artifacts as appropriate.

Supported Host Platforms

SNA connectivity, 3270 terminal emulation, host print service, and SNA programming interfaces

- IBM z/OS, OS/390, MVS, VSE and VM

SNA connectivity, 5250 terminal emulation, host print service, and SNA programming interfaces

- IBM OS/400 V2R3 or later
- IBM AS/400 Advanced 36 System Support Program Release 7.5

IP-DLC Link Service

- IBM Communications Server for OS/390 V6 or later
- IBM OS/390 2R6 (with APAR OW36113) or later

Security Integration

- Computer Associates eTrust CA-ACF2 Security for z/OS and OS/390
- Computer Associates eTrust CA-Top Secret Security for z/OS and OS/390
- IBM RACF Security for z/OS and OS/390
- IBM AS/400 Security

OLE DB Provider for DB2, ODBC Driver for DB2, and Managed Provider for DB2

- IBM DB2 V6 and later for OS/390 and z/OS to support an SNA LU6.2 or TCP/IP network connection

- IBM OS/400 V5R1 and later to support an SNA LU6.2 or TCP/IP network connection
- IBM DB2 for Universal Database V7.1 and later for Windows and AIX operating systems to support a TCP/IP network connection

The following table provides a feature-by-feature view of the DB2 platforms and versions supported by Host Integration Server 2004.

Key Features for DB2	**DB2MVS**	**DB2400**	**DB2AIX**	**DB2NT**
Network Connections over SNA	V6	V5R1	n/a	n/a
Network Connections over IP	V6	V5R1	V7.1	V7.1
Distributed Transactions over SNA	V6	V5R1	n/a	n/a
Distributed Transactions over IP	V6	V5R1	V8.1	V8.1
Default Schema	V6	V5R1	V7.1	V7.1
Session Pooling	V6	V5R1	V7.1	V7.1
Single Sign-On (SNA and IP)	V6	V5R1	V7.1	V7.1
Client Application Name	V6	V5R1	V7.1	V7.1
Stored Procedure Multiple Results	V6	V5R1	V7.1	V7.1
Default Qualifier (CURRENT SCHEMA)	V6	V5R2	V7.1	V7.1
UNICODE Data	V7	V5R1	V7.1	V7.1
SQL Long Identifiers	V8	V5R1	V7.1	V7.1

OLE DB Provider for AS/400 and VSAM

- IBM Distributed File Manager (DFM) V1R2 and later to support an SNA LU6.2 network connection (DFM is a component of IBM Data Facility Storage Management Subsystem (DFSMS) for OS/390 and z/OS)
- IBM V5R1 and later to support an SNA LU6.2 or TCP/IP network connection
- IBM AS/400 Advanced 36 SSP (System Support Program) Release 7.5 to support an SNA LU6.2 network connection

Host File Transfer

- IBM Distributed File Manager (DFM) V1R2 and later to support an SNA LU6.2 network connection (DFM is a component of IBM Data Facility Storage Management Subsystem (DFSMS) for OS/390 and z/OS)
- IBM OS/400 V5R1 and later to support an SNA LU6.2 or TCP/IP network connection

AS/400 Data Queues

- IBM OS/400 V5R1 and later to support an SNA LU6.2 network connection

Transaction Integrator

- IBM CICS (Customer Information Control System) for MVS V3R3 or later to support an SNA LU6.2 network connection
- IBM CICS Transaction Server for VSE/ESA V2R1 or later to support an SNA LU6.2 network connection
- IBM CICS Transaction Server for OS/390 Version 1 or later to support an SNA LU6.2 or TCP/IP network connection
- IBM CICS Transaction Server for z/OS Version 2 or later to support an SNA LU6.2 or TCP/IP network connection
- IBM CICS Transaction Server for z/OS Version 2 Release 2 or later to support an Enhanced Listener for TCP/IP network connection
- IBM IMS (Information Management System) Version 4 to support an SNA LU6.2 network connection
- IBM IMS Version 5 to support an SNA LU6.2 network connection
- IBM IMS Version 6 or later to support reliable 2PC transactions across an SNA LU6.2 network connection
- IBM IMS Version 6 to support an SNA LU6.2 or TCP/IP network connection
- IBM IMS Version 7 to support an SNA LU6.2 or TCP/IP network connection
- IBM IMS Version 8 to support an SNA LU6.2 or TCP/IP network connection
- IBM OS/400 Version 4 Release 1 or later to support a TCP/IP network connection.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

New Security Model

Host Integration Server 2004 includes a new security model that greatly reduces the rights required for the service account compared to previous versions of the product. After upgrading a previous version of the product, the following user rights assignment and group membership can be removed from the service account.

User rights assignment

Act as part of the operating system (SE_TCB_NAME)

Group Membership

Local Administrators

Installing the Product

The following sections contain installation information for Host Integration Server 2004.

Important notes about installation

- In this release, the installation program may not provide complete information on whether you have installed all of the software prerequisites. It is important to read the previous section, Hardware and Software Requirements, carefully and make sure all prerequisites are complete before running the install program.
- This release supports limited interoperability with previous versions of Host Integration Server and SNA Server.
- You must install this release on a computer with no previous versions (retail or Beta) of either Host Integration Server or SNA Server.
- If you uninstall the product and then reinstall, all previous administration configuration will be lost.
- To install the Client package on a local account, you must be an administrator. To install the Client package on a domain account, you can be either an administrator or a non-administrator.

Accessing the latest product documentation

A new, fully-updated documentation set is now available over the Web on a quarterly basis. Each quarterly release, which you download to your desktop, includes more in-depth information, updates, and new topics. As the new documentation will replace your current set, you will need to close all instances of Host Integration Server 2004 Help for the update to install correctly. Downloading the new Help will not affect your Host Integration Server 2004 product installation or performance in any way.

You can download the latest documentation from the following location:

http://go.microsoft.com/fwlink/?LinkId=29507

Standard Edition and Enterprise Editions

Host Integration Server 2004 is available in Standard and Enterprise editions. The Enterprise edition has the same capabilities as the Standard edition, with the addition of the following features:

Application Integration

- Transaction Integration
- Transaction Integration Designer

Message Integration

- MSMQ-MQSeries Bridge

You can use the SNAVER utility to quickly determine which version and edition of Host Integration Server 2004 is installed on the servers in your organization.

To check version and edition information

1. Click **Start**, and then click **Run...**
2. Type "snaver" and click **OK**. Your version and edition will be displayed.

To Install Host Integration Server 2004

1. In Windows Explorer, navigate to the installation folder in which you extracted the setup files.
2. Double-click **setup.exe**. The Host Integration Server 2004 Autorun panel will appear.
3. Click **Install Host Integration Server 2004** to begin installation. The Host Integration Server 2004 **Installation Wizard** appears and guides you through the rest of the installation process.
4. Click **Finish** when you are done.

To Uninstall Host Integration Server 2004 using Add/Remove Programs

1. Click **Start**, point to **Settings**, and then click **Control Panel**.
2. In Control Panel, open **Add/Remove Programs**, select **Microsoft Host Integration Server 2004** and click **Change/Remove**. The Microsoft Host Integration Server 2004 Add/Remove Application dialog box appears.
3. Click **Remove**, and then click **Next**. The **Uninstall Wizard** appears and automatically begins the uninstall process.
4. When the wizard has completed the process, click **Finish**.

Note Uninstalling Host Integration Server 2004 does not uninstall Single Sign-On. To uninstall Single Sign-On, see Uninstalling Single Sign-On below.

Unattended install

Unattended installation is useful for installing Host Integration Server 2004 on a large number of computers to ensure that they are all configured in exactly the same way. It is also useful if you need to change or update the existing configuration of a large number of computers.

You perform an unattended installation by creating a “model” installation on one computer, which you then apply to the other computers.

To perform unattended installations

1. Using the standard, Windows-based installation program, perform a full installation on a single computer. Since the installation parameters you choose will be saved as a model, make the selections you want to use on the other installations.
2. When setup is complete, run the **Configuration Wizard** on the same computer. As in Step 1, make the selections you want to use on the other installations. Stop when you reach the **Summary Page**.
3. At the **Configuration Wizard Summary Page**, click **Save**. The wizard will create a configuration file called **HISServerConfig.xml**.
4. Finish and close the **Configuration Wizard**.
5. If you need to, open **HISServerConfig.xml** in a browser and make any necessary changes.
6. On the appropriate server computer, open a command prompt and run the **Unattended Installation** command (see below). Where the command calls for the configuration file, use the name and location of the **HISServerConfig.xml** file created in Steps 1-5. You can also use the options listed below.

Commands

Use the following commands and options for unattended install.

```
Setup.exe /Product HIS /InstallPlatform /L c:\HISInstall.log /S c:\ HISServerConfig.xml /INSTALLDIR C:\HIS
```

```
ConfigFramework.exe /L c:\ConfigFramework.Log /F /S c:\HISServerConfig.xml
```

Options

/InstallPlatform

Using this flag will cause the installation program to install any platform prerequisites.

/Product [HIS | HISC]

Using this flag will install either Host Integration Server 2004 (HIS), or Host Integration Server 2004 Client (HISC).

/L c:\HISInstall.log

Using this flag will determine the log file location that is created during setup.

/S C:\HISServerConfig.xml

Using this flag will specify the configuration file (list of features) that is used on installation. The file "HISServerConfig.xml" contains information about which features to install and how they should be configured. Sample copies of these files are located in the Support\Unattended_Installs directory of the install folder. This file can also be created during setup by selecting the **Save** button in the summary panel of the Configuration Wizard.

/INSTALLDIR C:\HIS

This option tells setup where to install the product (for example C:\HIS or "C:\Program Files\Microsoft Host Integration Server\")

Unattended uninstall

Use following command for unattended uninstall:

```
Setup.exe /l C:\UninstallLog.txt /REMOVE ALL /Product HIS
```

Uninstalling Enterprise Single Sign-On

Uninstall

Uninstalling Host Integration Server will not uninstall Enterprise Single Sign-On. To uninstall this feature, use the following procedure:

1. On the **Start** menu, point to **Settings**, and then click **Control Panel**.
2. Double-click **Add/Remove Programs**.
3. In the **Add/Remove Programs** dialog box, click **Microsoft Enterprise Single Sign-On**, and click **Remove**.
4. Click **Yes** when prompted to confirm removal of Microsoft Enterprise SSO.

    Note If you have BizTalk Server Runtime, Development, or Administration features installed, or Host Integration Server Administration features installed, you will not be able to uninstall the SSO Runtime or Administration components until all dependencies are removed.

Unattended Uninstall

> **Note** You will need the original installation media to perform unattended uninstalls of Single Sign-On Server or Client versions.

Use the following commands for unattended uninstall:

HIS 2004 Server

MSIEXEC /X <Drive>\Platform\SSO\SSO.msi\SSO.MSI

HIS 2004 Client

MSIEXEC /X <Drive>\Platform\SSO\CLIENT\SSOClient.msi

> **Note** If you have BizTalk Server Runtime, Development, or Administration features installed, or Host Integration Server Administration features installed, you will not be able to uninstall the SSO Runtime or Administration components until all dependencies are removed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Making and Testing a Connection

This section provides the procedures used to make successful connections. Several steps are required to connect your host system to Microsoft® Host Integration Server 2004.

One way to remember the four steps required to make a successful connection is with the acronym **LCLUA** that stands for **L**-Link Service, **C**-Connection, **LU**-LUs and **A**-Adding and Assigning Users.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

For information about configuring Host Integration Server 2004 for your enterprise environment, see Configuring Your Enterprise.

This section contains:

- Important Connection Information
- Important Configuration Information
- Step 1 (L) Creating and Configuring Link Services
- Step 2 (C) Creating and Configuring Connections
- Step 3 (LU) Creating and Configuring 3270 LUs
- Step 4 (A) Adding and Assigning Users
- Testing the Connection

See Also

IP-DLC Link Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Important Connection Information

This section includes details about the information required to make a successful connection. Review the connection information section to verify your settings.

This section contains:

- About Making a Connection
- Items to Consider for a Successful Connection
- Verify Host Connection Information
- Verify Operating System Connection Information
- Verify Host Integration Server 2004 Information

See Also

IP-DLC Link Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

About Making a Connection

Complete the following steps to give users and groups access to the mainframe environment, install connections, and verify the installation.

(For information on the new IP-DLC Link Service, see IP-DLC Link Service.)

Install Host Integration Server 2004, which includes:

- Verify Host connection information
- Verify Microsoft Windows Server™ 2003 or Windows® 2000 Server configuration information
- Verify Host Integration Server 2004 SNA service configuration information
- Install Host Integration Server 2004
- Install appropriate link services

Configure Host Integration Server 2004, which includes:

- Step 1 (L) Creating and Configuring Link Services
- Step 2 (C) Creating and Configuring Connections
- Step 3 (LU) Creating and Configuring 3270 LUs
- Step 4 (A) Adding and Assigning Users

Test Host Integration Server 2004, which includes:

- Testing Connections with the 3270 Client
- Testing Connections with the 5250 Client

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Items to Consider for a Successful Connection

For a connection to be established successfully, a number of software settings and hardware characteristics must work together.

The following table outlines items to consider when configuring a connection with Host Integration Server 2004.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

Element	Considerations
Host configuration settings must match the connection and server settings on the Host Integration Server 2004 computer.	**Mainframe node ID settings**: For most mainframes, IDBLK and IDNUM in the physical unit (PU) definition must match the two parts of the Remote Node ID on the Host Integration Server 2004 connection. **AS/400 name settings**: For the AS/400 computer, local and remote control point names (CP names) and network names must be matched with corresponding Host Integration Server 2004 settings **Addresses**: For 802.2, X.25, or channel connections, you must match the host settings with equivalent settings on the Host Integration Server 2004 connection. **BTU length**: For the mainframe, the BTU length is set through MAXDATA in the PU definition. For the AS/400 computer, this is set through MAXFRAME. These should equal the Max BTU Length on the Host Integration Server 2004 connection. **Other settings**: With SDLC, the NRZ/NRZI settings on the host must match those on the Host Integration Server 2004 connection.
For SDLC and X.25 **Communications hardware**: line, modem (if applicable), and adapter characteristics must match the link service and connection settings on the Host Integration Server 2004 computer.	**Speed and duplexing**: For SDLC and X.25, note the speed and duplexing capabilities of the line, modem (or DCE), and adapter, to be sure that they will not be exceeded by the settings in the Host Integration Server 2004 link service and connection. Settings for fast transmission or for full duplexing cause greater demands on hardware. The hardware element with the smallest capacity limits the capacity of the entire system.

See Also

Important Connection Information

Verify Host Connection Information

Collect and review the required host connection information to ensure the host environment is set up and configured correctly.

	Required Host connection information	**Your value**
	Remote Network Address	
	Remote SAP Address	
	Local SAP Address	
	Network Name	
	Control Point Name	
	Local Node ID	
	XID Type	
	Remote Node ID	
	Peer DLC Role	
	Compression Type	
	Max BTU Length	
	Receive ACK Threshold (frames)	
	Unacknowledged Send Limit (frames)	
	Retry Limit	
	XID Retries	
	802.2 Timeouts - Response (t1)	
	802.2 Timeouts - Receive Ack (t2)	
	802.2 Timeouts - Inactivity (ti)	
	Maximum Retries	
	Delay After Failure	

See Also

IP-DLC Link Service

Important Connection Information

Verify Operating System Connection Information

Collect and review the required operating system information to ensure your operating environment is set up and configured correctly.

	Required operating system information	**Your value**
	Windows Domain Name	
	Windows Administrator Account	
	Administrator Account Password	Never disclose passwords!

See Also

IP-DLC Link Service

Important Connection Information

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Verify Host Integration Server 2004 Information

Collect and review the required Host Integration Server 2004 information to ensure the environment is set up and configured correctly.

Required Host Integration 2000 information	Your value
Service Account (domain\user)	
Service Account Password	Never disclose passwords!
Host Security Account (domain\user)	
Host Security Account Password	Never disclose passwords!
Subdomain Name	
Server Role (Primary or Backup)	
Name of Primary Server if set up as Backup Server	
Active Directory Support	
Organizational Unit for Active Directory Support	
Client/Server Protocol (TCP/IP is default)	
NetWare Tree Name	
NetWare Context Name	

See Also

IP-DLC Link Service

Important Connection Information

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Important Configuration Information

The following sections detail important configuration information:

- Using SNA Manager
- Opening a Subdomain
- Configuring Server Properties
- Configuring SNA Service Properties

See Also

IP-DLC Link Service

Using SNA Manager

SNA Manager provides an interface for configuration and operation of Host Integration Server 2004 components. SNA Manager allows flexibility in viewing and managing SNA server subdomains, computers, link services, connections, logical units (LUs), sessions, and users. It integrates the administration of TN3720 service, TN5250 service, Host Print service, Shared Folder Gateway service, and Host Security Integration.

You can view all Host Integration Server 2004 computers in an SNA server subdomain and manage multiple subdomains at the same time. This allows for central configuration and administration of all servers in an enterprise. You can remotely configure and manage Host Integration Server 2004 computers across all popular protocols, including TCP/IP, IPX/SPX, and Microsoft Networking.

SNA Manager can be installed on any computer running Windows Server 2003 or Windows 2000 Server, enabling management of the entire Host Integration Server 2004 network from a single computer. In addition, SNA Manager allows more than one administrator to simultaneously view and manage the same SNA server subdomain.

SNA Manager provides a hierarchical, tree-like view of an SNA server subdomain and all its resources.

In the console tree, the subdomain is presented as a hierarchical collection of resources. At the top of the hierarchy is the subdomain itself, which contains Servers, LU Pools, Configured Users, Workstations APPC Modes, CPI-C Symbolic Names, and Host Security Domains. You can view as much of the subdomain detail as needed by opening and closing folders.

When you click an item in the console tree, the details pane shows resources available to the item. Double-clicking an item that does not contain other objects displays the properties of the item.

Shortcut menus (available by right-clicking an object) allow selection of the appropriate command for a particular object. For example, if you select a server and right-click, a shortcut menu allows you to stop the service, control all other services, insert new resources, and view and configure the properties.

SNA Manager lets you administer more than one SNA subdomain by displaying each domain in a separate window with its own hierarchical arrangement of resources.

SNA Manager also simplifies administrative tasks by providing wizards to step you through many of the more complicated tasks, such as configuring AS/400 connectivity, configuring 3270 display LUs, and creating a range of LUs.

See Also

IP-DLC Link Service

Opening a Subdomain

Configuring Server Properties

Configuring SNA Service Properties

Opening a Subdomain

Before you can configure Host Integration Server 2004 components, you must open a subdomain.

The **Start Subdomain** dialog box can be used to change SNA subdomains including:

- Local SNA Subdomain
- Remote SNA Subdomain
- Offline Configuration

To open a subdomain

1. Start SNA Manager.
2. In SNA Manager, right-click **SNA Manager** (top level), and select **Open Subdomain**. The **Start SNA Manager for** dialog box appears.
3. Select the appropriate settings for your subdomain, and click **Finish**.

See Also

IP-DLC Link Service

Using SNA Manager

Configuring Server Properties

Configuring SNA Service Properties

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring Server Properties

The **Server Configuration** dialog box can be used to change Host Integration Server 2004 properties, including:

- Server Name
- Subdomain Name
- Active Directory OU Name
- Server Role - Primary or Backup
- Restart - MngAgent and SnaBase

To configure server properties

1. Start SNA Manager.
2. In SNA Manager, right-click the server, and select **Properties**.
3. To change the server name, click **Change** near the top of the **Server Configuration** tab. Note that the server must be offline before you can change the name.
4. To set the Group Identity (Subdomain name and Active Directory), Server Role (Primary or Backup), or Network Transports (TCP/IP is default), click **Change** near the bottom of the **Server Configuration** tab.
5. Make the appropriate changes to your configuration, and then click **OK**.
6. You must save your configuration to keep the properties you set. Right-click the server, and click **Save Configuration**.

See Also

IP-DLC Link Service

Using SNA Manager

Opening a Subdomain

Configuring SNA Service Properties

Configuring SNA Service Properties

The **SNA Service configuration** dialog box can be used to change SNA service properties, including:

- Server Comment
- Network Name
- Control Point Name

To change properties of SNA service

1. Start SNA Manager.
2. In SNA Manager, right-click **SNA Service**, and select **Properties**.
3. Make appropriate changes.
4. Click **OK** when done.
5. You must save your configuration to keep the properties you set. Right-click the server, and click **Save Configuration**.

See Also

IP-DLC Link Service

Using SNA Manager

Opening a Subdomain

Configuring Server Properties

Step 1 (L) Creating and Configuring Link Services

This section details creating and configuring link services. The maximum number of 802.2 link services that one Host Integration Server 2004 computer can support is:

- 64 per network adapter (limited by SAP)
- 255 per SNA server (limited by index from 0x01 to 0xFF)

However, SNA Manager allows only 64 link services per Host Integration Server 2004 computer, no matter how many adapters are installed on the server. To configure the number higher than this, use the utility Linkcfg.exe.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

To create and configure link services, see the following topics:

- Creating Link Services
    - Creating the DLC 802.2 Link Service
    - Creating the 3270 Demonstration
    - Creating the 5250 Demonstration
    - Creating the LU1 Print Demonstration
    - Creating the LU3 Print Demonstration
- Configuring Link Services
    - Configuring the DLC 802.2 Link Service
    - Configuring the 3270 Demonstration
    - Configuring the 5250 Demonstration
    - Configuring the LU1 Print Demonstration
    - Configuring the LU3 Print Demonstration

Creating Link Services

By default, when Host Integration Server 2004 is installed, all the software files required by all standard link services are copied to the server, but the link services themselves are not installed or configured.

The following sections contain procedures detailing how to create link services using SNA Manager. This section contains:

- Creating the DLC 802.2 Link Service
- Creating the 3270 Demonstration
- Creating the 5250 Demonstration
- Creating the LU1 Print Demonstration
- Creating the LU3 Print Demonstration

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating the DLC 802.2 Link Service

The following procedure details creating a new DLC 802.2 link service.

To create the DLC 802.2. link service

1. Start SNA Manager.
2. In SNA Manager, right-click the server on which to add the link service, point to **New**, and then click **Link Service**.
3. Select the **DLC 802.2 Link Service**, and click **Add**.
4. Configure the following link service information (if required):
   - Title
   - Adapter
   - Local Service Access Point (SAP)
   - Use Fixed SAP option
   - Allow Link Server to be Distributed option
5. Click **OK**.

   The **Insert Link Service** box will continue to be displayed, allowing you to insert additional link services as needed.
6. After you have finished adding the needed link services, click **Finish**.
7. Right-click **Link Services**, and then click **Save configuration**.

   > **Note** When the link services have been inserted, SNA Manager displays them in the **Link Services** folder.

See Also

IP-DLC Link Service

Creating Link Services

Creating the 3270 Demonstration

Creating the 5250 Demonstration

Creating the LU1 Print Demonstration

Creating the LU3 Print Demonstration

Creating the 3270 Demonstration

The following procedure details creating the Continuous 3270 Demonstration.

To create the 3270 demonstration

1. Start SNA Manager.
2. In SNA Manager, right-click the server on which to add the link service, point to **New**, and then click **Link Service**.
3. Select **DEMO SDLC Link Service**, and click **Add**.
4. Verify the script file is for the **3270 Continuous Demo** and click **OK**.

   The **Insert Link Service** box will continue to be displayed, allowing you to insert additional link services as needed.

5. After you have finished adding the needed link services, click **Finish**.
6. Right-click **Link Services**, and then click **Save configuration**.

> **Note** When the link services have been inserted, SNA Manager displays them in the **Link Services** folder.

See Also

IP-DLC Link Service

Creating Link Services

Creating the DLC 802.2 Link Service

Creating the 5250 Demonstration

Creating the LU1 Print Demonstration

Creating the LU3 Print Demonstration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating the 5250 Demonstration

The following procedure details creating the 5250 Demonstration.

To create the 5250 demonstration

1. Start SNA Manager.
2. In SNA Manager, right-click the server on which to add the link service, point to **New**, and then click **Link Service**.
3. Select **DEMO SDLC Link Service**, and click **Add**.
4. Verify the script file is for the **AS 400 Demo** and click **OK**.

   The **Insert Link Service** box will continue to be displayed, allowing you to insert additional link services as needed.

5. After you have finished adding the needed link services, click **Finish**.
6. Right-click **Link Services**, and then click **Save configuration**.

   Note When the link services have been inserted, SNA Manager displays them in the **Link Services** folder.

See Also

IP-DLC Link Service

Creating Link Services

Creating the DLC 802.2 Link Service

Creating the 3270 Demonstration

Creating the LU1 Print Demonstration

Creating the LU3 Print Demonstration

Creating the LU1 Print Demonstration

The following procedure details creating the LU1 Print Demonstration.

To create the LU1 print demonstration

1. In SNA Manager, right-click the server on which to add the link service, point to **New**, and then click **Link Service**.
2. Select **DEMO SDLC Link Service**, and click **Add**.
3. Verify the script file is for the **LU1 Print Demo** and click **OK**.

   The **Insert Link Service** box will continue to be displayed, allowing you to insert additional link services as needed.

4. After you have finished adding the needed link services, click **Finish**.
5. Right-click **Link Services**, and then click **Save configuration**.

> **Note** When the link services have been inserted, SNA Manager displays them in the **Link Services** folder.

See Also

IP-DLC Link Service

Creating Link Services

Creating the DLC 802.2 Link Service

Creating the 3270 Demonstration

Creating the 5250 Demonstration

Creating the LU3 Print Demonstration

Creating the LU3 Print Demonstration

The following procedure details creating the LU3 Print Demonstration.

To create the LU3 print demonstration

1. In SNA Manager, right-click the server on which to add the link service, point to **New**, and then click **Link Service**.
2. Select the **DEMO SDLC Link Service**, and click **Add**.
3. Verify the script file is for the **LU3 Print Demo**, and click **OK**.

   The **Insert Link Service** box will continue to be displayed, allowing you to insert additional link services as needed.

4. After you have finished adding the needed link services, click **Finish**.
5. Right-click **Link Services**, and then click **Save configuration**.

> **Note** When the link services have been inserted, SNA Manager displays them in the **Link Services** folder.

See Also

IP-DLC Link Service

Creating Link Services

Creating the DLC 802.2 Link Service

Creating the 3270 Demonstration

Creating the 5250 Demonstration

Creating the LU1 Print Demonstration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring Link Services

By default, when Host Integration Server 2004 is installed, all the software files required by all standard link services are copied to the server. After the link services are installed, they must be configured for your host environment.

The following sections contain procedures detailing how to configure link services.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

This section contains:

- Configuring the DLC 802.2 Link Service
- Configuring the 3270 Demonstration
- Configuring the 5250 Demonstration
- Configuring the LU1 Print Demonstration
- Configuring the LU3 Print Demonstration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring the DLC 802.2 Link Service

Use the following procedure to configure the DLC 802.2 link service.

To configure the DLC 80.2. link service

1. In SNA Manager, expand the server, and then click **Link Service**.
2. Right-click the DLC 802.2 **(SNADLC1)** link service, and click **Properties**.
3. In **Properties**, click **Configure**.
4. Make configuration changes, and click **OK**.
5. Click **OK** to close the **Properties** dialog box.

See Also

IP-DLC Link Service

Configuring Link Services

Configuring the 3270 Demonstration

Configuring the 5250 Demonstration

Configuring the LU1 Print Demonstration

Configuring the LU3 Print Demonstration

Configuring the 3270 Demonstration

Use the following procedure to configure the 3270 Demonstration link service.

To configure the 3270 demonstration

1. In SNA Manager, expand the serve,r and then click **Link Service**.
2. Right-click the 3270 Demonstration (**SNADEMO1**) link service, and click **Properties**.
3. In **Properties**, click **Configure**.
4. Make configuration changes, and click **OK**.
5. Click **OK** to close the **Properties** dialog box.

See Also

IP-DLC Link Service

Configuring Link Services

Configuring the DLC 802.2 Link Service

Configuring the 5250 Demonstration

Configuring the LU1 Print Demonstration

Configuring the LU3 Print Demonstration

Configuring the 5250 Demonstration

Use the following procedure to configure the 5250 (AS/400) Demonstration link service.

To configure the 5250 demonstration

1. In SNA Manager, expand the server, and then click **Link Service**.
2. Right-click the 5250 Demonstration (**SNADEMO2**) link service, and click **Properties**.
3. In **Properties**, click **Configure**.
4. Make configuration changes, and click **OK**.
5. Click **OK** to close the **Properties** dialog box.

See Also

IP-DLC Link Service

Configuring Link Services

Configuring the DLC 802.2 Link Service

Configuring the 3270 Demonstration

Configuring the LU1 Print Demonstration

Configuring the LU3 Print Demonstration

Configuring the LU1 Print Demonstration

Use the following procedure to configure the LU1 Print Demonstration link service.

To configure the LU1 print demonstration

1. In SNA Manager, expand the server, and then click **Link Service**.
2. Right-click the LU1 Print Demonstration (**SNADEMO3**) link service, and click **Properties**.
3. In **Properties**, click **Configure**.
4. Make configuration changes, and click **OK**.
5. Click **OK** to close the **Properties** dialog box.

See Also

IP-DLC Link Service

Configuring Link Services

Configuring the DLC 802.2 Link Service

Configuring the 3270 Demonstration

Configuring the 5250 Demonstration

Configuring the LU3 Print Demonstration

Configuring the LU3 Print Demonstration

Use the following procedure to configure the LU3 Print Demonstration link service.

To configure the LU3 print demonstration

1. In SNA Manager, expand the server, and then click **Link Service**.
2. Right-click the LU3 Print Demonstration (**SNADEMO4**) link service, and click **Properties**.
3. In **Properties**, click **Configure**.
4. Make configuration changes, and click **OK**.
5. Click **OK** to close the **Properties** dialog box.

See Also

IP-DLC Link Service

Configuring Link Services

Configuring the DLC 802.2 Link Service

Configuring the 3270 Demonstration

Configuring the 5250 Demonstration

Configuring the LU1 Print Demonstration

Step 2 (C) Creating and Configuring Connections

This section details creating and configuring connections.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

This section contains:

- Creating Connections
    - Creating a 3270 Connection Using a Wizard
    - Creating a 3270 Connection Manually
    - Creating a 5250 Connection Using a Wizard
    - Creating a 5250 Connection Manually
    - Creating a 5250 Local APPC LU
    - Creating a 5250 Remote APPC LU
- Configuring Connections
    - Configuring a 3270 Connection
    - Configuring a 5250 Connection
    - Configuring a 5250 Local APPC LU
    - Configuring a 5250 Remote APPC LU

Creating Connections

With Host Integration Server 2004, you can create connections with wizards or manually. Host Integration Server 2004 provides you with three wizards to aid you in installing and configuring connections to your host environment (HE).

These tools step you through configuring connection properties, creating 3270 display LUs and an LU pool, and assigning the LUs to the LU pool.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

This section contains:

Mainframe (3270) environments:

- Creating a 3270 Connection Using a Wizard
- Creating a 3270 Connection Manually

AS/400 (5250) environments:

- Creating a 5250 Connection Using a Wizard
- Creating a 5250 Connection Manually
- Creating a 5250 Local APPC LU
- Creating a 5250 Remote APPC LU

Creating a 3270 Connection Using a Wizard

The following procedure details using a wizard to create a 3270 connection. The 3270 Continuous link service will be used as an example.

To create a 3270 connection using a wizard

1. In SNA Manager, right-click the server on which to add a connection.
2. Point to **All Tasks**, and then select the **3270 Wizard** option.
3. Click **Next** on the **Welcome** screen.
4. Select the computer where SNA service resides, and click **Next**.
5. Enter a **Name** for the connection, **DM3270**, and click **Next**.
6. Select the appropriate link service, **SNADEMO1**, and click **Next**.
7. Accept the default Local Node ID information, and click **Next**.
8. Accept the default PU address information, and click **Next**.
9. Accept the default LU information, and click **Next**.
10. Click **Add** to add a member (user).
11. Select a member, click **Add**, and then click **OK**.
12. Click **Next**.
13. Click **Finish** to complete the wizard.
14. Click **OK** on the final wizard information page.
15. When the wizard completes, right-click **SNA Service**, and click **Save configuration**.
16. Stop and then start SNA service.

See Also

IP-DLC Link Service

Creating Connections

Creating a 3270 Connection Manually

Creating a 5250 Connection Using a Wizard

Creating a 5250 Connection Manually

Creating a 5250 Local APPC LU

Creating a 5250 Remote APPC LU

Creating a 3270 Connection Manually

The following procedure details creating a 3270 connection manually.

To create a 3270 connection manually

1. In SNA Manager, expand the server on which to create the connection, and then expand **SNA Service**.
2. Right-click **Connections**, point to **New**, and then click the type of connection (802.2) to be created.
3. Configure the **Connection Properties**. You are required to specify which link service to use for the connection, as well as the name of the connection and additional information. The choices you make depend on the purpose of the connection.

   The following information must be configured correctly to make a connection:

   - General Tab
   - Address Tab
   - System Identification Tab
   - DLC 802.2 Tab
4. Click **OK**.
5. Right-click **SNA Service**, and then click **Save configuration**.
6. Stop and then start SNA service.

   To display this dialog box after the connection has been created, double-click the connection in the tree view, or select the connection, and click **Properties** in the **View** menu.

See Also

IP-DLC Link Service

Creating Connections

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating a 5250 Connection Using a Wizard

The following procedure details using a wizard to create a 5250 connection.

To create a 5250 connection using a wizard

1. In SNA Manager, right-click the server on which to add a connection.
2. Point to **All Tasks**, and then select the **AS/400 Wizard** option.
3. Click **Next** on the **Welcome** screen.
4. Select the computer where SNA service resides, and click **Next**.
5. Enter a name for the connection, **DM5250**, and click **Next**.
6. Select the appropriate link service, **SNADEMO2**, and click **Next**.
7. Accept the default network name and control point name, and click **Next**.
8. Accept the default PU address information, and click **Next**.
9. Click **Finish** to complete the wizard.
10. Click **OK** on the final wizard information dialog box.
11. When the wizard completes, right-click **SNA Service**, and click **Save configuration**.
12. Stop and then start SNA service.

See Also

IP-DLC Link Service

Creating Connections

Creating a 3270 Connection Using a Wizard

Creating a 3270 Connection Manually

Creating a 5250 Connection Manually

Creating a 5250 Local APPC LU

Creating a 5250 Remote APPC LU

Creating a 5250 Connection Manually

The following procedure details creating a 5250 connection manually.

To create a 5250 connection manually

1. In SNA Manager, expand the server on which to create the connection, and then expand **SNA Service**.
2. Right-click **Connections**, point to **New**, and then click the type of connection (such as SDLC or 802.2) to be created.

   Connection Properties lets you specify which link service to use for the connection, as well as the name of the connection and additional information. The choices you make depend on the purpose of the connection.

3. Click **OK**.
4. Right-click **SNA Service**, and then click **Save configuration**.
5. Stop and then start SNA service.

   To display this dialog box after the connection has been created, double-click the connection in the tree view. Or select the connection and then, on the **View** menu, click **Properties**.

See Also

IP-DLC Link Service

Creating Connections

Creating a 3270 Connection Using a Wizard

Creating a 3270 Connection Manually

Creating a 5250 Connection Using a Wizard

Creating a 5250 Local APPC LU

Creating a 5250 Remote APPC LU

Creating a 5250 Local APPC LU

The following procedure details creating a 5250 local APPC LU manually.

To create a 5250 local APPC LU

1. In SNA Manager, expand the server on which to add the **Local APPC LU**.
2. Expand **SNA Service**, and right-click **Local APPC LU**.
3. Point to **New**, and then select **Local LU**.
4. On the **General** tab:
    - Enter LU Alias.
    - Enter Network Name.
    - Enter LU Name.
    - Enter Comment (optional).
5. On the **Advanced** tab:
    - Select if this is a member of default local APPC LU pool.
    - Enter time-out in seconds for starting invokable TPs.
    - Select implicit incoming remote LU.
    - Select LU 6.2 type.
    - Select SyncPoint support.
6. Click **OK**.
7. Right-click **SNA Service**, and click **Save configuration**.
8. Stop and then start SNA service.

See Also

IP-DLC Link Service

Creating Connections

Creating a 3270 Connection Using a Wizard

Creating a 3270 Connection Manually

Creating a 5250 Connection Using a Wizard

Creating a 5250 Connection Manually

Creating a 5250 Remote APPC LU

Creating a 5250 Remote APPC LU

The following procedure details creating a 5250 remote APPC LU manually.

To create a 5250 remote APPC LU

1. In SNA Manager, expand the server on which to add the **Remote APPC LU**.
2. Expand **SNA Service**, and right-click **Remote APPC LU**.
3. Point to **New**, and then select **Remote LU**.
4. On the **General** tab:
    - Enter Connection.
    - Enter LU Alias.
    - Enter Network Name.
    - Enter LU Name.
    - Enter Uninterpreted Name.
    - Enter Comment (optional).
5. On the **Options** tab:
    - Select if this remote LU supports parallel sessions.
    - Select implicit incoming remote LU.
    - Select Session-Level security.
    - Select SyncPoint support.
6. Click **OK**.
7. Right-click **SNA Service**, and click **Save configuration**.
8. Stop and then start SNA service.

See Also

IP-DLC Link Service

Creating Connections

Creating a 3270 Connection Using a Wizard

Creating a 3270 Connection Manually

Creating a 5250 Connection Using a Wizard

Creating a 5250 Connection Manually

Creating a 5250 Local APPC LU

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring Connections

If you run a wizard to create your connections, most of the configuration information will be added with the criteria you entered when the wizard runs. The AS/400 Wizard, the Mainframe APPC/LU6.2 Wizard, and the 3270 Wizard step you through configuring connection properties, creating 3270 display LUs and an LU pool, and assigning the LUs to the LU pool.

If you need to configure a connection manually, you may need to verify the host connection information before you can proceed. For more information, see Verify Host Connection Information.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

This section contains:

Mainframe (3270) environments:

- Configuring a 3270 Connection

AS/400 (5250) environments:

- Configuring a 5250 Connection
- Configuring a 5250 Local APPC LU
- Configuring a 5250 Remote APPC LU

Configuring a 3270 Connection

The following procedure details configuring a 3270 connection.

To configure a 3270 connection

1. In SNA Manager, expand the server on which to configure the connection, and then expand **SNA Service**.
2. Expand **Connections**, right-click the 3270 (**DM3270**) connection, and then click **Properties**.

   Connection Properties lets you specify which link service to use for the connection, as well as the name of the connection and additional information. The choices you make depend on the purpose of the connection.

3. After you have made your configuration changes, click **OK**.
4. Right-click **SNA Service**, and then click **Save configuration**.
5. Stop and then start SNA service.

See Also

IP-DLC Link Service

Configuring Connections

Configuring a 5250 Connection

Configuring a 5250 Local APPC LU

Configuring a 5250 Remote APPC LU

Configuring a 5250 Connection

The following procedure details configuring a 5250 connection.

To configure a 5250 connection

1. In SNA Manager, expand the server on which to configure the connection, and then expand **SNA Service**.
2. Expand **Connections**, right-click the 5250 (**DM5250**) connection, and then click **Properties**.

   Connection Properties lets you specify which link service to use for the connection, as well as the name of the connection and additional information. The choices you make depend on the purpose of the connection.

3. After you have made your configuration changes, click **OK**.
4. Right-click **SNA Service**, and then click **Save configuration**.
5. Stop and then start SNA service.

See Also

IP-DLC Link Service

Configuring Connections

Configuring a 3270 Connection

Configuring a 5250 Local APPC LU

Configuring a 5250 Remote APPC LU

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring a 5250 Local APPC LU

The following procedure details configuring a 5250 local APPC LU.

To configure a 5250 local APPC LU

1. In SNA Manager, expand the server on which to configure the connection, and then expand **SNA Service**.
2. Expand **Local APPC LUs**, right-click the appropriate 5250 local APPC LU, and then click **Properties**.

   Connection Properties lets you specify which LU alias to use, as well as the name of the network and LU name information. The choices you make depend on the purpose of the connection.

3. After you have made your configuration changes, click **OK**.
4. Right-click **SNA Service**, and then click **Save configuration**.
5. Stop and then start SNA service.

See Also

IP-DLC Link Service

Configuring Connections

Configuring a 3270 Connection

Configuring a 5250 Connection

Configuring a 5250 Remote APPC LU

Configuring a 5250 Remote APPC LU

The following procedure details configuring a 5250 remote APPC LU.

To configure a 5250 remote APPC LU

1. In SNA Manager, expand the server on which to configure the connection, and then expand **SNA Service**.
2. Expand **Remote APPC LUs**, right-click the appropriate 5250 remote APPC LU, and then click **Properties**.

   Connection Properties lets you specify which LU alias to use, as well as the name of the network and LU name information. The choices you make depend on the purpose of the connection.

3. After you have made your configuration changes, click **OK**.
4. Right-click **SNA Service**, and then click **Save configuration**.
5. Stop and then start SNA service.

See Also

IP-DLC Link Service

Configuring Connections

Configuring a 3270 Connection

Configuring a 5250 Connection

Configuring a 5250 Local APPC LU

Step 3 (LU) Creating and Configuring 3270 LUs

This section details information regarding creating and configuring LUs.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

This section contains:

- Creating LUs
    - Creating a 3270 Display LU
    - Creating a 3270 Printer LU
    - Creating a 3270 Application LU (LUA)
    - Creating a 3270 Downstream LU
    - Creating a Local APPC LU
    - Creating a Remote APPC LU
- Configuring LUs
    - Configuring a 3270 Display LU
    - Configuring a 3270 Printer LU
    - Configuring a 3270 Application LU (LUA)
    - Configuring a 3270 Downstream LU
    - Configuring a Local APPC LU
    - Configuring a Remote APPC LU

Creating LUs

After configuring the connection, you can create the 3270 LUs. The LUs can be display (terminal emulation) LUs, printer LUs, application LUs (LUAs), or downstream LUs.

Each 3270 LU is configured based on the type of connection used. If the connection is channel, 802.2, X.25, or SDLC, the LUs need an LU number, which identifies the LU on its connection. This number should match the LOCADDR= parameter of the LU definition in Virtual Telecommunications Access Method (VTAM) or in the Network Control Program (NCP) GEN. Up to 254 LUs can be configured for each connection, and they can be consecutively configured as a range of LUs.

You can create LUs one at a time or in a consecutively numbered range. When creating a range of LUs, all the LUs are given the same properties. You can modify individual LUs after creating them.

This section contains:

- Creating a 3270 Display LU
- Creating a 3270 Printer LU
- Creating a 3270 Application LU (LUA)
- Creating a 3270 Downstream LU
- Creating a Local APPC LU
- Creating a Remote APPC LU

Creating a 3270 Display LU

The following procedure details how to create a display LU.

To create a 3270 display LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Connections**.
2. Right-click the appropriate connection, **DM3270**, point to **New**, and then click **Display LU**.

   You can define LUs in this **Properties** dialog box. Keep the default for the **LU Number** box as 2. Two is the first available number, because one is reserved for the host.

   The LU number is meaningful to the connection. You can add a user-friendly name in the **LU Name** box.

3. Type the LU Name, **LU 2**. Leave the other boxes as they are.
4. Click the **Display Model** tab and choose **2 (24 X 80)** as the display station model. Because models can change without notification, click **Model can be overridden**.
5. Click the **Associated Printer** tab. When configuring an LU, these boxes are generally left blank.
6. Click **OK**.

See Also

IP-DLC Link Service

Creating a 3270 Printer LU

Creating a 3270 Application LU (LUA)

Creating a 3270 Downstream LU

Creating a Local APPC LU

Creating a Remote APPC LU

Creating a 3270 Printer LU

The following procedure details how to create a printer LU.

To create a 3270 printer LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Connections**.
2. Right-click the appropriate connection, **DM3270**, point to **New**, and then click **Printer LU**.

   You can define LUs in this **Properties** dialog box. Keep the default for the **LU Number** box as 3. Three is the first available number, because two was used in the previous example and one is reserved for the host.

   The LU number is meaningful to the connection. You can add a user-friendly name in the **LU Name** box.

3. Type the LU Name, **LU 4**. (You might have expected LU 3, but LU 3 is reserved for the LU3 demo.) Leave the other boxes as they are.
4. Type a comment (optional).
5. If you are using compression, select the **Use Compression** box.
6. If the workstation is secured, select the **User Workstation Secured** box.
7. Click **OK**.

See Also

IP-DLC Link Service

Creating a 3270 Display LU

Creating a 3270 Application LU (LUA)

Creating a 3270 Downstream LU

Creating a Local APPC LU

Creating a Remote APPC LU

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating a 3270 Application LU (LUA)

The following procedure details how to create an application LU (LUA).

To create a 3270 application LU (LUA)

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Connections**.
2. Right-click the appropriate connection, **DM3270**, point to **New**, and then click **Application LU (LUA)**.

   You can define LUs in this **Properties** dialog box. Keep the default for the **LU Number** box as 4. Four is the next available number, because two and three were used in the previous examples, and one is reserved for the host.

   The LU number is meaningful to the connection. You can add a user-friendly name in the **LU Name** box.

3. Type the LU Name, **LU 5**. Leave the other boxes as they are.
4. Type a comment (optional).
5. If you are using compression, select the **Use Compression** box.
6. If the workstation is secured, select the **User Workstation Secured** box.
7. If you require high priority mode, select the **High Priority Mode** box.
8. Click **OK**.

See Also

IP-DLC Link Service

Creating a 3270 Display LU

Creating a 3270 Printer LU

Creating a 3270 Downstream LU

Creating a Local APPC LU

Creating a Remote APPC LU

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating a 3270 Downstream LU

The following procedure details how to create a downstream LU.

To create a 3270 downstream LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Connections**.
2. Right-click the appropriate connection, **DM3270**, point to **New**, and then click **Downstream LU**.

   You can define LUs in this **Properties** dialog box. Keep the default for the **LU Number** box as 5. Five is the next available number, because two, three, and four were used in the previous examples and one is reserved for the host.

   The LU number is meaningful to the connection. You can add a user-friendly name in the **LU Name** box.

3. Type the LU Name, **LU 6**. Leave the other boxes as they are.
4. Type a comment (optional).
5. Click **OK**.

See Also

IP-DLC Link Service

Creating a 3270 Display LU

Creating a 3270 Printer LU

Creating a 3270 Application LU (LUA)

Creating a Local APPC LU

Creating a Remote APPC LU

Creating a Local APPC LU

The following procedure details how to create a local APPC LU.

To create a local APPC LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Local APPC LUs**.
2. Right-click **Local APPC LUs**, point to **New**, and then click **Local LU**.
3. On the **General** tab:
   - Type the LU Alias.
   - Type the Network Name.
   - Type the LU Name.
   - Type a comment (optional).
4. On the **Advanced** tab:
   - If you are a member of the local APPC LU pool, select the **Member of Default Outgoing Local APPC LU Pool** box.
   - Type the amount of time in seconds for **Timeout for Staring Invokable TPs**.
   - Select the **Implicit Incoming Remote LU**.
   - Select the **LU 6.2 Type (Independent or Dependent)**.
   - Select **SyncPoint Support** if required.
5. Click **OK**.

See Also

IP-DLC Link Service

Creating a 3270 Display LU

Creating a 3270 Printer LU

Creating a 3270 Application LU (LUA)

Creating a 3270 Downstream LU

Creating a Remote APPC LU

Creating a Remote APPC LU

The following procedure details how to create a remote LU.

To create a remote APPC LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Remote APPC LUs**.
2. Right-click **Remote APPC LUs**, point to **New**, and then click **Remote LU**.
3. On the **General** tab:
    - Type the LU Alias.
    - Type the Network Name.
    - Type the LU Name.
    - Type the Uninterpreted Name.
    - Type a comment (optional).
4. On the **Options** tab:
    - Select the **Support Parallel Sessions** box.
    - Select the **Implicit Incoming Mode**.
    - Select the **Session-Level Security** mode.
    - Select **SyncPoint Support** if required.
5. Click **OK**.

See Also

IP-DLC Link Service

Creating a 3270 Display LU

Creating a 3270 Printer LU

Creating a 3270 Application LU (LUA)

Creating a 3270 Downstream LU

Creating a Local APPC LU

Configuring LUs

This section provides information detailing configuring LUs.

This section contains:

- Configuring a 3270 Display LU
- Configuring a 3270 Printer LU
- Configuring a 3270 Application LU (LUA)
- Configuring a 3270 Downstream LU
- Configuring a Local APPC LU
- Configuring a Remote APPC LU

Configuring a 3270 Display LU

The following procedure details how to configure a display LU.

To configure a 3270 display LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Connections**.
2. Right-click the appropriate connection, **DM3270**. You should see the available LUs in the details pane.
3. Click the **Display LU**, **LU 2**, and then click **Properties**.
4. Make appropriate configuration changes, and then click **OK**.

See Also

IP-DLC Link Service

Configuring a 3270 Printer LU

Configuring a 3270 Application LU (LUA)

Configuring a 3270 Downstream LU

Configuring a Local APPC LU

Configuring a Remote APPC LU

Configuring a 3270 Printer LU

The following procedure details how to configure a printer LU.

To configure an 3270 printer LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Connections**.
2. Right-click the appropriate connection, **DM3270**. You should see the available LUs in the details pane.
3. Click the **Printer LU**, **LU 3**, and then click **Properties**.
4. Make appropriate configuration changes, and then click **OK**.

See Also

IP-DLC Link Service

Configuring a 3270 Display LU

Configuring a 3270 Application LU (LUA)

Configuring a 3270 Downstream LU

Configuring a Local APPC LU

Configuring a Remote APPC LU

Configuring a 3270 Application LU (LUA)

The following procedure details how to configure an application LU (LUA).

To configure a 3270 application LU (LUA)

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Connections**.
2. Right-click the appropriate connection, **DM3270**. You should see the available LUs in the details pane.
3. Click the **Application LU**, **LU 4**, and then click **Properties**.
4. Make appropriate configuration changes, and then click **OK**.

See Also

IP-DLC Link Service

Configuring a 3270 Display LU

Configuring a 3270 Printer LU

Configuring a 3270 Downstream LU

Configuring a Local APPC LU

Configuring a Remote APPC LU

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring a 3270 Downstream LU

The following procedure details how to configure a downstream LU.

To configure a 3270 downstream LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Connections**.
2. Right-click the appropriate connection, **DM3270**. You should see the available LUs in the details pane.
3. Click the **Downstream LU**, **LU 5**, and then click **Properties**.
4. Make appropriate configuration changes, and then click **OK**.

See Also

IP-DLC Link Service

Configuring a 3270 Display LU

Configuring a 3270 Printer LU

Configuring a 3270 Application LU (LUA)

Configuring a Local APPC LU

Configuring a Remote APPC LU

Configuring a Local APPC LU

The following procedure details how to configure a local APPC LU.

To configure a local APPC LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Local APPC LUs**.
2. Right-click the appropriate **Local APPC LU**, and then click **Properties**.
3. On the **General** tab:
   - Verify LU Alias.
   - Verify Network Name.
   - Verify LU Name.
4. On the **Advanced** tab:
   - Verify you are a member of the local APPC LU pool, and then select the **Member of Default Outgoing Local APPC LU Pool** box.
   - Verify the amount of time in seconds for **Timeout for Staring Invokable TPs**.
   - Verify the **Implicit Incoming Remote LU**.
   - Verify the **LU 6.2 Type**.
   - Verify **SyncPoint Support**.
5. Click **OK**.

See Also

IP-DLC Link Service

Configuring a 3270 Display LU

Configuring a 3270 Printer LU

Configuring a 3270 Application LU (LUA)

Configuring a 3270 Downstream LU

Configuring a Remote APPC LU

Configuring a Remote APPC LU

The following procedure details how to configure a remote LU.

To configure a remote APPC LU

1. In SNA Manager, expand **Servers**, expand **SNA Service**, and then expand **Local APPC LUs**.
2. Right-click the appropriate remote LU, and then click **Properties**.
3. On the **General** tab:
    - Verify Connection.
    - Verify Network Name.
    - Verify LU Name.
    - Verify Uninterpreted Name.
4. On the **Options** tab:
    - Verify Supports Parallel Sessions box.
    - Verify Implicit Incoming Mode.
    - Verify Session-Level Security.
    - Verify SyncPoint Support.
5. Click **OK**.

See Also

IP-DLC Link Service

Configuring a 3270 Display LU

Configuring a 3270 Printer LU

Configuring a 3270 Application LU (LUA)

Configuring a 3270 Downstream LU

Configuring a Local APPC LU

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Step 4 (A) Adding and Assigning Users

This section describes adding users and assigning LUs to configured users.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

This section contains:

- Adding Users
- Assigning LUs to Configured Users
- Assigning Remote APPC LUs to Configured Users

Adding Users

Although Host Integration Server 2004 utilizes the User accounts of the Windows Server 2003 or Windows 2000 Active Directory® directory service, users must be configured to use Host Integration Server 2004 resources such as LUs.

To add new users

1. In SNA Manager, expand the SNA subdomain where the users reside.
2. Right-click **Configured Users**, point to **New**, and then click **User**.
3. Select a user (or group) from the list, and click **OK**.

See Also

IP-DLC Link Service

Assigning LUs to Configured Users

Assigning Remote APPC LUs to Configured Users

Assigning LUs to Configured Users

Although Host Integration Server 2004 utilizes the User accounts of the Windows Server 2003 or Windows 2000 Active Directory directory service, users must be configured to use Host Integration Server 2004 resources such as LUs.

To assign LUs to configured users

1. In SNA Manager, expand the SNA subdomain where the users reside.
2. Expand **Configured Users**. Select a user, and then right-click **Assign LUs**.
3. Select an LU, and then click **OK**.

The list of LUs that a particular user can access depends on how the user connects to Host Integration Server 2004. If Active Directory is used, a user can access any LUs assigned directly to the user account and can also access any LUs assigned to any of the groups the user is a member of. If not using Active Directory, a user can only access LUs assigned directly to the user, or if no LUs are assigned to the user account, then the user can access LUs assigned to exactly one group. The groups are checked in the following order: global groups, local groups, well known groups. There is no ordering within a group.

See Also

IP-DLC Link Service

Adding Users

Assigning Remote APPC LUs to Configured Users

Assigning Remote APPC LUs to Configured Users

Although Host Integration Server 2004 utilizes the User accounts of the Windows Server 2003 or Windows 2000 Active Directory directory service, users must be configured to use Host Integration Server 2004 resources such as LUs.

To assign remote APPC LUs to a configured user

1. In SNA Manager, expand the SNA subdomain where the users reside.
2. Select **Servers**, expand **Servers**, select a server, expand it, and then expand **Remote APPC LUs**.
3. Select an LU, right-click it, and assign it to a user.
4. Select the user, and click **OK**.

See Also

IP-DLC Link Service

Adding Users

Assigning LUs to Configured Users

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Testing the Connection

The topics in this section detail testing, including running and configuring, the 3270 and 5250 Client applications.

For information on the new IP-DLC Link Service, see IP-DLC Link Service.

This section contains:

- Testing Connections with the 3270 Client
  - Running the 3270 Client
  - Configuring the 3270 Client
  - Running the 3270 Client Demonstration
- Testing Connections with the 5250 Client
  - Running the 5250 Client
  - Configuring the 5250 Client
  - Running the 5250 Client Demonstration

Testing Connections with the 3270 Client

The 3270 Client can be used to access your mainframe (3270) environment.

This section contains:

- Running the 3270 Client
- Configuring the 3270 Client
- Running the 3270 Client Demonstration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Running the 3270 Client

The following procedure details running the 3270 Client application.

To run the 3270 client

1. Start **SNA Manager**.
2. On the **Tools** menu, click **3270 Client**. This launches the Host Integration Server 2004 3270 Client application.
3. Next, configure the 3270 Client application. For details, see Configuring the 3270 Client.

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Configuring the 3270 Client

The following procedure details configuring the 3270 Client application.

The 3270 continuous demo will be used for this procedure.

To configure the 3270 client

1. Start SNA Manager.
2. On the **Tools** menu, click **3270 Client**.
3. On the **Session** menu, click **Session Configuration**.
4. Select the correct LU or pool name, **DM3270**, and then click **OK**.
5. Next, run the 3270 demonstration. For details, see Running the 3270 Client Demonstration.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Running the 3270 Client Demonstration

The following procedure details running the 3270 continuous demonstration.

To run the 3270 client demonstration

1. Start SNA Manager.
2. On the **Tools** menu, click **3270 Client**.
3. On the **Session** menu, click **Connect**, which connects you to the 3270 demonstration script.
4. Return to SNA Manager. The status of the DM3270 connection should show **Active**.

See Also

IP-DLC Link Service

Testing Connections with the 3270 Client

Testing Connections with the 5250 Client

The 5250 Client can be used to access your AS/400 environment. The following topics detail running and configuring the 5250 Client application.

This section contains:

- Running the 5250 Client
- Configuring the 5250 Client
- Running the 5250 Client Demonstration

Running the 5250 Client

The following procedure details running the 3270 Client application.

To run the 5250 client

1. Start SNA Manager.
2. Right-click **SNA Service**, and click **Start**.
3. On the **Tools** menu, click **5250 Client**. This launches the Host Integration Server 2004 3270 Client application.
4. Next, configure the 5250 Client application. For details, see Configuring the 5250 Client.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring the 5250 Client

The following procedure details configuring the 5250 Client application.

The 5250 (AS/400) demo will be used for this procedure.

To configure the 5250 client

1. Start SNA Manager.
2. On the **Tools** menu, click **5250 Client**.
3. On the **Session** menu, click **Session Configuration**.
4. Select the correct LU or pool name, **DM5250**, and then click **OK**.
5. Next, run the 5250 demonstration. For details, see Running the 5250 Client Demonstration.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Running the 5250 Client Demonstration

The following procedure details running the 5250 demonstration.

To run the 5250 client demonstration

1. Start SNA Manager.
2. On the **Tools** menu, click **5250 Client**.
3. On the **Session** menu, click **Connect**, which connects you to the 5250 (AS/400) demonstration script.
4. Return to SNA Manager. The status of the DM5250 connection should show **Active**.

See Also

Testing Connections with the 5250 Client

Configuring Your Enterprise

While the section Making and Testing a Connection provided the basic steps to configure a link service, make a connection, create logical units (LUs), and log on to a host computer, this section follows a similar format and provides the concepts and procedures for configuring Host Integration Server 2004 in your enterprise.

For information about the new IP-DLC Link Service, see IP-DLC Link Service.

This section contains:

- Creating and Configuring Link Services
- Creating and Configuring Connections
- Creating and Configuring LUs
- Configuring APPC LUs for TPs or 5250 Emulation
- Managing Users

Creating and Configuring Link Services

By default, when Host Integration Server 2004 is installed, all the software files required by all standard link services are copied to the server, but the link services themselves are not installed or configured.

For information about the new IP-DLC Link Service, see IP-DLC Link Service.

The following procedures detail how to create link services using SNA Manager:

- Creating DLC 802.2 Link Service
- Creating the 3270 Demonstration
- Creating the 5250 Demonstration
- Creating the LU1 Print Demonstration
- Creating the LU3 Print Demonstration

The following procedures detail how to configure link services using SNA Manager:

- Configuring the DLC 802.2 Link Service
- Configuring the 3270 Demonstration
- Configuring the 5250 Demonstration
- Configuring the LU1 Print Demonstration
- Configuring the LU3 Print Demonstration

Creating and Configuring Connections

You can create connections between Host Integration Server 2004 and your host computer with wizards or manually. Host Integration Server 2004 provides three wizards to help you install and configure connections to your host environment (HE).

The AS/400 Wizard, the Mainframe APPC/LU 6.2 Wizard, and the 3270 Wizard step you through configuring connection properties, creating 3270 display LUs and an LU pool, and assigning the LUs to the LU pool.

For information about the new IP-DLC Link Service, see IP-DLC Link Service.

The following procedures detail how to create connections:

Mainframe (3270) environments:

- Creating a 3270 Connection Using a Wizard
- Creating a 3270 Connection Manually

AS/400 (5250) environments:

- Creating a 5250 Connection Using a Wizard
- Creating a 5250 Connection Manually
- Creating a 5250 Local APPC LU
- Creating a 5250 Remote APPC LU

If you use a wizard to create your connections, most of the configuration information is added along with the criteria you entered when the wizard runs.

If you need to configure a connection manually, you may need to verify some of your connection information. For more information, see Important Connection Information.

Creating and Configuring LUs

After you configure the connection, you can create the 3270 LUs. The LUs can be display LUs (terminal emulation), printer LUs, application LUs (LUAs), or downstream LUs.

Each 3270 LU is configured based on the type of connection used. If the connection is channel, 802.2, X.25, or Synchronous Data Link Control (SDLC), the LUs need an LU number, which identifies the LU on its connection. This number should match the LOCADDR= parameter of the LU definition in Virtual Telecommunications Access Method (VTAM) or in the Network Control Program (NET) Gen. Up to 254 LUs can be configured for each connection, and they can be consecutively configured as a range of LUs.

You can create LUs one at a time or in a consecutively numbered range. When you create a range of LUs, all the LUs are given the same properties. You can modify individual LUs after creating them.

For information about the new IP-DLC Link Service, see IP-DLC Link Service.

For procedures about creating LUs, see the following:

- Creating a 3270 Display LU
- Creating a 3270 Printer LU
- Creating a 3270 Application LU (LUA)
- Creating a 3270 Downstream LU
- Creating a Local APPC LU
- Creating a Remote APPC LU

For procedures about configuring LUs, see the following:

- Configuring a Range of 3270 LUs
- Assigning LUs to Workstations
- Associating 3270 Printer LUs with 3270 Display LUs
- Configuring Downstream Connections
- Configuring APPC LUs for TPs or 5250 Emulation
- Precedence of Accounts in Determining Default LUs

To modify a 3270 LU

1. In SNA Manager, ensure that the appropriate service is inactive by right-clicking **SNA service**, and then click **Stop**.
2. Double-click **Connections**, and then double-click the connection that contains the LU you want to view.
3. Right-click the LU whose properties you want to view, and then click **Properties**. Click the appropriate tab to view or modify the LU properties.
4. Click **Save Configuration** on the **Action** menu if you made changes, and then restart the affected service.

   Note Restarting the server disconnects all users. Try to schedule configuration changes when they least affect users.

Configuring a Range of 3270 LUs

You can create a consecutively numbered range of LUs. To do so, you will need to identify the base LU name—limited to eight characters—on which the numbered range of names will be built.

After identifying the base LU name, you can create the LUs by identifying the number of LUs in the range and the number the range will start with. Host Integration Server 2004 will create LUs using the sequential numbering scheme.

To configure a range of 3270 LUs

1. In SNA Manager, ensure that the appropriate service is inactive by right-clicking **SNA service**, and then click **Stop**.
2. Right-click the connection to which you want to assign the LUs. Point to **All Tasks**, and then click the **Range of LUs**.
3. Fill in the LU Creation Wizard, and click **Finish** when done.
4. On the **Action** menu, click **Save Configuration**.
5. On the **Action** menu, click **Refresh**.

    Note When you create a range of LUs, all the LUs are given the same properties. You can modify individual LUs after creating them.

See Also

Creating and Configuring LUs

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating LU Pools

Although you can create individual LUs and assign them to users and groups, using LU pools to manage and deploy a large number of LUs is a more efficient method of administering these resources.

LU pools are groupings of 3270, LUA, or downstream LUs that allow you to maximize access to LUs. A user, LUA application, or downstream system using the pool can get LU access as long as one of the pooled LUs is available. If some of the pooled LUs are not functioning, the user, LUA application, or downstream system will not be affected, as long as another LU in the pool is available.

LU pools allow groups of intermittent users to use resources efficiently. For example, ten 3270 users who only need intermittent access may find that a pool of five 3270 LUs is adequate for their needs.

If a user needs access to multiple LU sessions, you can assign one LU or LU pool for each session that the user needs. A pool can be assigned multiple times to the same user.

To encourage efficient use of LUs, you can change the order in which they appear in lists seen by the user. For example, you can place an LU at the top of the list, so the user is likely to try that LU first.

In this security mode, if a user is assigned LUs through one or more accounts (such as group and individual accounts), the LUs accumulate, allowing the user to access all LUs assigned to that user.

For example, a 3270 LU called LU 1 is assigned to a user account (a high-priority account) called JOHND. At the same time, an LU named LU 2 is assigned to a local group (a low-priority account) of which JOHND is a member. JOHND will be given access to both LU 1 and LU 2.

You can place LUs in pools by using the drag-and-drop feature. After configuring the LU pool properties (pool name, pool type, and 3270 display model), you can select the LUs to be added and then drag them to the named pool.

An LU can be removed from an LU pool by simply deleting it from the pool.

The following procedures will help you manage your LU pools:

- To create LU pools
- To assign a 3270 LU to a connection
- To assign LUs and LU pools to users and groups
- To view LUs or pools assigned to users
- To add 3270 LUs to a pool
- To add a workstation and assign LUs
- To remove an LU from a pool

To create LU pools

1. In SNA Manager, right-click the **Pools** folder, point to **New**, and then click **3270 Display LU Pool**.
2. In **Pool Properties**, enter a name for your pool, up to eight characters in length. A comment is optional.
3. Leave the check box cleared, and click **OK**.
4. The new pool appears in the **Pools** folder.

To assign a 3270 LU to a connection

1. In SNA Manager, expand SNA service for the server you are working with, and then expand **Connections**.
2. Right-click the connection where you want to add the LU, point to **New**, and click the type of 3270 LU you want to assign.
3. In the **3270 LU Properties** box, enter the LU Name. The LU number is system-assigned.
4. Click **OK** to exit.
5. On the **Action** menu, click **Save Configuration**.

To assign LUs and LU pools to users and groups

1. In SNA Manager, right-click the LU or LU pool, click **Assign to User**, and then select the users you want to assign.
2. Click **OK**.
3. Verify that the state of the server is active and that the connections are available (either **OnDemand** or **Active**). If the server is not active, right-click the server in SNA Manager, and then click **Start**.

To view LUs or pools assigned to users

1. In SNA Manager, double-click **Configured Users**. Then click the user or group that you want to view. The details pane shows the LUs and pools assigned to that user or group, plus other details, such as status and LU number.
2. To view local or remote APPC LUs assigned to a user or group, right-click the targeted user or group, and click **Properties** under **Configured Users**. Click the **APPC Defaults** tab. When you are done viewing, click **Cancel**.

To add 3270 LUs to a pool

1. In SNA Manager, expand **Servers**, and then expand the server you are working with.
2. Expand **Connections**, and then click the connection that contains the needed 3270 LUs.
3. In the right pane, right-click the 3270 LU that you want to assign and click **Assign Pool**.
4. In the dialog box, click the pool to which you want to assign the LU, and then click **OK**.
5. Repeat steps 2 and 3 for each LU that you want to assign to a pool.
6. On the **Action** menu, click **Save Configuration**.

   Note To verify that the LUs are in the correct pool, make sure the **Pools** node is expanded, double-click the name of the affected pool, and view its LUs in the details pane.

   Both the LUs and the LU pool must be of the same type (3270).

To add a workstation and assign LUs

1. In SNA Manager, right-click **Workstations**, point to **New**, and then click **Workstation**.
2. Fill in the **Workstation Properties** dialog box.
3. Click **OK** to add the new workstation.
4. To assign LUs to the workstation, double-click **Connections**, and then double-click the connection that contains the needed LUs.
5. Right-click the LU that you want to assign, and click **Assign to Workstation**.
6. In the dialog box, click the workstation, and then click **OK**.
7. On the **Action** menu, click **Save Configuration**.

   Note All workstation users must be members of the same SNA subdomain. You can avoid having to add each user to the subdomain by assigning the **Everyone** group to the subdomain and assigning no LUs to the group.

To remove an LU from a pool

1. In SNA Manager, click **Pools**.
2. Right-click the LU that you want to remove, and then click **Delete**.
3. In the **Confirmation** dialog box, click **Yes** to delete the LU.
4. On the **Action** menu, click **Save Configuration**.
5. On the **Action** menu, click **Refresh**.

   Note An empty pool provides no LU access.

See Also

Creating and Configuring LUs

Assigning LUs to Workstations

You can assign LUs to a workstation rather than a user, which makes it possible to lock LUs to a particular workstation. Assigning an LU to a workstation makes it easier for users to find and access different resources. For example, it makes it easier for a user at a workstation to use a printer located near the workstation, instead of one assigned to the user.

With this feature, you can insert a workstation object and define it by specifying parameters such as IP address, workstation name, and others. You can then assign 3270 display and printer LUs to the workstation. These LUs will be accessible to any users connecting from those workstations. The LUs do not need to be specifically assigned to the user.

For example, 200 hospital users share 50 workstations and 50 printers. Users may want to use any of the 50 workstations and 50 printers. They can log on to any of the 50 workstations and print using the printer attached to that workstation. Instead of assigning all 50 printers to 200 user accounts, the administrator can add the 50 workstations to Host Integration Server 2004 and assign a printer LU to each workstation. When a user logs on to any of the 50 workstations, the printer attached to that workstation will be available in the list of LUs.

You can also configure a workstation so that it will only allow the use of those LUs assigned to the workstation, regardless of the user who is logged on. You can assign LUs to workstations in the same manner that LUs are assigned to users.

For example, if the workstation is flagged for restricted access, a user cannot gain unauthorized access to other LUs regardless of the user ID and password that is used. This feature enhances network security.

To assign LUs to workstations

1. In the Host Integration Server 2004 console tree, right-click **Workstations**, point to **New**, and then click **Workstation**.
2. Fill in the **Workstation Properties** dialog box.
3. Click **OK** to add the new workstation.
4. To assign LUs to the workstation, click **Connections**, and then click the connection that contains the LUs.
5. Right-click the LU that you want to assign, and click **Assign to Workstation**.
6. Click the workstation, and click **OK**.
7. On the **Action** menu, click **Save Configuration**.

   Note All workstation users must be members of the same SNA subdomain. You can avoid having to add each user to the subdomain by assigning the **Everyone** group to the subdomain and assigning no LUs to the group.

See Also

Associating 3270 Printer LUs with 3270 Display LUs

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Associating 3270 Printer LUs with 3270 Display LUs

Users who have host applications with direct relationships between display LUs and printer LUs can associate printers with the LUs.

You can associate a printer LU with a display LU. This feature is designed to support specialized host applications that have hard-coded associations between display LUs and printer LUs. When a 3270 display LU is configured to have an associated printer and then subsequently assigned to a user or group, users will see both the display LU and a special printer LU named ASSOCPRT. When users connect to the display LU, they can then open the ASSOCPRT LU, which Host Integration Server 2004 maps to the defined associated printer LU.

You can also add display LUs with associated printer LUs to LU pools. The LU pools can then be assigned to users and groups.

When multiple display LUs are assigned to users, the order in which the resources are opened is important. If all of the display LUs have associated printers, the user should alternate opening displays and ASSOCPRTs. If some of the display LUs do not have associated printers, use a naming convention so the user can determine the display LUs that have associated printers from those that do not.

To associate printer LUs to display LUs

1. In the Host Integration Server 2004 console tree, click **Pools**.
2. Right-click the display LU that you want to associate with a printer, and click **Properties**.
3. Click the **Associated Printer** tab.
4. In the **Associated Printer LU** box, select the printer that you want to associate, and then click **OK**.
5. Repeat steps 2 through 4 for each display LU that you want to associate with a printer LU.
6. On the **Action** menu, click **Save Configuration**.

   Note Printer LUs are available to any users or groups that have been assigned the corresponding display LUs.

   Associated printer LUs are assigned a generic placeholder name of ASSOCPRT.

See Also

Assigning LUs to Workstations

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring Downstream Connections

You can configure Host Integration Server 2004 to enable downstream LUs to communicate with the host. Following are the general procedures:

1. Gather needed information about the host and downstream systems, including information about identifiers, such as addresses and exchange identification (XID), and information about Max BTU Length.
2. Configure the host connection as you would configure any other host connection. When specifying the remote end for the connection, select **Host System**.
3. Select the host connection and assign and configure one or more new downstream LUs.
4. Optionally, you can put downstream LUs into a pool to maximize their availability.
5. Configure the downstream connection. When specifying the remote end for the connection, select **Downstream**.

   The downstream connection can be an 802.2, SDLC, or X.25 connection. It cannot be a channel connection.

6. Select the downstream connection and associate the downstream LUs (from step 3) and LU pools (from step 4) with that connection.
7. If necessary, reorder the downstream LU numbers; that is, the LU numbers used by the downstream system.

   A downstream LU has two LU numbers: one recognized by the downstream system and one recognized by the host. These numbers need not match.

To put configuration changes into effect, save the configuration file and restart the server (if you have added a link service or connection).

> **Note** It is recommended that you manually separate the sessions of your downstream pools if you are upgrading from SNA Server 4.0 or later. If this is not done, you may experience incorrect behavior from Host Integration Server 2004 when attempting to connect downstream client computers.

After creating the downstream LUs, you must associate them with the downstream connection they will use. Downstream LUs do not stand alone and need to be mapped to the upstream LU. Associating the LUs with the upstream connection maps the correct downstream LUs to the correct upstream LUs.

Downstream LUs have two parameters:

- The LU number, which identifies the LU to the host.
- The downstream LU number, which identifies an LU or LU pool to the downstream system.

The LU number and the downstream LU number need not match, and probably will not match. The downstream LU number should match the LU number on the downstream system.

Check with the host administrator for the correct value of the LU number. It should match the LOCADDR= parameter of the LU definition in VTAM or in the NCP Gen. If the number you specify has already been assigned to an LU or an APPC LU-LU pair on the current connection, you must change the number. The range for LU numbers is 1 through 254.

Host Integration Server 2004 assigns a downstream LU number to each LU or LU pool assigned to the downstream connection. Host Integration Server 2004 assigns downstream LU numbers starting with 2 and ascending sequentially. Therefore, one way to change downstream LU numbers is to reorder the list of LUs for the downstream connection. Another way to change downstream LU numbers is to use empty LU pools to take up unwanted numbers, leaving the correct (larger) numbers for other LU pools or LUs.

> **Note** The LU numbers generated for an LU range are sequential. If the numbers assigned by your host administrator are not sequential, you can modify the numbers of individual LUs after they have been created.

You can move one or more downstream LUs to a different host connection, regardless of whether the LUs were created as part of a range. Although downstream LUs can be associated with multiple downstream connections, they can be assigned to only one host connection.

You can configure multiple LUs simultaneously by configuring them as a consecutively numbered range. After configuring the range of LUs, you can modify the numbering of individual LUs in the range.

To configure a downstream connection

1. In the Host Integration Server 2004 console tree, expand **Servers**, expand the server you are working with.
2. Right-click **Connections**, point to **New**, and click either **802.2**, **SDLC**, or **X.25**.

3. Fill in the **Connection Properties** dialog box, type a name for the new downstream connection, select a link service, and type a comment.
4. Under **Remote End**, select **Downstream**.
5. Under **Allowed Directions**, select an option. For SDLC downstream connections, select **Outgoing Calls**.
6. If you selected **Outgoing Calls**, under **Activation**, select either **On Server Startup** or **By Administrator**.
7. Click the other tabs to specify other connection parameters between the downstream system and Host Integration Server 2004. Click **OK** to exit.
8. On the **Action** menu, click **Save Configuration**.
9. To put the configuration changes into effect, you must restart the server.

   Note Restarting the server disconnects all users. Try to schedule configuration changes when they least affect users.

   Two connections are needed for a downstream system: a downstream connection (from the downstream system to the computer running Host Integration Server 2004) and an ordinary host connection (from the computer running SNA Server to the host).

   Activation does not affect incoming calls. A connection that accepts incoming calls begins to listen for these calls when the server node is started.

To assign a downstream LU to a host

1. Before you begin, verify that you have configured the host connection that the downstream LU will use.
2. Ensure that the server is inactive. If necessary, right-click the appropriate server node, and click **Stop**.
3. Double-click **SNA service**, and then double-click **Connections**.
4. Right-click the host connection to which you want to assign a downstream LU, point to **New**, and then click **Downstream LU**.
5. Enter the LU name. Click **OK** to exit.
6. On the **Action** menu, click **Save Configuration**.

   Note After you assign a new downstream LU to a host, you must also associate that LU with a downstream connection.

   A downstream LU pool must contain LUs from a single server. Downstream LUs cannot access pooled downstream LUs from multiple servers.

To view or modify a downstream LU

1. Right-click the LU whose properties you want to view, and click **Properties**.
2. In the **Properties** dialog box, do one of the following:
   - View the properties and click **Cancel**.
   - Modify the properties and click **OK**.
3. If you made changes, on the **Action** menu, click **Save Configuration**.
4. Stop and restart **SNA service**.

To assign a downstream LU

1. In the Host Integration Server 2004 console tree, expand **Servers**, expand the server you are working with, and then click **Connections**.
2. Right-click the host connection to which you want to assign the downstream LU, point to **New**, and click **Downstream LU**.
3. Fill in the **Connection Properties** dialog box, and click **OK**.
4. On the **Action** menu, click **Save Configuration**.

To associate a downstream LU with a downstream connection

1. Verify that the server is inactive. If necessary, right-click the service node and click **Stop**.
2. In the Host Integration Server 2004 console tree, select the downstream LUs from the host connection.

   To select several adjacent items, click the first item you want, hold down SHIFT, and click the last item.

   To select several nonadjacent items, hold down CTRL as you click the items that you want.

3. Drag the LUs from the host connection to the downstream connection.
4. On the **Action** menu, click **Save Configuration**.

    Important If a downstream system needs access to multiple LU sessions, assign one LU or LU pool for each session needed. You can assign a pool multiple times to the same downstream connection.

    Note Before you can associate downstream LUs with a downstream connection, you must define the host connection, downstream connection, and the LUs.

    Note Downstream LU pools must contain LUs from a single server. Downstream LUs cannot access pooled downstream LUs from multiple servers.

See Also

Creating and Configuring LUs

Reordering Downstream LUs

An administrator might create a downstream LU called DOWNLU3, and then realize that two additional LUs are needed. After creating the LUs, with the names DOWNLU2 and DOWNLU4, the LUs would be associated with the listed LU numbers.

LU name	**Downstream LU number**
DOWNLU3	2
DOWNLU2	3
DOWNLU4	4

To change the downstream numbers so that they match the digits in the LU names, DOWNLU2 could be reordered so that it is placed before DOWNLU3.

LU name	**Downstream LU number**
DOWNLU2	2
DOWNLU3	3
DOWNLU4	4

To reorder the numbering of downstream LUs

1. Verify that the server is inactive. If necessary, right-click the server node, and click **Stop**.
2. In the Host Integration Server 2004 console tree, select the downstream connection with which the LUs are associated.
3. Select one or more LUs and pools that you want to move up in the list.

   To select several adjacent items, click the first item you want, hold down SHIFT, and click the last item.

   To select several nonadjacent items, hold down CTRL as you click the items that you want.

1. To move LUs up or down in the list, click the up or down arrow buttons on the Host Integration Server 2004 toolbar.
2. To put configuration changes into effect, restart the server.

To create a downstream pool

1. Right-click **Pools**, point to **New**, and then click **Downstream LU Pool**.
2. Type a pool name and, if desired, a comment. This name identifies the pool on SNA Server, not on the host or downstream system.
3. To add LUs to the new downstream pool, double-click **Connections**, and then double-click the connection that has the LUs you want to work with.
4. Verify that the **Pools** node is fully expanded, and drag the first LU into the pool.
5. To add more LUs to the pool, drag each LU from its place in the **Connections** folder to its downstream LU pool.
6. On the **Action** menu, click **Save**.

   Note Downstream LU pools must contain LUs from a single server. Downstream LUs cannot access pooled downstream LUs from multiple servers.

See Also

Creating and Configuring LUs

Configuring APPC LUs for TPs or 5250 Emulation

The following is an overview of the procedures to add and configure APPC LUs:

1. Assign the local APPC LU to a server.
2. Configure the local APPC LUs:
    - For an independent LU, specify the LU Alias, Network Name, and LU Name. Depending on system configuration, you may need to specify other information.
    - For a dependent LU, specify LU Alias, LU Number, and LU Name. Depending on system configuration, you may need to specify other information.
3. Create a remote APPC LU on a connection and configure the remote APPC LU:
    - For a remote LU to be used with an independent local LU, specify the LU Alias, Network Name, and LU Name. Depending on system configuration, you may need to specify other information. For communication with an AS/400 computer, make the remote LU name the same as the name of the AS/400 computer.
    - For a remote LU to be used with a dependent local LU, specify the LU Alias, Network Name, LU Name, and Uninterpreted LU Name. Depending on system configuration, you may need to specify other information.
4. Optionally, configure session security for the remote LU.
5. You must configure an appropriate mode if it has not already been done.
6. Optionally, assign a default local APPC LU and a default remote APPC LU to users and groups.
7. If you are using Common Programming Interface for Communications (CPI-C), configure one or more CPI-C symbolic destination names.
8. If you are using the display verb, you may want to change the default connection that Host Integration Server 2004 uses for the verb. To ensure that all changes take effect, restart the server.

    Note APPC LUs are used for transaction programs (TPs) or for 5250 emulation. APPC LUs used with TPs are generally for communication between TPs on different systems, not communication between TPs on a single system.

To add local and remote APPC LUs

1. In the Host Integration Server 2004 console tree, double-click **SNA service**, and then click **Local APPC LUs**.
2. On the **Action** menu, point to **New**, and click **Local LU**.
3. Configure the properties for the local LU, and then click **OK**.
4. To add the remote LU, click **Remote APPC LUs**.
5. On the **Action** menu, point to **New**, and click **Remote LU**.
6. Configure the properties for the remote LU, and click **OK**.
7. On the **Action** menu, click **Save Configuration**.

    Note APPC uses both local and remote LUs. These LUs need to be properly configured before Host Integration Server 2004 can communicate with the AS/400 computer.

    The option, **Member of Outgoing Local APPC LU Pool**, differs from other types of LU pools, such as the 3270, LUA, and downstream LU pools.

    Configuring session security for remote LUs is optional.

To configure incoming APPC sessions

1. Verify that you have configured a remote LU to represent the incoming host or that you have configured one remote LU for each host.
2. In the Host Integration Server 2004 console tree, double-click **Local APPC LUs**, and then click the local LU that you want to configure.
3. On the **Action** menu, click **Properties**.
4. Click the **Advanced** tab, specify the **Implicit Incoming Remote LU**, which is the name of the incoming host, and then click **OK**.
5. Repeat steps 2–4 for each local APPC LU that you want to configure.
6. On the **Action** menu, click **Save Configuration**.

Note All incoming requests must specify a local LU name that is recognized by Host Integration Server 2004, even when using an Implicit Incoming Remote LU and Implicit Incoming Mode.

To assign default APPC LUs to users or groups

1. In the Host Integration Server 2004 console tree, double-click **Configured Users**, and click the user or group that you want to configure.
2. On the **Action** menu, click **Properties**.
3. Click the **APPC Defaults** tab.
4. In the **Local APPC LU** box, select a default local APPC LU.
5. In the **Remote APPC LU** box, select a default remote APPC LU, and then click **OK**.
6. On the **Action** menu, click **Save Configuration**.

See Also

Creating and Configuring LUs

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Precedence of Accounts in Determining Default LUs

When user and group account memberships overlap, the highest-priority account that contains a default local APPC LU determines that LU for the user, and the highest-priority account that contains a default remote APPC LU determines that LU for the user. Accounts are prioritized as follows:

1. User accounts (highest priority)
2. Subdomain groups
3. Local groups
4. Well-known groups such as Everyone (lowest priority)

For example, suppose a user account (a high-priority account) called JOHND contains LOCLU1 as the default local APPC LU, but no default remote APPC LU. At the same time, suppose a local group (a low-priority account) of which JOHND is a member contains LOCLU2 as the default local APPC LU, and REMLU2 as the default remote APPC LU. For JOHND, the high-priority assignment, a default local APPC LU of LOCLU1, will be combined with the only other available assignment, a default remote APPC LU of REMLU2.

To assign or edit CPI-C information

1. In the Host Integration Server 2004 console tree, click **CPI-C Symbolic Names**.
2. On the **Action** menu, point to **New**, and click **CPI-C Symbolic Name**.
3. Fill in the **Properties** dialog box, and click **OK**.
4. On the **Action** menu, click **Save Configuration**.

   Note If you are using applications based on Common Programming Interface for Communications (CPI-C), use this procedure to configure the CPI-C symbolic destination name.

To configure the default display verb

1. In SNA Manager, select the subdomain that you want to configure.
2. On the **Action** menu, click **Properties**.
3. Click the **Display Verb** tab.
4. Select the default connection for the display verb, and click **OK**.
5. On the **Action** menu, click **Save Configuration**.

   Note When the display verb does not specify a connection, Host Integration Server 2004 uses the connection that you specify in this procedure. If you do not specify a default display verb connection, Host Integration Server 2004 randomly selects a connection for the verb to use.

To configure hot backup for 5250 LUs

Configuring hot backup involves setting up a system environment in which one resource can automatically fill in if another fails. In such a configuration, resources are interchangeable.

1. Configure one connection to the AS/400 computer for each computer that runs Host Integration Server 2004 and supports the 5250 protocol.
2. Create a local LU on each server, specifying the following:
   - For **LU 6.2 Type**, select **Independent**.
   - For **LU Alias**, specify the same string on each server.
   - For **LU Name**, specify a unique string on each server. This is required to avoid device name conflicts across servers.
3. Create a remote LU on each server and give all the remote LUs the same LU name and alias, (which must match the Control Point Name of the AS/400 computer).

   Be sure that the **Supports Parallel Sessions** box is selected for these LUs.
4. Make the local and remote LUs available to users and groups, by doing one of the following:
   - For each group or user that uses 5250, select the appropriate default local APPC LU and the appropriate default remote APPC LU.
   - To keep this process simple, use or create a group that includes all 5250 users, and assign the appropriate default LUs

to that group.

- For the 5250 emulator, have users specify the local and remote LUs when configuring a session on the emulator.

Note To achieve hot backup, Host Integration Server 2004 chooses a server to connect with the AS/400 computer based on availability. This distributes the load more evenly.

To configure hot backup for 5250 users, you must configure multiple servers and pairs of LUs that can all handle sessions to the intended AS/400 computer.

For better protection against failure, use multiple servers, and not multiple connections on the same server.

To configure a server with multiple connections to the same AS/400 computer

1. In the Host Integration Server 2004 console tree, double-click **Connections**.
2. Click the first connection that you want to configure.
3. On the **Action** menu, click **Properties**.
4. Click the **System Identification** tab, and fill in the properties for the local and remote node.
5. Click **OK** to exit the dialog box.
6. Repeat steps 2 through 5 for each connection to the same AS/400 computer.
7. On the **Action** menu, click **Save Configuration**.
8. After you configure a connection, you must stop and restart the server.

Important Each connection to the same AS/400 computer must use a separate link service.

Note This procedure makes the fully qualified network name unique for each connection.

The settings that you specify in this procedure override the fully qualified network name configured in the properties for the server.

To configure a connection for dynamic definition of remote APPC LUs

1. Select the connection that you want to configure.
2. On the **Action** menu, click **Properties**.
3. On the **General** tab in the **Properties** dialog box, select **Supports Dynamic Remote APPC LU Definition**, and click **OK**.
4. On the **Action** menu, click **Save Configuration**.

See Also

Configuring APPC LUs for TPs or 5250 Emulation

Managing Users

Although Host Integration Server 2004 utilizes the User accounts of the Microsoft® Windows Server™ 2003 or Windows® 2000 Active Directory® directory service, users must be configured to use Host Integration Server 2004 resources such as LUs.

To create users

1. In SNA Manager, expand the SNA subdomain where the users reside.
2. Right-click **Configured Users**, point to **New**, and then click **User**.
3. Select a user (or group) from the list, and click **OK**.

To view active 3270 users

1. In SNA Manager, expand **Servers**, and then expand the server you are working with.
2. Click **Active Users**. The results pane shows the active 3270 users and provides details such as **User Name**, **Client**, and **Server**.

See Also

Configuring APPC LUs for TPs or 5250 Emulation

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Operations

This section includes individual User’s Guides for all feature sets of Microsoft® Host Integration Server 2004. These guides contain the concepts, procedures, and security best practices necessary to operate your deployment of Host Integration Server 2004.

This section contains:

- Application Integration User's Guide
- Data Integration User's Guide
- Network Integration User's Guide
- Messaging User's Guide
- Security User's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Application Integration User's Guide

Transaction Integrator (TI) is the synchronous COM+ or .NET application integration solution in Microsoft® Host Integration Server 2004. TI enables you to integrate mainframe-based transaction programs (TPs) and AS/400 transactions with component-based Windows Server System™ applications under the following conditions:

- A synchronous or transactional solution is needed
- Both the client and server systems are running at the time the call is made

If you need an application integration solution that does not require the client and server systems to be running at the time the call is made, use an asynchronous messaging solution such as the MSMQ-MQSeries Bridge instead of TI. In an asynchronous solution, the middle-tier queuing system is running at the time the client issues a request message, the server retrieves the message and sends back the reply, and then the client receives the reply back from the middle tier.

With TI, you can integrate existing mainframe-based TPs with Windows-based COM, distributed COM (DCOM), or .NET applications. You might not even have to modify your TP if you have separated the business logic from the presentation logic. The wizards in TI guide you through the modification process, step by step.

With TI, you can preserve existing CICS and IMS TPs as you move to a three-tier client/server or Web-to-host computing environment. By using TI to invoke mainframe transactions, you can program in the visual object-oriented environments and programming languages that you know while you maintain access to host transactions.

TI supports both SNA connectivity and TCP/IP connectivity without requiring a host footprint or costly host transaction rewrites. You can choose SNA connectivity if you need two-phase commit (2PC), or choose TCP/IP connectivity if you need direct throughput. IBM has not implemented 2PC for the TCP/IP protocol, but for those cases where 2PC is not necessary, TCP/IP can give you direct connectivity.

True integration of online transaction processing (OLTP) with COM- or .NET-compliant systems means the integration of CICS and IMS with Windows-based solutions. CICS and IMS are widely used in the mainframe arena to create distributed OLTP solutions such as customer tracking and order entry. TI integrates CICS and IMS with COM by creating COM interfaces or .NET interfaces to the CICS and IMS transactions and then running the CICS and IMS transactions on the mainframe from Windows.

A TI component in a COM+ application works in concert with the TI run-time environment, Microsoft Distributed Transaction Coordinator (MS DTC), and the associated remote environment (RE) to drive a CICS or IMS TP. Together, they accomplish these tasks:

- Activate the host (mainframe) TP.
- Pass the parameters specified by the TI component to the TP.
- Run the TP.
- Return the results to the TI component.

Once you deploy a TI component (a type library .tlb file) in a COM+ application, that COM+ application becomes a TI *Automation server*. When a client application invokes a method in that TI Automation server, Windows automatically starts the TI run-time environment in the associated remote environment to invoke the mainframe transaction that is associated with that TI method. Component Services in Windows 2000 automatically handles any class factory, early or late binding, or other internal operations needed. The invoked mainframe transaction can call other transactions on the mainframe before it returns the result to the COM-based client application through the TI Automation server.

This section contains:

- Introduction to Host-Initiated Processing
- Installing Transaction Integrator
- Remotely Administering Transaction Integrator
- The Transaction Integrator Manager Console
- Using Host-Initiated Processing
- Using Windows-Initiated Processing
- Test an Application Using Capture and Playback

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Introduction to Host-Initiated Processing

This section features an example of communication between a central data center and multiple branch offices. It shows how the Host-Initiated Processing (HIP) feature of Microsoft® Host Integration Server 2004 enables such communication.

An important goal of a successful enterprise organization is to reduce costs and increase profitability. One approach to achieving this goal is to improve operating efficiency and streamline the production process. A common obstacle to achieving this goal is the cost of integrating legacy data-storage systems with newer desktop systems often used at remote sites.

A typical enterprise organization might run its daily operations using mission-critical applications composed of customized COBOL programs running in an IBM MVS environment either as scheduled batch jobs or as online programs in CICS and IMS transaction programs. Such an organization faces the challenge of bringing data from external sources into the legacy batch processing flow without disrupting predefined automated processing schedules.

These external sources are likely to be based on new Windows®-based computing solutions—for example Microsoft SQL Server™ and Microsoft BizTalk® Server—that offer qualities such as performance, scalability, and reliability. Taking advantage of emerging Windows-based technologies and integrating them with legacy business processes can be daunting for most IT departments, because the organization must invest in costly and complex development programs to build applications to achieve that integration.

Microsoft Host Integration Server 2004 offers a variety of tools that help you effectively and rapidly implement new integration solutions. The Host-Initiated Processing (HIP) feature enables you to build applications that integrate resources like SQL Server databases, BizTalk orchestration schedules, BizTalk messaging, and Microsoft Exchange Server with enterprise application processes that drive data acquisition from those Windows-based resources.

HIP is composed of three core features:

- **Transaction Integrator Designer.** You use Transaction Integrator Designer to build and deploy integrated business processes that are initiated from IBM legacy batch processing jobs or CICS and IMS transaction manager environments so that they can easily and seamlessly access services and resources in the Microsoft Windows environment (for example, COM+, the NET Framework, BizTalk Server).
- **Transaction Integrator Manager.** You use Transaction Integrator Manager to configure endpoints, associate resources with requests, and define security and access rules. With TI Manager, you can easily integrate IBM client application programs and Windows services and resources.
- **HIP Service.** The HIP Service is a run-time service that manages the Windows communications endpoint for accepting requests from programs in an IBM environment, presenting the requests to a Windows resource, and returning the resulting information from the resource to the requesting IBM application program.

The example presented in this section shows how you can use HIP to integrate processes between legacy and Windows-based applications.

This section contains:

- A Typical Banking System Using Legacy Processes
- How HIP Can Help to Streamline the Processes

A Typical Banking System Using Legacy Processes

Enterprise organizations using IBM operating environments like MVS, CICS, and IMS need solutions for automatically incorporating data from remote sites and for integrating this information into existing business processing systems. Enterprise organizations also need to release knowledge workers from constraints imposed by the data center's schedules, resources, and computing capacity, especially when the processes are periodically run under control of an automated scheduling system.

The following three situations exemplify these needs:

- Legacy batch processing systems need to routinely pull information from one or more remote sites.
- Existing batch processing systems or online transaction programs need to push periodic updates to remote sites.
- Online transaction programs need to report, log, or notify knowledge workers of sales or business activity.

A typical enterprise organization uses large IBM mainframe systems running MVS or z/OS in a centralized data center, and small and mid-range systems running OS/400, MVS, or z/OS at remote sites.

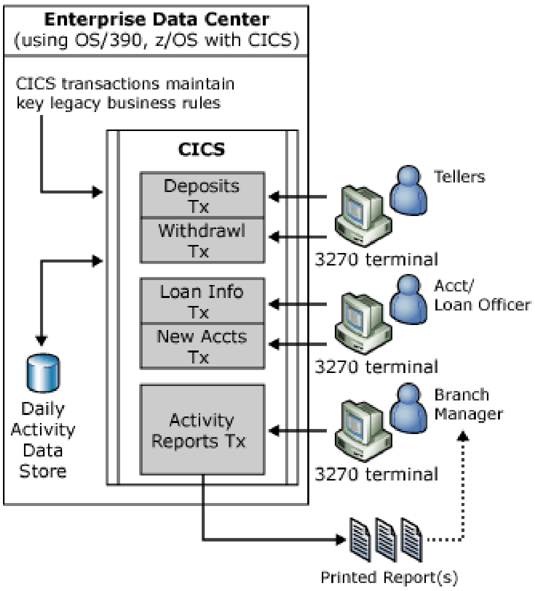
The following topics describe typical enterprise environment operations within a banking system, and how knowledge workers interact with that system.

This section contains:

- Legacy Online Activity
- Legacy Off-Peak Batch Processing
- Legacy Batch Processing Systems Updating Branch Offices
- Legacy Systems Handling Notification Requests

Legacy Online Activity

The following diagram shows an enterprise environment in which a central data center maintains the data store and legacy business rules in online processing systems. Daily transactions are collected and maintained in a data store for subsequent processing during off-peak hours. Businesses that typically operate under these rules include banks, insurance companies, and subscription fulfillment firms.


Enterprise Data Center
(using OS/390, z/OS with CICS)
CICS transactions maintain key legacy business rules
CICS
Deposits Tx
Withdrawl Tx
Loan Info Tx
New Accts Tx
Activity Reports Tx
Daily Activity Data Store
Tellers
3270 terminal
Acct/ Loan Officer
3270 terminal
Branch Manager
3270 terminal
Printed Report(s)

The activities illustrated are:

- Online bank teller activity occurs throughout business hours, using standard IBM 3270 terminal devices.
- Online account and loan officer activity occurs throughout business hours, using standard IBM 3270 terminal devices.
- Data is captured for later processing during off-peak hours. Legacy business rules are applied to the daily data captured during online entry.
- The branch manager requests periodic reports. These requests are made from standard IBM 3270 terminal devices to a CICS transaction. The reports are typically printed to an IBM 3270 printer at the remote location.
- The report is generated by the CICS transaction and sent to a standard IBM 3270 printer at the remote site. The branch manager can then review the printed report material.

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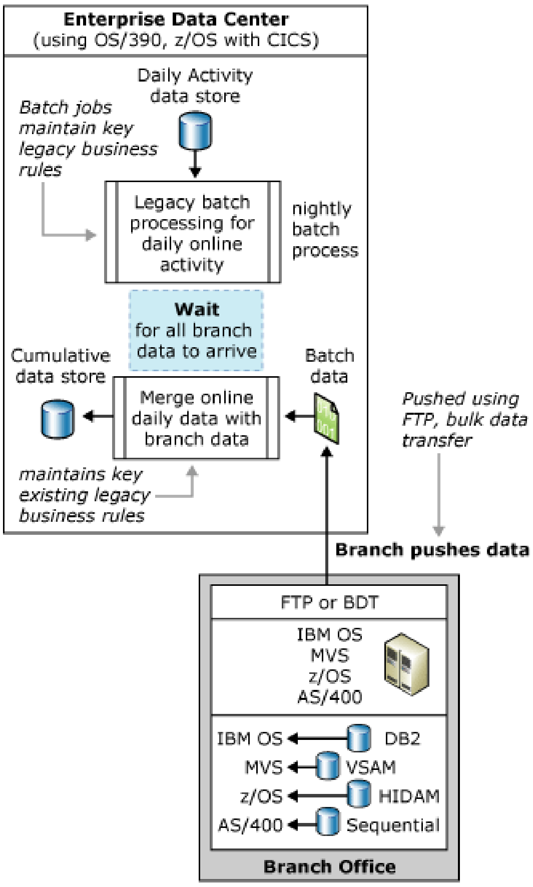
Legacy Off-Peak Batch Processing

The following diagram continues the banking application scenario by showing the central data center that maintains the data store and legacy business rules in the batch processing system. The central data center uses the daily transaction activity from online processing and merges additional business data from branch offices.

When all daily activity is available, merging and final processing can continue. The final processing must be complete before the organization opens for business the next day. This makes the business processes very time-sensitive.


Enterprise Data Center
(using OS/390, z/OS with CICS)
Daily Activity data store
Batch jobs maintain key legacy business rules
Legacy batch processing for daily online activity
nightly batch process
Wait for all branch data to arrive
Cumulative data store
Batch data
Merge online daily data with branch data
Pushed using FTP, bulk data transfer
maintains key existing legacy business rules
Branch pushes data
FTP or BDT
IBM OS
MVS
z/OS
AS/400
IBM OS
DB2
MVS
VSAM
z/OS
HIDAM
AS/400
Sequential
Branch Office

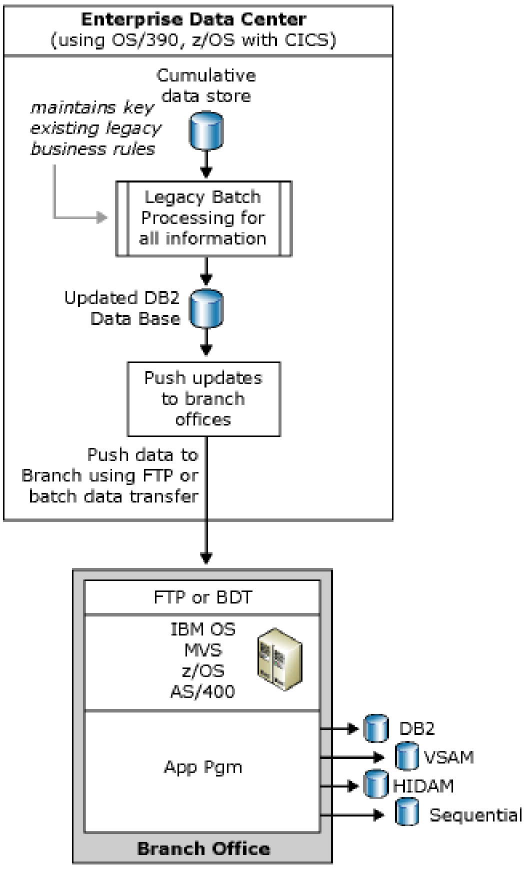
The activities illustrated are:

- Data is collected from online activity processed during off-peak hours. Validation is performed by batch jobs that correlate and apply legacy business rules to this raw transaction data.
- The central data center includes the data from remote sites in the processing stream.
- The data center processing schedule is delayed until all the branch offices have delivered their daily data, typically through bulk data transfers (BDT), File Transfer Protocol (FTP), or file drop procedures. The length of the delay can be affected by geographic locations of the branch offices, staffing, and availability of the processing systems at the branch offices.
- Each branch office typically delivers its daily activity data through BDT, FTP, or file drop procedures that are manually initiated.
- After all branch office data is available to the central processing system, the validated online activity data from the central data center and the remote site data are merged to produce a cumulative image of the daily activity.

Legacy Batch Processing Systems Updating Branch Offices

The following diagram continues the banking application scenario by showing business processes that occur after the cumulative data is available at the central data center.

Before the organization opens for business the following day, the data center must apply business rules to the cumulative data and must make the online systems available for the next day. Delays in this process can be expensive and can damage trust on the part of the branch offices.


Enterprise Data Center
(using OS/390, z/OS with CICS)
Cumulative data store
maintains key existing legacy business rules
Legacy Batch Processing for all information
Updated DB2 Data Base
Push updates to branch offices
Push data to Branch using FTP or batch data transfer
FTP or BDT
IBM OS
MVS
z/OS
AS/400
App Pgm
DB2
VSAM
HIDAM
Sequential
Branch Office

The activities illustrated are:

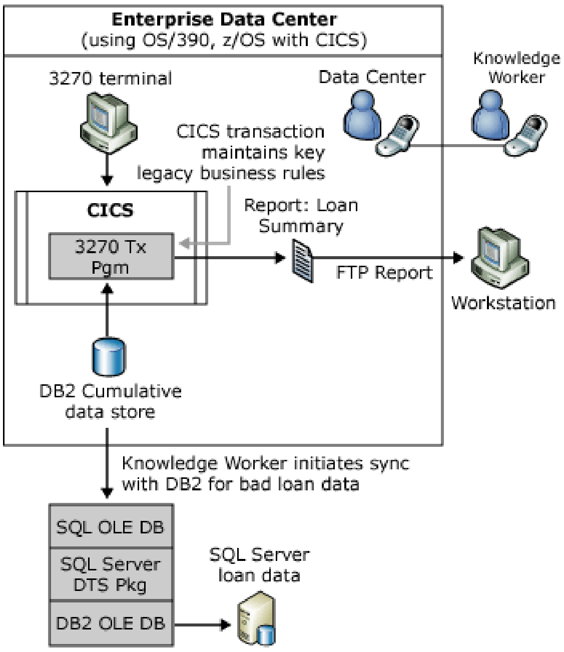
- The cumulative data store is made available for continued processing. Legacy business rules are applied to the data through batch processing.
- Legacy business processes eventually update the central data center’s data repository.
- The final batch processing step is to distribute the information to the branch offices. This process is accomplished by techniques similar to those that initially receive the data from the remote sites (BDT, FTP, or file drop).
- There can be logistics problems (from the central data center’s perspective) in getting the branch office data stores updated with accurate and timely information. The process can be affected by the reliability of the branch office operations staff and availability of their processing systems. If any one of the branch offices does not successfully receive and update the data stores, the business as a whole is adversely affected.
- Each branch office must receive the information and update its local data store.

Legacy Systems Handling Notification Requests

Additional workloads can be placed on the central data center's processing capacity when knowledge workers request special information that is maintained in the central data center's repositories. This information could be raw data, preprocessed data, or summarized reports.

In legacy processing systems there can be long delays between the time a request is made and the time the information can be delivered to the knowledge worker. These delays are typically due to limited central data center resources used to analyze the request and present the data, or to limited processing capacity for handling special requests.

The following diagram continues the banking application scenario by showing a typical delivery of information (such as sales forecasts, financial updates, or budget changes) to knowledge workers throughout the organization. A knowledge worker can request some of this information on an as-needed or periodic basis.


Enterprise Data Center
(using OS/390, z/OS with CICS)
3270 terminal
Data Center
Knowledge Worker
CICS transaction maintains key legacy business rules
CICS
3270 Tx Pgm
Report: Loan Summary
FTP Report
Workstation
DB2 Cumulative data store
Knowledge Worker initiates sync with DB2 for bad loan data
SQL OLE DB
SQL Server DTS Pkg
DB2 OLE DB
SQL Server loan data

The activities illustrated are:

- A knowledge worker calls the data center and makes a special request.
- The data center accepts the call, identifies the calling individual, and determines the nature of the request.
- The data center starts an online transaction to satisfy the request.
- The online transaction produces the requested information.
- Reports are sent to the requesting knowledge worker.
- The knowledge worker begins a manual process to synchronize the data repository in the IBM environment (DB2) with the local repository (SQL Server). This allows the knowledge worker to produce custom reports that help improve the corporate processes (such as bad loans, mortgages, or overdraft accounts).

How HIP Can Help to Streamline the Processes

The challenge for most organizations is to design and implement a comprehensive solution that is reliable and that seamlessly fits into the data center's established legacy processing procedures and schedules. Technical issues surrounding this challenge include:

- Building customized reliable data transfer application programs and procedures.
- Allowing remote sites to use new emerging technologies (Windows, SQL Server, BizTalk Server, the .NET Framework, COM+) to improve operating efficiency while maintaining compatibility with legacy data center processing procedures.
- Moving away from the manual scheduling procedure of legacy procedures to automated scheduling and automatic execution of new procedures associated with local or remote sites.

The Host-Initiated Processing (HIP) feature of Host Integration Server 2004 delivers a simple solution that enterprise organizations need to bridge the gap between old and new technologies. HIP is highly scalable, high performing, robust, and easily administered for integrating legacy processing procedures with the Windows Server System™ environment.

The following topics describe how the use of HIP and .the NET Framework can assist with integration in the banking application scenario.

This section contains

- Integration Objectives
- Providing Data Center and Remote Site Independence
- Using Host-Initiated Processing

Integration Objectives

This scenario integrates legacy enterprise business processing systems and rules that are maintained in a centralized data center with remote site operations. Its objectives are:

- Use Microsoft technologies to improve site cost effectiveness, efficiency, and operations while allowing the central data center to maintain its investment in legacy business rules captured in the COBOL application programs.
- Provide seamless integration of existing data center processing procedures with new business systems written for Microsoft environments.
- Provide access to Microsoft Windows services through standard IBM operating systems, transaction manager facilities, and data sources that are familiar to individuals working in those IBM environments.
- Allow the central data center to use less costly human resources to develop portions of the solution, reserving more expensive personnel resources to maintain the legacy systems and lend support to integration with new business rules on Microsoft server platforms.

The next section describes how these objectives can be applied to assist an enterprise customer to improve business operations.

Providing Data Center and Remote Site Independence

The organization’s central data center is the reliable and secure place to maintain the corporate data. However, it can be time-consuming and costly for the data center staff to satisfy special requests for data and information. Remote sites are often better equipped for such tasks.

However, in cases where the remote sites are running small IBM systems (for example, OS/400, OS/390, or z/OS), the cost to maintain, enhance, and customize the application systems running there can be staggering. These costs include hardware, operating system software, and application systems. Perhaps the most costly are the human resources necessary to work on these legacy systems. Few knowledgeable COBOL programmers are available. People who can effectively and efficiently maintain MVS operating systems are rare, as are those who are competent in CICS and IMS system generation and maintenance.

In the IBM operating environment, it is difficult to react quickly to customer needs. Using Microsoft technologies to run day-to-day business at remote sites enables those sites to improve their operating efficiency and to gain flexibility. In turn, this enables them to provide a personal level of contact and support for their customers.

Integration of data between the data center and remote sites using Microsoft technologies must be seamless and efficient. After this is accomplished, the data center benefits from not dealing with special requests for information, and the remote sites gain the flexibility to manage local business operations in a manner that benefits customer relations.

Using Host-Initiated Processing

Inserting host-initiated processing into the legacy business processing model can streamline the data center operations with little impact on the legacy system processing architecture.

The banking scenario described earlier can be made more efficient and cost effective by:

- Replacing legacy remote site operating environments with streamlined systems based on Microsoft technologies (Windows Server™ 2003, the .NET Framework, COM+, SQL Server, and BizTalk Server).
- Allowing the knowledge worker to use the Transaction Integrator feature to subscribe to data and information that is maintained by the central data center and updated on a periodic basis.
- Using the Host-Initiated Processing (HIP) feature to systematically pull data from remote sites.
- Using HIP to systematically update remote site data stores.
- Using HIP to notify knowledge workers about information availability.
- Using HIP to automatically deliver or synchronize custom data with knowledge workers.

The following topics describe a similar banking system that takes advantage of the capabilities of the Host Integration Server 2004 HIP feature.

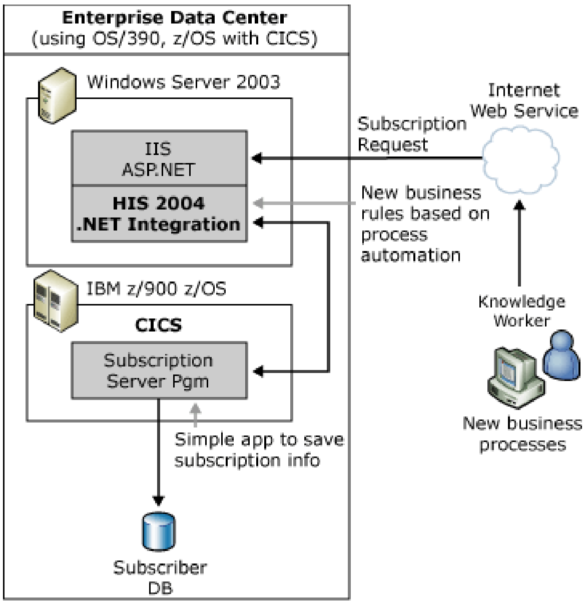
This section contains:

- Subscribing to Data Center Services
- Updated Online Activity
- Automated Accumulation of Business Data
- Distributing Information by Pushing Updates
- Distributing Information by Pulling Updates

Subscribing to Data Center Services

It is time and resource intensive for a knowledge worker to repeatedly request data or information from a data center. The .NET Framework application integration feature of Host Integration Server 2004 enables the knowledge worker to use Microsoft technologies to make such a request just one time. After the request is made, the central data center can periodically deliver the information to the knowledge worker any time that it is available.

The following diagram shows the banking scenario using .NET Framework application integration.


Enterprise Data Center
(using OS/390, z/OS with CICS)
Windows Server 2003
IIS
ASP.NET
HIS 2004
.NET Integration
IBM z/900 z/OS
CICS
Subscription
Server Pgm
Simple app to save subscription info
Subscriber DB
Internet Web Service
Subscription Request
New business rules based on process automation
Knowledge Worker
New business processes

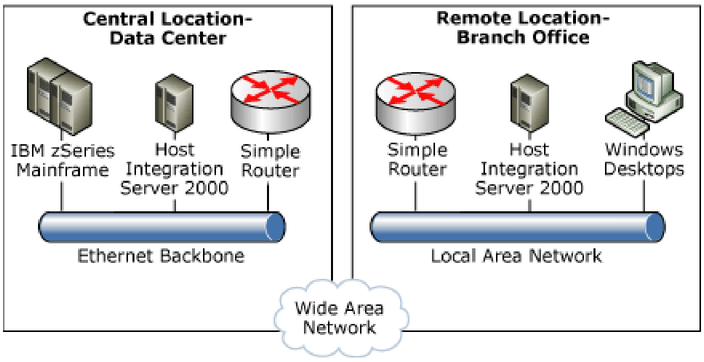
The activities illustrated are:

- The knowledge worker uses Microsoft technologies to manage customer relationships and business processes at the remote site.
- The knowledge worker uses the .NET Framework and the Host Integration Server 2004 .NET Integration Web Service to build new business rules and to subscribe to the central data center for periodic custom information updates and other notifications.
- The new business rules are based on the .NET Framework and on Web services that are part of the Host Integration Server 2004 .NET Integration feature.
- The Host Integration Server 2004 .NET object executes a CICS subscription transaction that records the subscription request.
- The request is recorded to a subscriber database for later use in the existing business processing system.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Updated Online Activity

The following diagram shows the updated banking application scenario. This enhanced online transaction processing system uses HIP to automatically deliver report data to a Web site so that branch managers and knowledge workers can access the information using robust new technologies that provide high availability.


Central Location-
Data Center
IBM zSeries Mainframe
Host Integration Server 2000
Simple Router
Ethernet Backbone
Remote Location-
Branch Office
Simple Router
Host Integration Server 2000
Windows Desktops
Local Area Network
Wide Area Network

The activities illustrated are:

- Online bank teller activity occurs throughout business hours, using standard IBM 3270 terminal devices.
- Online account and loan officer activity occurs throughout business hours, using standard IBM 3270 terminal devices.
- Data is captured for later processing during off-peak hours. Legacy business rules are applied to the daily data captured during the online entry.
- Based on subscription information provided at an earlier time, an online transaction constructs a report or raw data that is automatically delivered, using HIP, to a predefined Web site or Web service.
- A knowledge worker can generate custom reports to meet customer needs. A branch manager can either view the requested reports through an easy-to-use Web service or view the raw data on the Web site. The availability of the data on the Web site is now independent of the central data center's schedule.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

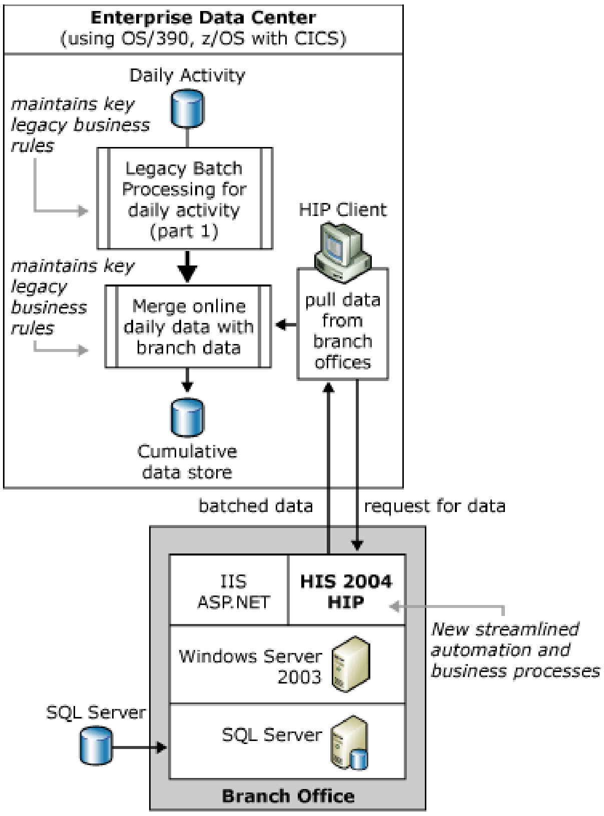
Automated Accumulation of Business Data

While the knowledge worker drives the process of subscribing to the central data center for updates, the central data center should control the process of accumulating daily data from the remote sites. The central data center's control of the data acquisition process removes barriers to timely processing of all data by the organization as a whole.

Remote sites have different needs. They need to have their daily data available from the central data center when they need it, which is typically outside the normal business hours for the remote site.

The remote sites also need to have the freedom and flexibility to develop new business rules that improve their customer partnerships. The use of Microsoft technologies such as SQL Server, BizTalk Server, the .NET Framework, and Web services can help the remote sites achieve their specialized and responsive needs.

The HIP feature brings together these disparate processing models by providing a way to easily insert steps into legacy batch processing systems to retrieve data from an intelligent remote site and seamlessly present the data to an existing business process.

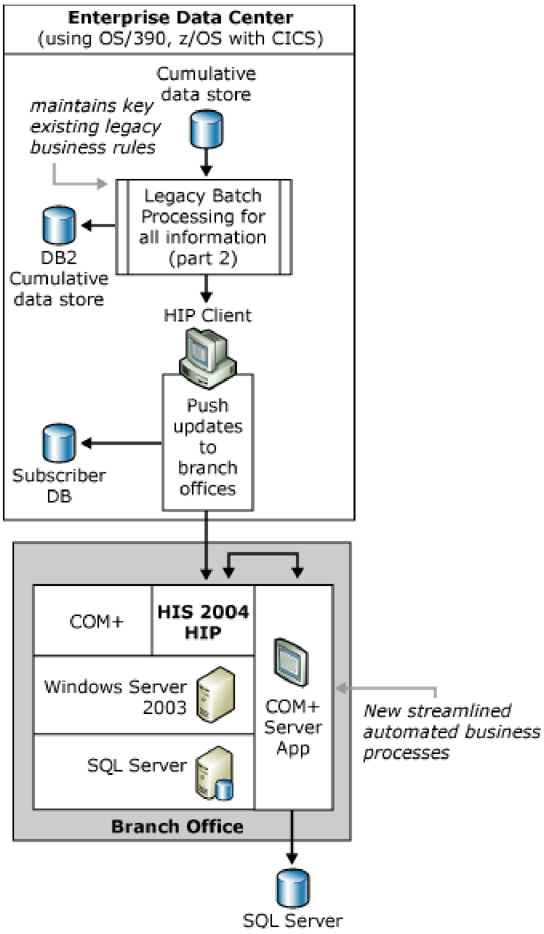

Enterprise Data Center
(using OS/390, z/OS with CICS)
Daily Activity
maintains key legacy business rules
Legacy Batch Processing for daily activity (part 1)
HIP Client
maintains key legacy business rules
Merge online daily data with branch data
pull data from branch offices
Cumulative data store
batched data
request for data
IIS ASP.NET
HIS 2004 HIP
New streamlined automation and business processes
Windows Server 2003
SQL Server
SQL Server
Branch Office

The activities illustrated are:

- The daily online activity data is presented to the batch processing system that is run during off-peak hours. Validation, correlation, and the merging of business rules are applied to this data in preparation for subsequent processing.
- A step (an application program), which acts as a HIP client, is inserted into the legacy batch processing system to retrieve data from each remote site. This application program can be written in a language that is familiar to people who work in IBM environments (for example, COBOL). This step in the legacy batch processing system contacts each site and retrieves the daily data.
- The central data center processing does not have to "wait" for the remote site to deliver the data.
- The remote site does not have to be attended.
- The HIP client accepts the request, activates the COM+ or .NET object, and returns data in a form that is native to the legacy IBM operating environment (for example, COBOL copybook data constructs). This information is then presented to the existing batch processing system, usually in the form of a sequential file.
- The daily data from the central data center and the remote sites is merged into a cumulative data store that is maintained at the central data center.

Distributing Information by Pushing Updates

The following diagram shows subsequent business processes performed on the cumulative data collected by the central data center. Before the organization opens for business the following day, the data center must apply its business rules against the cumulative data and make the online systems available for the next day of business.


Enterprise Data Center
(using OS/390, z/OS with CICS)
Cumulative data store
maintains key existing legacy business rules
Legacy Batch Processing for all information (part 2)
DB2 Cumulative data store
HIP Client
Push updates to branch offices
Subscriber DB
COM+
HIS 2004 HIP
Windows Server 2003
SQL Server
COM+ Server App
New streamlined automated business processes
Branch Office
SQL Server

The activities illustrated are:

- The cumulative data store is available for continued processing at the central data center. Legacy business rules are applied to the data and the central data store is updated.
- A batch processing step uses the information that was previously entered into the subscription database to distribute the updates to the remote sites.

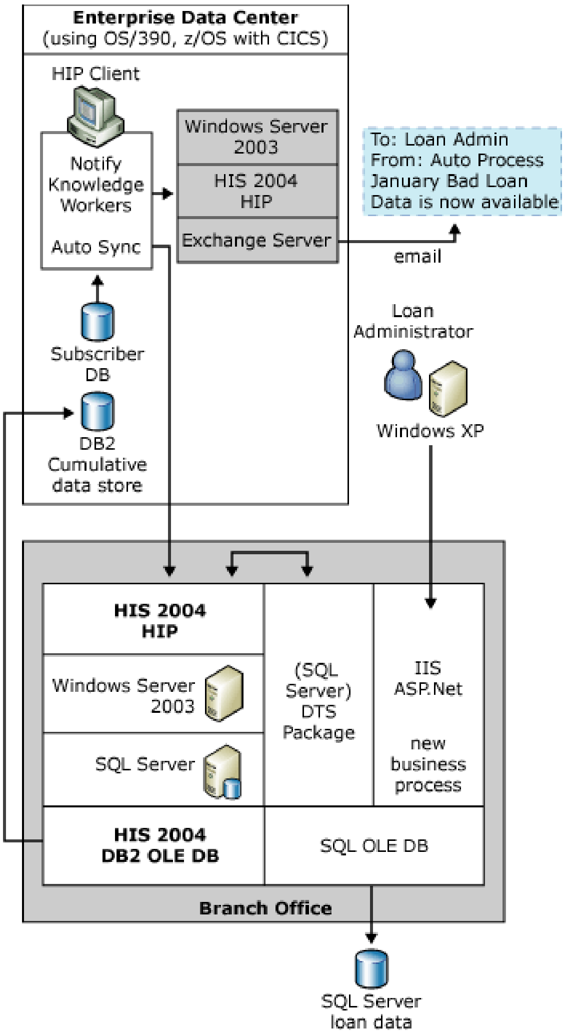
The batch processing step eliminates the need for manual or attended operations at the remote site by using HIP to automatically push the updates to the Windows environments.

Each remote site uses a HIP server application to automatically receive the updates and apply them to the local data store.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Distributing Information by Pulling Updates

The following diagram shows a process by which SQL Server uses notification messages to inform knowledge workers that product processing or requested data is available and to initiate the data synchronization process between central and remote site repositories.


Enterprise Data Center
(using OS/390, z/OS with CICS)
HIP Client
Notify Knowledge Workers
Auto Sync
Subscriber DB
DB2 Cumulative data store
Windows Server 2003
HIS 2004 HIP
Exchange Server
To: Loan Admin
From: Auto Process
January Bad Loan
Data is now available
email
Loan Administrator
Windows XP
HIS 2004 HIP
Windows Server 2003
SQL Server
(SQL Server) DTS Package
IIS ASP.Net
new business process
HIS 2004 DB2 OLE DB
SQL OLE DB
Branch Office
SQL Server loan data

The activities illustrated are:

- HIP is used to start two concurrent processes. This batch processing step sends a notification e-mail message to knowledge workers who previously subscribed to such messages. It also initiates the automatic synchronization of the updated DB2 data store on the IBM mainframe with the remote site SQL Server repository.
- The HIP client delivers a message, generated from a COBOL program, to a Windows COM or .NET object through HIP. This object interprets the message and delivers a message through Exchange Server to notify a set of knowledge workers that specific business processes have been completed.
- At the same time, the HIP client initiates a Data Transformation Services (DTS) package in COM+ that uses the HIS DB2OLEDB and SQLOLEDB providers to automatically retrieve data from DB2 and update the SQL repository.
- Finally, the knowledge worker uses Web services to access the information in the updated SQL repository, independent of the central data center's schedule and availability.

Installing Transaction Integrator

Transaction Integrator (TI) is installed and configured as part of the Host Integration Server 2004 Server Installation Wizard. You can install and configure TI at the time you first install Host Integration Server 2004 Server, or you can use the Host Integration Server 2004 Installation Wizard to add TI at a later time. The HIS 2004 Server Installation Wizard installs everything you need, including program files, Help files, the CedarBank sample application, and other tools. The main hardware and software requirements for TI are the same as for Host Integration Server 2004.

To install Transaction Integrator

1. Launch Host Integration Server 2004 Server setup and accept all defaults until you reach the **Custom Installation** page.
2. On the **Custom Installation** page, expand the **Application Integration** node.
3. Select **Transaction Integrator** and any other options.
4. Click **Next**, and then follow the directions on screen.

See Also

Installation

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Remotely Administering Transaction Integrator

Transaction Integrator (TI) does not support remote installation or configuration, and it does not support remote administration of Windows-initiated processing (WIP) except through use of the Windows Remote Desktop. TI does support remote administration of host-initiated processing through the use of TI Manager and the Remote Desktop. TI also supports the use of remote SQL Server databases.

Remote Installation and Configuration

TI must be installed and configured locally, and TI does not support remote installation or configuration. The only way to install TI Manager and the TI runtime is by using the **Host Integration Server 2004 Installation Wizard**, and selecting Application Integration on the options page. You cannot install TI Manager or the TI runtime programmatically.

Remote Administration of Windows-Initiated Processing

You can administer Windows-initiated processing only from the local computer, and TI does not support remote administration for WIP. Each computer that has TI installed and configured and that is used for WIP is administratively separate from any other computer that also has TI installed. If you need to administer WIP when you are away from the local computer, then you must use the Windows Remote Desktop feature to access TI Manager and the TI runtime.

Remote Administration of Host-Initiated Processing

You can administer the host-initiated processing remotely, but only from a computer that also has TI installed on it and uses the same HIP configuration database. For example, if three servers each have TI installed on them and all three are configured to use the same HIP database, then you can remotely administer any of the three servers from either of the other two servers. You cannot remotely administer the TI runtime from another server that has TI installed but uses a different HIP configuration database. For example, if you have a fourth server also has TI installed but uses a different HIP configuration database from the three servers in the previous example, you cannot remotely administer the TI runtime on any of the three other servers. Neither can you remotely administer the fourth server from any of the other three servers.

If you need to administer HIP when you are away from a computer that is configured to use the same HIP configuration database, then you must use the Windows Remote Desktop feature to access TI Manager and the TI runtime.

Use of Remote Databases

You can also configure TI to use a remote SQL Server database. The SQL Server database is used to store TI host-initiated processing (HIP) configuration data. Use the **Microsoft Host Integration Server 2004 Configuration Wizard** to specify the database server to use.

To configure a remote database

1. Click Start, then point to **Programs** and **Microsoft Host Integrator Server 2004**, and then click **Configuration Wizard**.
2. Follow the directions on the screen.
3. One the **Database configurations** wizard page, select **Transaction Integrator Configuration Database**.
4. Click **Edit**.
5. In the **Transaction Integrator Configuration Database Properties** dialog box, select the remote server and database to be used.
6. Click **OK**, and then click **Next**.
7. Continue to follow the directions on the screen.

After you click **Finish** in the Wizard, TI installs the HIP database on the designated remote server.

See Also

Installation

The Transaction Integrator Manager Console

Transaction Integrator is administered through the Transaction Integrator (TI) Manager management console. The Microsoft Management Console (MMC) is a framework for hosting administrative tools called snap-ins. In general, a console can contain tools, folders or other containers, World Wide Web pages, and other administrative items. These items are displayed in the left pane of the console, called a console tree. The MMC provides a single user interface for integrating various Microsoft and third-party management tools. You can create custom consoles combining your choice of the various registered snap-ins; for example, you might put the SNA Manager and Transaction Integrator snap-ins together in a single console.

The TI Manager management console consists of a left pane that displays the console tree and a right pane that displays the properties of the objects in the left pane. The topmost node in the console tree is the **Console Root**, and as you add snap-ins to the MMC they appear under the **Console Root**.

When you first open TI Manager, the console root has three major nodes (or snap-ins):

- **Transaction Integrator**. The **Transaction Integrator** node is the entry point to the TI Manager administrative tool.
- **Component Services**. The **Component Services** node is the entry point to the Component Services administrative tool. The Component Services administrative tool enables you to configure and administer COM components and COM+ applications, including installing and configuring COM+ applications, setting security at the application level, and creating and maintaining COM+ partitions. The Component Services administrative tool is designed both for system administrators and for application developers. For example, developers can configure routine component and application behavior, such as participation in transactions and object pooling.
- **Internet Information Services**. The **Internet Information Services** (IIS) node appears in the console only if IIS is installed on the computer. The Internet Information Services node is the entry point to the IIS administrative tool.

The **Transaction Integrator** node contains two major subnodes:

- **Host-Initiated Processing**. You can use the **Host-Initiated Processing** node to view the major elements used in host-initiated processing (HIP) environment.
- **Windows-Initiated Processing**. You can use the **Windows-Initiated Processing** node to view the major elements used in Windows-initiated processing (WIP) environment.

See Also

Transaction Integrator Manager Help

Transaction Integrator (mode) Node

Host-Initiated Processing Node

Windows-Initiated Processing Node

Using Host-Initiated Processing

The following topics explain how to use Host-Initiated Processing.

This section contains:

- Creating a Local Environment
- Creating a Host Environment
- Creating a Security Policy
- Defining New Objects
- Creating an Object View
- Modifying Objects
- Creating a New Application

Creating a Local Environment

A local environment (LE) is a set of end points that the HIP runtime uses to listen for incoming requests from the host. If communications with the host uses the TCP/IP network protocol, then the endpoints are either port numbers or service names. If communications with the host uses the SNA network protocol, the endpoint is the local LU alias.

Use the **New Local Environment Wizard** to create a new local environment.

See Also

Using Host-Initiated Processing

Creating a Host Environment

A host environment (HE) defines the network and hardware characteristics of the non-Windows host that will be initiating requests to the Windows platform. For example, a host that uses the TCP/IP protocol to initiate requests to Windows will be identified to host-initiated processing (HIP) through an HE that contains the IP address of the host and the code page that the host uses to represent its data.

You can use the **New Host Environment Wizard** to create a new host environment.

See Also

Using Host-Initiated Processing

Creating a Security Policy

Security policy definitions are created and managed from within the **Security Policies** node. When the HIP Console is first started the **Security Policies** node is empty. The **Security Policies** node contains definitions for how Windows security credentials are established prior to the execution of the server object. The source of the security credentials can be:

- Based on User IDs and Passwords delivered to HIP by the client application program
- Based on User IDs and Passwords delivered to HIP by well defined host protocol standards (SNA attach header: FMH5)
- Default host based User ID and Password
- Windows credentials that eh HIP Application runs under

When host based credentials are used, the windows credentials are obtained through the use of the single sign-on (SSO) feature. This feature translates, in a secure manner, host based User ID, Password and SSO Affiliated Application ID to a SID that is representative of the Window credentials.

The execution of the server object is then executed with the translated security credentials.

You can create a new security policy using the **Security Policy Wizard**.

See Also

Using Host-Initiated Processing

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Defining New Objects

Objects in the host-initiated processing (HIP) environment represent the Windows Server that will be started after a request is received from a host. The object is defined by a Transaction Integrator Metadata (TIM) file that is generated by the development-time tool in Microsoft Visual Studio .NET 2003.

See Also

Using Host-Initiated Processing

Creating an Object View

Object views in HIP allow different ways to look at and manage Windows Server objects in the HIP environment. During the definition of an object view, all methods or a subset of the Object's methods can be defined in the view. This provides a level of security by limiting the number of methods available for execution.

When a Host environment is associated with an object view the level of security is elevated. With the HE association, only certain hosts are able to execute specific methods of an Object.

When the object view is finally associated with a local environment, the security is enhanced further by restricting the execution of a method on an object to a request from a specific host that made a request to a specific transport endpoint on the Windows platform.

You can create new object views using the New Object View Wizard. The **New Object View Wizard** helps you construct the following administrative entities:

- A view of an object
- One or more methods in the object to be defined on the view
- A local environment association
- Host environment association
- Method resolution information

See Also

Using Host-Initiated Processing

Modifying Objects

After an object has been created and assigned to an application within the host-initiated processing environment, you must be careful when making changes to the object or its TIM file.

To safely modify a TIM file for an existing object

1. In the TI Manager console tree, right click the object to be changed, and then click **Delete**.
2. Exit TI Manager.
3. Modify the TIM file and save it.
4. Start TI Manager.
5. In the TI Manager console tree, right-click **Objects**, point to **New**, and then click **Object**.
6. Follow the instructions in the **Object Wizard** to re-create the object.
7. In the TI Manager console tree, right-click the re-created object, point to **New**, and then click **View**.
8. Follow the instructions in the **New Object View Wizard** to re-create the object views.

See Also

Using Host-Initiated Processing

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating a New Application

HIP applications represent the execution environment for Windows Server objects that are initiated or driven from host requests. The HIP application execution environment is hosted in and synonymous with a Windows service.

A HIP application can host more than one server object. A HIP application can also have more than one listening endpoint associated with it.

Application definitions are created and managed from within the Computers node on a specific computer. When the HIP console is first started the **Computers** node has only a single computer defined. That single computer is the computer where the HIP administrative console is running. When the Console is first started, no applications are defined on that computer.

You can add a new application to the TI Manager without specifying the local environment, host environment, objects, and object views used by the application.

See Also

Using Host-Initiated Processing

Using Windows-Initiated Processing

The following topics explain how to use Windows-Initiated Processing over TCP/IP and over SNA.

This section contains:

- Run TI Over TCP/IP
- Run TI Over SNA (APPC/LU 6.2)

Run TI Over TCP/IP

You can install and run TI over TCP/IP without installing or using any of the SNA services of Host Integration Server 2004.

Use the following procedure to run a TI application over TCP/IP.

1. Configure the mainframe (CICS or IMS) for TCP/IP, and establish a connection with your Windows-based Host Integration Server 2004 Server computer. For more information, see Configure CICS for TCP/IP or Configure IMS for TCP/IP.
2. Install the COBOL programs within the CICS or IMS region that receives TI-initiated calls.
3. Define an appropriate TCP/IP remote environment for the CICS or IMS region that receives TI-initiated calls.
4. Build the TI component with a method for each transaction in the TP.
5. Deploy the TI component in a COM+ application to create a TI Automation server.
6. Run the client application that calls the new TI Automation server to automate the TP.

You can test this out by using the CedarBank sample application. For more information, see the *Sample Application Tutorial for HIS 2004 Transaction Integrator*.

Related Topic

Define a TCP/IP Remote Environment

Configure CICS for TCP/IP

CICS TCP/IP Platform Requirements

TCP/IP version 3R2

CICS version 3.3 or later

Connections to CICS using TCP/IP

CICS uses the IBM-supplied Concurrent Listener (program EZACIC02, transaction ID CSKL) to establish an interaction with TCP/IP. The Listener is a transaction that automatically starts when CICS TCP/IP is started and enabled. When the Listener starts, it obtains a socket on which it can "listen" for connection requests from TCP/IP. The Listener binds the socket to a specified port, and then waits for a client request on that port. TCP/IP maintains a relationship of a port number to a CICS job. When a client makes a request on a port associated with CICS, TCP/IP forwards the connection request to the Listener in that CICS job.

For additional details about the CICS MS LINK communication model, see "CICS MS LINK (TCP/IP)"

TCP/IP-to-CICS Configuration

A TCP/IP port number is associated with a CICS region in the TCP/IP profile data set (hlq.PROFILE.TCPIP). The port statement is used to define this relationship. For example, a port statement that associates port 3000 with CICS region CICSRG is:

```
3000 TCP CICSRG
```

CICS-to-TCP/IP Configuration

The following sample host definition shows configuration parameters for CICS-to-TCP using the EZAC transaction:

```
EZAC,DEFINE
ENTER ONE OF THE FOLLOWING
CICS         ===> yes                  Enter Yes|No
LISTENER     ===>                      Enter Yes|No
EZAC,DEFINE,CICS
ENTER ALL FIELDS
APPLID       ===> CICSRG               APPLID of CICS System
EZAC,DEFINE,CICS
OVERTYPE TO ENTER
APPLID       ===> CICSRG               APPLID of CICS System
TCPADDR      ===> TCPIP                Name of TCP Address Space
NTASKS       ===> 020                  Number of Reusable Tasks
DPRTY        ===> 000                  DPRTY value for ATTACH
CACHMIN      ===> 015                  Minimum Refresh Time for Cache
CACHMAX      ===> 030                  Maximum Refresh Time for Cache
CACHRES      ===> 010                  Maximum number of Resolvers
ERRORTD      ===> CSMT                 TD Queue for Error Messages
```

The following sample host definition shows configuration parameters for the CICS Concurrent Listener using the EZAC transaction:

```
EZAC,DEFINE
ENTER ONE OF THE FOLLOWING
CICS         ===>                      Enter Yes|No
LISTENER     ===> yes                  Enter Yes|No
EZAC,DEFINE,LISTENER
ENTER ALL FIELDS
APPLID       ===> CICSRG               APPLID of CICS System
NAME         ===> CSKL                 TRANSACTION NAME OF LISTENER
EZAC,DEFINE,LISTENER
OVERTYPE TO ENTER
APPLID       ===> CICSRG               APPLID of CICS System
TRANID       ===> CSKL                 Transaction Name of Listener
PORT         ===> 03000                Port Number of Listener
IMMEDIATE    ===> YES                  Immediate Startup   Yes|No
```

```
BACKLOG      ===> 010                  Backlog Value for Listener
NUMSOCK      ===> 050                  Number of Sockets in Listener
MINMSGL      ===> 004                  Minimum Message Length
ACCTIME      ===> 060                  Timeout Value for ACCEPT
GIVTIME      ===> 030                  Timeout Value for GIVESOCKET
REATIME      ===> 000                  Timeout Value for READ
FASTRD       ===> YES                  Read Immediately    Yes|No
TRANTRN      ===> YES                  Translate TRNID     Yes|No
TRANUSR      ===> YES                  Translate User Data Yes|No
SECEXIT      ===>                      Name of Security Exit
```

Before attempting to use the TCP/IP connection:

- Verify that you have a TCP address space running on the host. (You should be able to PING the host at its IP address or DNS name.) Record the IP address; you will need to know it later when you use TI Manager to define a TCP/IP remote environment for the CICS region.
- Check that the CICS region supports TCP/IP, and that the IBM-supplied Listener (program EZACIC02, transaction ID CSKL) is defined. These procedures are described in chapter 5 of *TCP/IP V3R2 for MVS: CICS TCP/IP Socket Interface Guide* (IBM Document #SC31-7131). Note that this is a CICS TS version 1.2 document, but the configuration is supported in CICS version 4.1, as well.
- Determine the IP port number of the Listener (EZAC DISPLAY LISTENER); you will need to know it when you use TI Manager to define a TCP/IP remote environment for the CICS region.
- Start the IBM-supplied Listener (EZAO START) and check the CICS view of the Listener status (execute the CEMT INQUIRE TASK command, and verify that CSKL is running).

See Also

Run TI Over TCP/IP

Configure IMS for TCP/IP

IMS TCP/IP Platform Requirements

TCP/IP version 3R2

IMS version 4 or later

Connections to IMS using TCP/IP

IMS uses a Listener (program EZAIMSLN) to establish an interaction with TCP/IP. The Listener in an IMS Batch Message Processing (BMP) helps facilitate the connection process. When the Listener starts, it obtains a socket on which it can "listen" for connection requests from TCP/IP. The Listener binds the socket to a specified port, and then waits for a client request on that port.

TCP/IP maintains a relationship of a port number to an IMS Listener BMP. When a client makes a request on a port associated with IMS, TCP/IP forwards the connection request to the Listener in that BMP.

Implicit mode

Implicit mode uses the IMS Assist Module to translate conventional IMS communication into corresponding socket calls. The Implicit mode is dependent on the IBM-supplied default Listener (EZAIMSLN) that runs in a BMP region.

The host server application model processes input data using the IMS message queue. The Listener puts the TRANID and the input data into the queue. The IMS control region schedules the transaction in a Message Processing Region. The Transaction Program reads the request from the queue using GU and GN commands. All response data is delivered to the client by way of the ISRT command. The IBM-supplied Assist Module delivers the data directly to the client through socket API calls.

The Assist Module uses the DBLADLI API for Implicit mode. Host applications are written using CBLADLI or CBLTDLI APIs. If you want existing IMS applications to use Implicit Mode TCP/IP, you must change to the CBLADLI API and recompile the program.

Explicit mode

The IMS Explicit (TCP/IP) model requires the installation, within IMS, of the IBM-supplied default Listener (EZAIMSLN) that runs in a BMP region. This host server application model processes data without using the IMS message queue. The Listener places only a single segment (the Transaction Initiation Message) into the message queue. The IMS control region schedules the execution of the transaction into a Message Processing Region. The transaction then communicates directly with the client through socket API calls.

All IMS host server programs must be administered by IMS as no-response transactions.

For additional details about the IMS communication models, see "IMS Implicit (TCP/IP)" and "IMS Explicit (TCP/IP)."

TCP/IP-to-IMS Configuration

A TCP/IP port number is associated with an IMS Batch Processing Region (BPR) in the TCP/IP profile data set (hlq.PROFILE.TCPIP). The port statement is used to define this relationship. For example, a port statement associating port 3000 with an IMS batch region with a job name of WNWIBR1 is:

```
3000 TCP WNWIBPR1
```

IMS-to-TCP/IP Configuration

You can start an IMS Message Processing Program by specifying the program name of the IBM-supplied Listener program (EZAIMSLN). The Listener reads a configuration file identified by the DD statement "LSTNCFG." This configuration data set contains one or more of the following startup parameter statements (one set for each transaction defined for at least one Command Region):

- TCPIP statement
- LISTENER statement
- TRANSACTION statement

The TCPIP statement identifies the job name for the TCP/IP address space that manages the connection for the Listener.

The LISTENER statement specifies the port number that the Listener will use. This statement also specifies other port-related parameters, such as backlog, timeout values, and so on.

The TRANSACTION statement defines a list of transactions that the Listener can start. It also defines whether the Implicit or

Explicit connection mode is used.

The Listener uses the three previously listed parameter statements to inform TCP/IP which port to use and which transactions are accessible through TCP/IP.

Here is a sample of an IMS-to-TCP/IP host definition:

```
TCPIP ADDRSPC=WNWTCP31
LISTENER PORT=4000 BACKLOG=50
TRANSACTION NAME=TRANIMPL TYPE=IMPLICIT
TRANSACTION NAME=TRANEXPL TYPE=EXPLICIT
```

See Also

Run TI Over TCP/IP

Define a TCP/IP Remote Environment

The following tables shows how you can define a TCP/IP remote environment (RE) to fit each of the five mainframe-based programming models even though there are only two TI RE types.

TI Remote Environment Type	Mainframe Programming Model
CICS and IMS using TCP/IP	CICS Concurrent Server (TCP/IP)
CICS and IMS using TCP/IP	CICS MS Link (TCP/IP)
CICS and IMS using TCP/IP	IMS Implicit (TCP/IP)
CICS and IMS using TCP/IP	IMS Explicit (TCP/IP)
IMS Connect or OTMA	IMS Connect or OTMA (TCP/IP)

Use TI Manager to define either TCP/IP RE.

See Also

Run TI Over TCP/IP

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Run TI Over SNA (APPC/LU 6.2)

If you have a distributed network, use TI over an SNA (APPC/LU 6.2) network connection in order to take advantage of its support for two-phase commit (2PC) in ACID (atomic, consistent, isolated, and durable) transaction processing. To support ACID transactions, your COBOL transaction program (TP) must support Sync Level 2. The TCP/IP protocol has no default support for 2PC, so TCP/IP is not appropriate in a distributed network.

To run a TI application over an SNA network

1. Configure the mainframe (CICS or IMS) for SNA, and establish a connection with your Windows-based Host Integration Server 2004 Server computer.
2. Install the COBOL transaction programs within the CICS or IMS region that receives TI-initiated calls.
3. Define an appropriate SNA remote environment for the CICS or IMS region that receives TI-initiated calls.
4. Build the TI component with a method for each transaction in the TP.
5. Deploy the TI component in a COM+ application to create a TI Automation server.
6. Run the client application that calls the new TI Automation server to automate the TP.

You can test this out by using the CedarBank sample application. For more information, see the *Sample Application Tutorial for HIS 2004 Transaction Integrator*.

See Also

Run TI Over TCP/IP

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Test an Application Using Capture and Playback

Once you have developed a client application that generates TI requests, you can capture either actual or simulated activity between your application and a mainframe transaction program (TP). Captured messages are stored in a recording (.rcd) file. Once you have created the recording, you can play it back to provide responses to your application as though a mainframe program were executing and returning output parameters and a return value. Captured messages do not have to be played back in the order they were recorded. The .rcd file is more like a database of stored responses. Using Capture and Playback allows you to reduce the costs and overhead of connecting to the mainframe as you develop your application.

You can create a recording file either by capturing live from the mainframe or by capturing responses that you typed into the TI Test Console.

- **Capture from the mainframe**
  The Capture mechanism is used to record activity between a TI client and a mainframe server. Later, you can use this recording (.rcd) file as the source for information needed to respond to incoming client requests. This scenario requires mainframe connectivity, and a mainframe server application in order to create the initial recording.
- **Capture from the TI Test Console**
  The TI Test Console extends the Capture/Playback facility by allowing the recording to be created without a live connection to a mainframe transaction program (TP). On the TI Test Console user interface, you can see the input parameters of a remote request and type in values for output parameters. This gives you the ability to develop a test environment for TI Automation server applications, prior to the development of the mainframe code to respond to the requests.

Recording files are available in the CedarBank sample application for all eight possible environments. Use the CedarBank sample client application to practice using Diagnostic Capture and Diagnostic Playback remote environments (REs) as testing tools. For more information, see the *Sample Application Tutorial for HIS 2004 Transaction Integrator*.

> **Note** To use the TI Test Console, you must set the application or package identity in a COM+ application to **Interactive User**.

See Also

Capture Mainframe Transaction Program Responses

Capture TI Test Console Responses

Define a Diagnostic Capture Remote Environment

Define a Diagnostic Playback Remote Environment

Play Back Captured Responses

Define a Diagnostic Capture Remote Environment

You can define a specialized remote environment (RE) called a Diagnostic Capture RE to record mainframe or TI Test Console responses to TI requests. The responses are captured and stored in an .rcd file. The responses come from the Diagnostic Capture RE's *target,* which can be either the TI Test Console (the default) or from the mainframe transaction program (TP) over a live connection.

When you play back a recording (.rcd) file, it will give the recorded responses when the TI run-time environment makes a recorded request. For information on how to play back the recording, see Play Back Captured Responses.

Use the following procedures to define a Diagnostic Capture RE and set it to record responses coming from TI Test Console or from the mainframe TP:

- To define a Diagnostic Capture RE
- To change the default target from TI Test Console to the mainframe

To define a Diagnostic Capture RE

1. Start TI Manager.
2. In the console tree, double-click **COM Transaction Integrator**, and then click **Remote Environments**.
3. On the **Action** menu, point to **New**, and then click **Remote Environment**.
4. Click **Diagnostic Capture**, and then click **OK**.
5. Click the type of RE that your TI component uses, and click **Next**.
6. Type a name for the recording (.rcd) file to be created by the capture session. The name for a recording file can be a maximum of 255 characters. The default extension for the recording file is .rcd. If you want to store the .rcd file in a specific location, precede the name you enter with the path to that location.

   To use an existing .rcd file, click **Browse** to locate the file. When you run your application against an existing recording file, new data is appended to the file. If your application makes requests that were previously captured in the file, the new responses to these requests will overwrite the old responses.

7. Type a name for this new instance of a Diagnostic Capture RE (or accept the default). The name can be a maximum of 255 characters. Optionally, type a comment to describe any distinguishing characteristics of this Diagnostic Capture RE, and then click **Next**.
8. Click **Finish**.
9. If you are using capture and playback with a .NET application:
   a. Open the Capture RE file properties, and then select the security tab
   b. On the security tab, add everyone, and then set the permissions to all access. Failure to do this might cause TI runtime to return the following error (1300) Transaction Integrator was unable to allocate a state machine to process the method call (progress=3, hr=0x8000ffff).

The default target that provides responses to TI run-time environment requests is the TI Test Console. If you intend to create a recording file from a mainframe connection, change the default by specifying the RE that hosts the TP whose responses you want to record.

To change the default target from TI Test Console to the mainframe

1. Start TI Manager.
2. Double-click **COM Transaction Integrator**, double-click **Remote Environments**, and then click the Diagnostic Capture RE that you want to modify.
3. On the **Action** menu, click **Properties**, and then click the **Target** tab.
4. Click **Use responses from the following Remote Environment**.
5. Click the drop-down box, and click the RE that you want to respond to TI requests.
6. Click **OK**.

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Define a Diagnostic Playback Remote Environment

You can define a specialized remote environment (RE) called a Diagnostic Playback RE to play back previously recorded mainframe or TI Test Console responses to TI requests. You must have recorded the responses in a recording (.rcd) file previously by using a Diagnostic Capture RE.

Typically, you will play back recorded responses when you are testing a TI Automation server (a TI component in a COM+ application), and there is no live connection to the mainframe from the computer that you are using.

For complete information about how to play back a recording, see Play Back Captured Responses.

To define a Diagnostic Playback RE

1. Start TI Manager.
2. In the console tree, double-click **COM Transaction Integrator**, and then click **Remote Environments**.
3. On the **Action** menu, point to **New**, and then click **Remote Environment**.
4. In the **Add Remote Environment** dialog box, click **Diagnostic Playback**, and then click **OK**.
5. Click the type of RE that your TI component is designed to use, and then click **Next**.
6. Click **Browse** to locate the recording file that you want to play back, and then click **Next**.

   Alternatively, you can type the name of the file. If the recording file is stored in a location other than the default location, you must include the path when you type the file name.

7. Type a name for the new RE (or accept the default). The name can be a maximum of 255 characters. Optionally, comment to describe any distinguishing characteristics of this Diagnostic Playback RE, and then click **Next**.
8. Click **Finish**.

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Capture Mainframe Transaction Program Responses

Once you have developed a client application that generates TI requests, you can capture activity between your application and a mainframe transaction program (TP). Captured request/response pairs are stored in a recording (.rcd) file. Once you have created the recording, you can play it back to provide responses to your application as though a mainframe program were executing and returning output parameters and a return value.

To capture (or play back) mainframe responses, you need to create a Diagnostic Capture (or Diagnostic Playback) remote environment (RE) instance. By using the Diagnostic Capture and Diagnostic Playback REs, you can minimize the costs and overhead of connecting to the mainframe as you develop your application.

To capture mainframe responses in a recording (.rcd) file and subsequently play back the recording file, define the following three RE instances:

- An active RE that your application is designed to use
- A Diagnostic Capture RE used to create the recording file
- A Diagnostic Playback RE used to play back the recording file

To record mainframe responses, move your COM+ application's TI components from the active RE to the Diagnostic Capture RE. Then when a client application calls the COM+ application that holds those components, the TI run-time environment will save all mainframe (or TI Test Console) responses in the .rcd file.

To play back the recording, move the TI components from the Diagnostic Capture RE to the Diagnostic Playback RE. Then when a client application calls the COM+ application that holds those components, the TI run-time environment will use the mainframe responses that were previously captured and stored in the .rcd file.

When you finish testing your TI components, return them to their original RE.

When you create a Diagnostic Capture RE, you will see that the default capture target is the TI Test Console. If you create a recording file from a live mainframe connection, you must first change the default setting in the Capture Remote Environments property page Target tab to Use responses from the following Remote Environment. Then specify a corresponding RE that hosts the transaction program responses you want to record. You can specify this RE on the Target tab of the Diagnostic Capture RE's properties dialog box.

You can add to an existing recording by setting the recording file of a Diagnostic Capture RE to the existing file. The target can be either a mainframe RE or the Test Console. Either one will generate responses that will be returned to the application and added to the recording. When you run your application against an existing recording file, new data is appended to the file. If your application makes requests that were previously captured in the file, the new responses overwrite the old responses. You should exercise caution when using the Test Console with an existing recording file. This caution is noted here because recording files that are created or modified with the Test Console are more likely to contain less data or less accurate data than recording files that are created through an active connection with the mainframe.

See the "Define a Diagnostic Capture Remote Environment" topic in this guide to learn how to capture responses from the mainframe.

See Also

Test an Application Using Capture and Playback

Capture TI Test Console Responses

The TI Test Console extends the TI Capture/Playback facility by allowing you to respond to a remote request without connecting to a mainframe. The TI Test Console is a user interface that you can use to type in responses.

To get the TI Test Console to pop up, move a TI component from an SNA (APPC/LU 6.2) or TCP/IP remote environment (RE) to a Diagnostic Capture RE that has been targeted to the TI Test Console. Then when you run a client application that calls the TI Automation server containing that TI component, the TI Test Console will pop up, and you can enter a return value to be sent back to the client application.

For this to work, you must have both of these:

- A TI Automation server (a TI component in a COM+ application)
- A client application that calls the methods of the TI Automation server

However, you do not need a mainframe transaction program to service the TI requests.

TI Test Console User Interface

The TI Test Console consists of a menu bar, a console tree, and a details pane. The menu bar gives you commands for setting output parameters, completing responses, and locating help. The commands on the Edit menu reflect the properties of an item selected in the console tree. These properties were set when you created the TI component in Visual Studio.

The console tree lists the parameters of the method call and fully expands complex items to their elemental levels. The details pane gives the details about the properties of the method parameters. For example, selecting a recordset in the console tree causes information on the members of the recordset to appear in the details pane. If an elemental item is selected in the console tree, the details pane gives the details for that elemental item. An elemental item is one that cannot be further expanded, such as integers, the first element of an array of strings, a Long member of a recordset, or a user-defined type.

If the TI Test Console is the target of a Diagnostic Capture RE associated with a TI component in a COM+ application, you can type in the responses that will be recorded in the .rcd file. In this case, the TI Test Console pops up automatically to accept your input, and after you finish sending the response, the TI Test Console disappears automatically.

TI Test Console works with Diagnostic Capture REs only, not with Diagnostic Playback REs. In other words, you can use the TI Test Console to record responses that can later be played back in a Diagnostic Playback RE, but you cannot use TI Test Console to issue responses "live" to respond to TI Automation server requests.

You can use the TI Test Console to generate recorded interactive responses to TI Automation server requests. When a request is received, the TI Test Console displays the method's parameters in an explorer-like interface. The input values contain the values received with the request, and the output values are given initial default settings.

The menu bar provides a number of commands that allow the output parameters of the request to be set. When you have set all the output parameter values, click Terminate, and then click OK. This sends the responses back to the client application. All requests that complete successfully are added to the recording file associated with the Diagnostic Capture RE. The TI Test Console then exits until it receives another request.

> **Note** When you test your application, the Test Console appears only on the Host Integration Server 2004 Server computer where the TI run-time environment is installed.

Initial Output Value Settings in TI Test Console

The following table shows the default values that TI Test Console uses for the various parameter types.

VT_TYPE	Type Name	Default Value
VT_I2	Integer	0
VT_I4	Long	0
VT_R4	Single	0
VT_R8	Double	0
VT_CY	Currency	0
VT_DATE	Date	Current date and time
VT_BOOL	Boolean	0 (False)
VT_UI1	Byte	0
VT_DECIMAL	Decimal	0

VT_BSTR	String(n)	Empty string

Defaults for OCCURS DEPENDING ON Values

TI Test Console gives output-only OCCURS DEPENDING ON values an initial value of 1, and it initially sets input/output OCCURS DEPENDING ON values to their value on input if this value does not violate any of the bounds set in the type library for associated parameters. If the DEPENDING ON value exceeds any bounds, TI Test Console initially sets the OCCURS DEPENDING ON parameter to the largest legitimate value.

Defaults for Output Row Size

TI Test Console initially sets the number of output-only variably sized recordset output rows to 1, and it initially sets the number of input/output variably sized recordset output rows to the number of rows on input.

Defaults for Output Array Size

TI Test Console initially sets the number of output-only variably sized array output elements to 1 and the number of input/output variably sized array output elements to the number of array elements on input.

Defaults for Output String Size

TI Test Console initially sets the output-only variably sized string length to 1 and the input/output variably sized array string length to the string length on input.

Using TI Test Console

You can use the TI Test Console to make a recording file or enter responses live.

To use TI Test Console to make a recording (.rcd) file

1. In TI **Manager**, define a Diagnostic Capture RE for the TI component that you want to test. Accept the default value of **Use responses created from the Test Console**.
2. Move the TI component that you want to test to the new Diagnostic Capture RE.
3. Run the client application that calls the TI Automation server that contains the TI component that you want to test.
4. Enter the output values that you want to record when the TI Test Console pops into view.

To use TI Test Console to enter responses live

1. In TI **Manager**, define a Diagnostic Capture RE for the TI component that you want to test. Accept the default value of **Use responses created from the Test Console**.
2. Move the TI component that you want to test to the new Diagnostic Capture RE.
3. Run the client application that calls the TI Automation server that contains the TI component that you want to test.
4. Enter the output values that you want to send when the TI Test Console pops into view.

See Also

Test an Application Using Capture and Playback

Play Back Captured Responses

Once you have created a recording file either "live" from the mainframe or by using TI Test Console, you can play back the recording to:

- Test or demonstrate your application without connecting to the mainframe or requiring interactive intervention.
- Allow others to use your TI components without mainframe connectivity.

When you play back a recording, the TI run-time environment uses the recording file (.rcd file) to respond to the TI Automation server's requests in the same way that a mainframe would respond. To play back a recording (.rcd file), you need to create and use a Diagnostic Playback remote environment (RE) by using the following procedure.

> **Note** The recording file has no implicit ordering. During playback, the sequence of requests does not need to match that used during capture. Matches are determined by looking at each request independently.

To play back a recording (.rcd) file

1. Start TI **Manager**, and double-click **COM Transaction Integrator** in the console tree.
2. Right-click **Remote Environments**, point to **New**, and click **Remote Environment**.
3. In the **Add Remote Environment** dialog box, click **Diagnostic Playback**, and then click **OK** to start the **Playback Remote Environment Wizard**.
4. In the **Playback Remote Environment Wizard**, specify the actual type of RE that your TI components will use, the name of the recording (.rcd) file that you want to play back, and the name for the Diagnostic Playback RE.
5. Verify that none of the TI components support transactions. To do this, double-click **Component Services** (or **Microsoft Transaction Server**) in the console tree, and then navigate down to the COM+ application that contains the TI components that you want to use. For each TI component, right-click the component name. Then click **Properties**, click the **Transactions** tab, and click **Disabled** or **Not Supported** under **Transaction Support**. TI components that use a recording (.rcd) file cannot support ACID transactions because there is no real connection to the mainframe.
6. Move the TI components to the Diagnostic Playback RE that you just defined. To do this, double-click **COM Transaction Integrator** in the console tree. Then double-click **Remote Environments**, double-click the current remote environment, right-click each TI component, click **Move**, and then click the new RE in the **Move Component** dialog box.
7. Run the client application to call the TI Automation server.

See Also

Test an Application Using Capture and Playback

Data Integration User's Guide

New to this release are a .NET Framework-enabled Managed Provider for DB2 and a DB2 Network Protocol Client (DRDA AR), over which the ODBC, OLE DB, and Managed Provider communicate to the remote DB2 database server.

The Data Integration User's Guide contains information about the Data Access Tool (DAT). The DAT provides a single mechanism to help configure network, security, and database information. The DAT also helps you create packages on the DB2 system.

This section contains:

- Using the Managed Provider
- Determining Which Provider to Use
- Data Access Tool
- About Data Access

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Using the Managed Provider

For information about using the Managed Provider, see the following topics in the Host Integration Server 2004 Developer’s Guide.

- Managed Provider Programmer's Guide
- Managed Provider for DB2 Programmer's Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Determining Which Provider to Use

Microsoft® Host Integration Server offers two different types of providers with which to access data: a traditional COM-based OLE DB provider, and an ADO .NET provider. Both providers have their advantages, which you should consider carefully when determining which provider to use.

Reasons to Use the .NET Provider

The reasons to use the .NET Providers will be familiar to many who have programmed with .NET technologies: using the .NET providers improves your ability to manage and reuse your code base, access distributed and disconnected systems, and to increase security.

- Improved support for the disconnected business model

  ADO provides limited support for disconnected access using the **Recordset**. ADO.NET introduces a new object, the **DataSet**, which serves as a common, in-memory representation of relational data. The **DataSet** is, by design, disconnected at all times. Because it holds no persistent connection to outside resources, the **DataSet** is ideal for packaging, exchanging, caching, persisting, and loading data.

- Provider support

  Host Integration Server 2004 supports .NET database access using two optimized providers: the Managed Provider for DB2, and the OLE DB Provider for DB2 using ADO.NET. In addition, ADO.NET includes general provider support for SQL, OLE DB, and ODBC. Therefore, a .NET solution may work better for you than a COM-based solution if you are accessing these types of databases.

- XML integration

  In addition to persisting and loading both data and its relational structure as XML, ADO.NET relies on XML for remoting data between tiers or clients. The generic XML representation that ADO.NET uses provides a convenient method for transmitting data across any network, including those with restrictive security perimeters. For example, ADO.NET XML data objects are easier to transmit through firewalls, whereas most firewalls are set up to block the COM marshalling commands used by an OLE DB provider. ADO.NET also uses XML tools to perform validation, hierarchical queries, and data transformations on relational data.

- Consistent programming interface

  ADO constructs, such as the **Recordset**, do not employ familiar programming constructs but instead are modeled to be database-oriented. For example, cursors, which are used to navigate and retrieve data, function differently than other data constructs such as arrays and collections. In ADO .NET, however, in-memory data can be exposed through common .NET Framework structures, including arrays and collections, providing you with common access methods when working with relational data.

- Improved UI controls

  .NET data controls, such as the **DataGrid**, **Datalist**, and **DropDownList** controls, are generally easier to use and maintain the code base for than their predecessors. Such controls can change the face of your application, improving the look and feel, and increasing overall developer productivity.

- Increased native support

  Recent products by Microsoft are incorporating native support for the .NET Framework. For example, Microsoft BizTalk® Server has native orchestration and messaging support for the .NET framework, and therefore has been optimized to work efficiently with .NET data providers.

- Explicit control of data access behavior

  The design of ADO includes implicit behaviors that may not always be required in an application and that may therefore limit performance. ADO.NET provides well-defined, factored components with predictable behavior, performance, and semantics that enable you to address common scenarios in a highly optimized manner.

Reasons to Use the COM Provider

As with the .NET providers, the main reasons to use the COM providers will be familiar to many who have examined the issue for other technologies: COM providers have been integrated with current and legacy technologies, use less system resources than the

.NET equivalent, and do not require conversions or upgrades in order to implement.

- Speed and efficiency

  Like most COM-based technologies, the OLE DB provider tends to run with a smaller footprint and at greater speeds while using less network resources than the equivalent .NET provider does. While this is often countered with the increased ease in which .NET applications can be implemented and maintained, the OLE DB providers are more effective in situations where speed and bandwidth efficiency is a prime consideration.

- Scalability

  As a consequence of the previous point, an optimized OLE DB provider will scale more efficiently than the equivalent .NET provider will. Therefore, in a large-scale enterprise dealing with thousands of transactions per second over a wide-area network, you will most likely be better served using a COM-based connection.

- Architecture restrictions

  ADO .NET is optimized for a disconnected business model, where data is stored locally in discrete chunks. However, architectures designed with uninterrupted connections in mind will have little reason to take advantage of this feature.

  For example, an enterprise whose primary clients use server-side cursors to access data on a mainframe over a landline would not need to use the disconnected business features built into ADO.NET.

- Provider and driver support

  Host Integration Server 2004 supports several different options for data access. The OLE DB Provider for DB2 allows you to access a DB2 database; the OLE DB Provider for Host Files allows you to access the file system. While a .NET solution would grant you access to DB2, there is no equivalent .NET provider for accessing the file system.

  In addition, Host Integration Server 2004 supports an ODBC driver for DB2. In contrast, ADO.NET supports a general-purpose ODBC provider. Like a COM-based provider, the ODBC driver for DB2 is faster and has a smaller footprint than the equivalent .NET provider has. While not technically a COM-based solution, the ODBC driver is mentioned here as another possible reason for using a technology other than .NET.

- Product compatibility

  Some commonly used products are compatible only COM-based technologies and not with the .NET Framework. Specifically, SQL Server 2000 consumers utilize OLE DB and not ADO or ADO .NET. Similarly, Office XP consumers utilize ODBC and ADO. Therefore, when writing applications that interface with these products, you should also use the OLE DB Provider.

- Native support

  Many applications natively support COM access, and are therefore more efficient when accessing data through OLE DB than the .NET equivalent. Specifically, BizTalk Server Orchestration has native support for COM, which more effectively supports writing custom Receive Functions and AICs using the OLE DB Provider for DB2.

- Conversion overhead

  You may be working in an environment in which you have an existing code base that is not completely compatible with the .NET Framework. In order to use the .NET providers, you would have to translate your application into a language compatible with .NET, such as Microsoft Visual Basic® .NET. As doing so is a non-trivial task, it may pose a greater resource drain than you are willing to accept at this time.

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Data Access Tool

The Data Access Tool (DAT) is a new feature in Host Integration Server 2004 designed to streamline the process of creating and managing connections to data sources on host environments. Whereas this used to be divided into multiple feature sets and programs, the DAT provides a single mechanism to guide you through configuring network, security, and database information, and creating packages on the DB2 system.

The DAT consists of two items:

The **Data Source Browser** displays all data sources in familiar MMC format for configuration and management.

The **Data Source Wizard** guides you step by step through the configuration process. The wizard dynamically adapts to both DB2 and File System data sources, and displays the appropriate screens.

Note The Data Access Tool and DB2 data providers create DB2 packages for use by all DB2 users, by setting the execute privilege on the DB2 packages to PUBLIC. It is recommended that you revoke execute privileges to PUBLIC on these packages, and then grant execute to selected DB2 users or groups.

This section contains:

- Editing a Configuration
- Displaying an Initialization String
- Testing a Connection
- Creating Packages
- Running a Sample Query
- Converting Data Sources
- Adding a Table
- Creating a New Data Source or Data Description
- Opening a File
- Importing a File
- Other Tasks

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Editing a Configuration

Editing the configuration brings up the editor for the specific data source. In other words, OLE DB data sources trigger the Universal Data Links page, and ODBC data sources trigger the Data Access Tool Wizard.

To edit a configuration

1. In the **Data Source Browser** window, click the **Action** menu.
2. Click **Edit Data Source**. The **Data Source** property page will appear. When you are finished editing, click **OK**.

See Also

Data Access Tool

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Displaying an Initialization String

This option displays the native initialization string, for example, an OLE DB connection string or an ODBC connection string, in the output window. This string can be copied from the output window and pasted into another text-based window.

To display an initialization string

1. In the **Data Source Browser** window, click the **Action** menu.
2. Click **Display Connection String**. The connection string appears for viewing or copying.

See Also

Data Access Tool

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Testing a Connection

This command tests the connection to the data source and displays information about it, such as the host platform and version. In a connection between an AS/400 and a DB2, a typical result of this operation might look like the following:

```
Successfully connected to data source 'My_SOURCE'.
Server class: DB2/400
Server version: 05.01.0000
```

Certain operations may require the user to enter a user name and password. If this is the case, the **Password** dialog box will appear.

To test a connection

1. In the **Data Source Browser** window, click the **Action** menu.
2. Click **Test Connection**.

See Also

Data Access Tool

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Creating Packages

The create package command creates Host Integration Server packages on a DB2 system. As the process runs, status messages are displayed in the results pane. As seen on an AS/400, the result of this operation is:

```
Connected to data source 'MY_SOURCE_IP'.
AUTOCOMMITTED package has been created.
READ COMMITTED package has been created.
READ UNCOMMITTED package has been created.
SERIALIZABLE package has been created.
REPEATABLE READ package has been created.
The package creation process has completed successfully.
```

To create packages

1. In the **Data Source Browser** window, click the **Action** menu.
2. Click **Create Packages**. The **Create Packages** dialog box will appear.

See Also

Data Access Tool

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Running a Sample Query

This command performs a sample query against the host data source. The query retrieves a list of tables from the system catalogs using the default schema property configured in the data source. The data is displayed in the results pane as two tabs: an **Output** tab and a **Grid** tab.

To run a sample query

1. In the **Data Source Browser** window, click the **Action** menu.
2. Click **Sample Query**.

See Also

Data Access Tool

Converting Data Sources

Converting data sources allows you to convert a DB2 data source from one provider type to another. Only acceptable provider type conversion will be displayed. For example, converting from DB2 OLE DB to DB2 OLE DB is not enabled.

To convert a data source

1. In the **Data Source Browser** window, click the **Action** menu.
2. Click **Convert To**, and then select a provider from the list.

See Also

Data Access Tool

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Adding a Table

This command displays the **Table** dialog box. You can also access this dialog box by selecting a table and clicking **Properties** from the context-sensitive menu.

To add a table

1. In the **Data Source Browser** window, click the **Action** menu.
2. Click **Add Table**. The **Table** property page will appear.
3. Enter the appropriate information in the **Table** property page. For more information about these properties, click the **Help** button.
4. When you are finished, click **OK**.

See Also

Data Access Tool

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating a New Data Source or Data Description

Clicking **New Data Source** initiates the Data Source Wizard. Clicking **New Data Description** creates an empty data description file and adds it to the tree view.

To create a new data source or data description

1. In the **Data Source Browser** window, click the **File** menu.
2. Click **New**, and then click **Data Source** or **Data Description**.

See Also

Data Access Tool

Opening a File

Use this command to choose a .udl or .dsn file through a standard **File Open** dialog box. The command will open the data source using the Data Source Wizard.

To open a file

1. In the **Data Source Browser** window, click the **File** menu.
2. Click **Open Data Source**. The **File Open** dialog box appears.
3. **Browse** to the appropriate data source and click **Open**.

See Also

Data Access Tool

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Importing a File

This command enables you to import a file that contains the information in a DB2 Connect exported file (TCP/IP only). The values in the file are parsed and displayed in the Data Source Wizard.

To import a file

1. In the **Data Source Browser** window, click the **File** menu.
2. Click **Import**, and then click the appropriate file.

See Also

Data Access Tool

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Other Tasks

Edit menu

- Use the **Edit** menu to **Undo**, **Cut**, **Copy**, or **Paste** strings, and to **Delete** or **Remove** data sources.

View menu

- Use the **View** menu to **Refresh** the browser or view the Data Access Tool **Options** dialog box.

Help menu

- Use the **Help** menu to access Host Integration Server 2004 Help.

Toolbar buttons

- The toolbar buttons located at the top of the browser window offer single-click access to menu commands. To display a function, rest the mouse over a button.

See Also

Data Access Tool

About Data Access

Data services included with Microsoft® Host Integration Server 2004 enable you to interact with vital data sources, including host file systems and DB2 databases.These services are available for both the hierarchical and peer environments.

This section contains:

- OLE DB Provider for AS/400 and VSAM
- OLE DB Provider for DB2
- ODBC Driver for DB2
- File Transfer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OLE DB Provider for AS/400 and VSAM

To use Microsoft OLE DB Provider for AS/400 and VSAM with an OLE DB consumer application, you must either create a universal data link (.udl) file and call this from your application, or call the provider using a connection string that includes the provider name. Microsoft Data Access Components (MDAC) includes Microsoft Data Link, a generic method for managing and loading connections to OLE DB data sources. Microsoft Data Link also supports finding and storing connections to OLE DB data sources.

For additional information about using .udl files or connection strings, see Creating a Connection String for a .udl File or Configuring Data Descriptions in the Programmer's Guide..

> **Note** The SNAOLEDB provider runtime and Data Access Tool both support a full path to the HCD files. To maximize security, you should store HCD files in a secure local folder or share that only the developer and the runtime application can access.

See Also

Adding or Configuring a Data Link for Windows

Configuring a Data Source for OLE DB Provider for AS/400 and VSAM

Browsing OLE DB Data Sources

Data Description for AS/400 and VSAM

With the Microsoft OLE DB Provider for AS/400 and VSAM you can directly access record-level data in mainframe VSAM, Partitioned Data Sets (PDS), and midrange OS/400 files from within an application that uses OLE. The Object Linking and Embedding Database (OLE DB) is a standard set of interfaces that provides heterogeneous access to disparate sources of information located anywhere — file systems, e-mail folders, and databases. The OLE DB Provider for AS/400 and VSAM combines the universal data access of OLE DB with the record-level input/output (RLIO) protocol of the IBM Distributed Data Management (DDM) architecture.

In addition to describing tables used by the Microsoft OLE DB Provider for AS/400 and VSAM, tables can be described for the File Transfer utility. To indicate that the File Transfer Utility should use a given table, click the **Properties** page for the specific table, and then select the **Use Table for File Transfer** check box. Leaving this box clear indicates that the table is to be used by the Microsoft OLE DB Provider for AS/400 and VSAM.

In addition to the sample applications provided on the Host Integration Server 2004 CD-ROM, many of the sample programs that ship as part of the Microsoft Data Access Components (MDAC) SDK can be used with the OLE DB Provider for AS/400 and VSAM. To use the OLE DB Provider for AS/400 and VSAM, you must specify **SNAOLEDB** for the provider name.

For more information about using the Host Data Description utility, see Host CCSID and Data Description in the OLE DB Providers Programmer's Guides..

OLE DB Provider for DB2

To use the Microsoft OLE DB Provider for DB2 with an OLE DB consumer application, you must either create a universal data link (.udl) file and call it from your application, or call the provider using a connection string that includes the provider name. Microsoft Data Access Components (MDAC) version 2.0 and later includes Microsoft Data Link, a generic method for managing and loading connections to OLE DB data sources. Microsoft Data Link also supports finding and storing connections to OLE DB data sources.

For additional information about using .udl files or connection strings, see OLE DB Provider for DB2 Programmer's Guide in the OLE DB Providers Programmer's Guides

For information on File Transfer utility, see the utility’s online Help or the *Developer's Guide*.

See Also

Adding or Configuring a Data Link for Windows

Configuring a Data Source for OLE DB Provider for DB2

Browsing OLE DB Data Sources

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Browsing OLE DB Data Sources

By default, data links are created in the \Program files\Common files\System\Ole db\Data links folder. A shortcut is provided in the **Host Integration Server 2004** program group.

To browse OLE DB data sources

1. Click **Start**, point to **Programs**, and then point to **Host Integration Server**.
2. Point to **Data Integration**, and then click **OLE DB Data Source Browser**.

The list of data links appears.

See Also

OLE DB Provider for AS/400 and VSAM

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Packages for DB2

Microsoft OLE DB Provider for DB2 and Microsoft ODBC Driver for DB2 are implemented as IBM Distributed Relational Database Architecture (DRDA) Application Requesters. These features use DB2 packages to issue dynamic SQL statements and call DB2 stored procedures. The provider and driver create packages dynamically in the location to which the user points using the Package Collection attribute in the data source definition.

To launch the Create Package utility

- On the **Start** menu, click **Host Integration Server**, click **Data Integration**, and then select **Packages for DB2**.

See Also

OLE DB Provider for AS/400 and VSAM

Create Package Utility

Microsoft OLE DB Provider for DB2 and Microsoft ODBC Driver for DB2 are implemented as IBM Distributed Relational Database Architecture (DRDA) application requesters. These features use DB2 packages to issue dynamic SQL statements and call DB2 stored procedures. The provider and driver create packages dynamically in the location to which the user points using the Package Collection attribute in the data source definition.

By default, the provider will automatically create one package in the target collection, if one does not exist, at the time the user issues their first SQL statement (or calls SQL catalog to fetch schema information). The package is created with GRANT EXECUTE authority to a single <AUTH_ID> only, where AUTH_ID is based on the User ID value configured in the data source. The package is created for use by SQL statements issued under the same isolation level associated with the transaction isolation level property and parameter. If no transaction isolation level is specified, then the default for mainframe DB2 is CS and for other platforms the default is NC.

A problem can arise in multiuser environments. For example, if User A specifies a Package Collection value that represents a DB2 collection used by multiple users, but User A does not have authority to GRANT execute rights to the packages to other users (for example, PUBLIC), then the package is created for use only by User A. This means that User B may be unable to access the required package. The solution is for an administrative user, with package administrative rights (for example, PACKADM authority in DB2 for OS/390), to create a set of packages for use by all users.

Host Integration Server 2004 offers the Create Packages for DB2 utility, which an administrator can use to create packages. This utility can be run using a privileged User ID to create packages in collections accessed by multiple users. The utilities will create the following sets of packages and grant EXECUTE privilege to PUBLIC for all:

- AUTOCOMMIT package (MSNC001)
- READ_UNCOMMITTED package (MSUR001)
- REPEATABLE_READ package, (MSRR001)
- READ_COMMITTED package, (MSCS001)
- SERIALIZABLE or REPEATABLE_READ package (MSRS001)

Once created, the packages are listed in the DB2 (mainframe) SYSIBM.SYSPACKAGE, DB2/400 QSYS.SYSPACKAGE, and DB2 UDB SYSIBM.SYSPACKAGE catalog tables.

> **Note** When upgrading to Host Integration Server 2004 from Microsoft SNA Server 4.0 Service Pack 2 or Service Pack 3, it is necessary to re-create any existing packages by running the CrtPkg utility.

See Also

Support for Isolation Levels Using the OLE DB Provider for DB2

Support for Isolation Levels Using the ODBC Driver for DB2

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ODBC Driver for DB2

Microsoft ODBC Driver for DB2 enables access over SNA LU 6.2 and TCP/IP networks to remote DB2 databases. This driver is implemented as an IBM Distributed Relational Database Architecture (DRDA) application requester that can connect to most DRDA-compliant DB2 systems, including MVS, OS/390, OS/400, AIX RS/6000, and Microsoft Windows.

The driver can be used interactively or from an application program to issue SQL statements and execute DB2 stored procedures. From Microsoft Excel, users can import DB2 tables into worksheets and use Excel graphing tools to analyze the data. From Microsoft Access, users can import from and export to DB2. Using Microsoft Internet Information Services (IIS), developers can publish DB2-stored information to users through a Web browser interface.

See Also

Adding an ODBC Data Source

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Adding an ODBC Data Source

The following procedure helps you add an ODBC data source.To add an ODBC data source

1. Click **Start**, point to **Settings**, and then click **Control Panel**.
2. Double-click **ODBC Data Sources**.
3. Click **Add**.
4. Click **ODBC Driver for DB2**, and then click **Finish**.

For additional information about specific ODBC Driver for DB2 parameters, see Configuring a Data Source for the ODBC Driver for DB2.

> **Note** You can also display the ODBC Data Sources configuration tool from the shortcut located in the Host Integration Server 2004 program group.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Packages for DB2

Microsoft OLE DB Provider for DB2 and Microsoft ODBC Driver for DB2 are implemented as IBM Distributed Relational Database Architecture (DRDA) Application Requesters. These features use DB2 packages to issue dynamic SQL statements and call DB2 stored procedures. The provider and driver create packages dynamically in the location to which the user points using the Package Collection attribute in the data source definition.

To launch the Create Package utility

- On the **Start** menu, click **Host Integration Server**, click **Data Integration**, and then select **Packages for DB2**.

See Also

Adding an ODBC Data Source

Create Package Utility

Microsoft OLE DB Provider for DB2 and Microsoft ODBC Driver for DB2 are implemented as IBM Distributed Relational Database Architecture (DRDA) Application Requesters. These features use DB2 packages to issue dynamic SQL statements and call DB2 stored procedures. The provider and driver create packages dynamically in the location to which the user points using the Package Collection attribute in the data source definition.

By default, the provider automatically creates one package in the target collection, if one does not exist, at the time the user issues the first SQL statement (or calls SQL catalog to fetch schema information). The package is created with GRANT EXECUTE authority to a single <AUTH_ID> only, where AUTH_ID is based on the User ID value configured in the data source. The package is created for use by SQL statements issued under the same isolation level associated with the transaction isolation level property and parameter. If no transaction isolation level is specified, then the default for mainframe DB2 is CS and for other platforms the default is NC.

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- AUTOCOMMIT package (MSNC001)
- READ_UNCOMMITTED package (MSUR001)
- REPEATABLE_READ package, (MSRR001)
- READ_COMMITTED package, (MSCS001)
- SERIALIZABLE or REPEATABLE_READ package (MSRS001)

For a table that maps the DB2 isolation levels to the ANSI isolation levels, see the following topics:

- Support for Isolation Levels Using the OLE DB Provider for DB2
- Support for Isolation Levels Using the ODBC Driver for DB2

Once created, the packages are listed in the DB2 (mainframe) SYSIBM.SYSPACKAGE, DB2/400 QSYS.SYSPACKAGE, and DB2 UDB SYSIBM.SYSPACKAGE catalog tables.

> **Note** When upgrading to Host Integration Server 2004 from Microsoft SNA Server 4.0 Service Pack 2 or Service Pack 3, it is necessary to re-create any existing packages by running the CrtPkg utility.

File Transfer

Host File Transfer provides a user with the ability to move a file between the local computer and a host system.

This section contains:

Host File Transfer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host File Transfer

Host File Transfer provides a user with the ability to move a file between the local computer and a host system. Host Integration Server 2004 provides this service by means of a single ActiveX® control. This extends the ability for the client application to perform file transfer operations from a large number of client development environments.

For an example of the proper usage of the File Transfer ActiveX® control, see the following SDK sample:

SDK/Samples/FileTransfer/TestConnectVB/TestConnect.exe.

Samples in this directory may also be used as fully functional utilities.

See Also

Data Description

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Data Description

With the Microsoft OLE DB Provider for AS/400 and VSAM you can directly access record-level data in mainframe VSAM, Partitioned Data Sets (PDS), and midrange OS/400 files from within an application that uses OLE. The Object Linking and Embedding Database (OLE DB) is a standard set of interfaces that provides heterogeneous access to disparate sources of information located anywhere — file systems, e-mail folders, and databases. The OLE DB Provider for AS/400 and VSAM combines the universal data access of OLE DB with the record-level input/output (RLIO) protocol of IBM's Distributed Data Management (DDM) architecture.

In addition to describing tables used by the Microsoft OLE DB Provider for AS/400 and VSAM, tables can be described for the File Transfer utility. To indicate that a given table is to be used by the File Transfer utility, select the Properties page for the table and select the **Use Table for File Transfer** check box. Leaving this box cleared indicates that the table is to be used by the Microsoft OLE DB Provider for AS/400 and VSAM.

In addition to the sample applications provided on the Host Integration Server 2004 CD-ROM, many of the sample programs that ship as part of the Microsoft Data Access Components (MDAC) SDK can be used with the OLE DB Provider for AS/400 and VSAM. To use the OLE DB Provider for AS/400 and VSAM, you must specify **SNAOLEDB** for the provider name.

For more information on using the Data Description utility, see the Host Integration Server 2004 SDK documentation.

See Also

Host File Transfer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Adding or Configuring a Data Link for Windows

The following procedure shows the process for adding or configuring a data link.

1. Click **Start**, point to **Programs**, and then point to **Host Integration Server 2004**.
2. Point to **Data Integration**, and then click **OLE DB Data Source**.

   The **Data Link Properties** dialog box appears.

3. Configure the data source information for the selected provider. Click **Help** for more information.
4. Click **OK** to save the data link.

See Also

Host File Transfer

Data Description

Network Integration User's Guide

The topics in this section provide an overview of network communication in a Microsoft® Host Integration Server 2004 environment and describe the services you can use to manage it.

This section contains:

- IP-DLC Link Service provides steps for configuring and using the IP-DLC Link Service.
- SNA Service provides an overview of Host Integration Server 2004 data communications and connections.
- Host Print Service provides steps for configuring a print service in your environment.
- TN Service provides an overview of this Telnet-based service.
- Active Directory Services provides an overview of the Microsoft® Active Directory® directory service for Host Integration Server 2004.
- Host Configuration lists the configuration requirements for a host computer.
- Applications and Tools describes the use of tracing and performance utilities.

IP-DLC Link Service

This section describes the configuration and use of the IP-DLC Link Service.

This section contains:

Introduction to the IP-DLC Link Service

Managing IP-DLC Link Services

Secure Deployment of the IP-DLC Link Service

Configuring IP-DLC

Introduction to the IP-DLC Link Service

This section describes the overall architecture of the Host Integration Server 2004 system with IP-DLC link service functionality.

IP-DLC is a Host Integration Server 2004 feature that provides SNA connectivity for applications using dependent and independent sessions over a native IP network. It implements the HPR/IP protocol, which is also known as HPR over IP or Enterprise Extender. Each SNA packet is transmitted natively across the IP network as a UDP datagram.

This section contains:

- System Overview
- Supported Features
- Scalability
- Key Limitations
- IP-DLC Link Service Concepts and Terminology

System Overview

This topic outlines key points of the Host Integration Server 2004 implementation of the IP-DLC link service.

Key features of the IP-DLC link service include:

- The IP-DLC link service is configured and managed by the Host Integration Server 2004 administrator as for any other link service.
- To provide the support required for transporting dependent LU sessions across an APPN network, the IP-DLC link service runs the DLUR feature as defined by the SNA/APPN DLUR Architecture Reference. This provides dependent LU session support to a CS/390 host running the matching DLUS feature.
- The IP-DLC link service operates as a Branch Network Node (BrNN) as defined in the SNA/APPN Branch Extender Architecture Reference. When large numbers of Host Integration Server systems are connected to a mainframe, the Branch Network Node configuration ensures that the overhead of topology and network search traffic on the Host Integration Server 2004 and mainframe links is minimal—comparable to using Host Integration Server 2004 without the IP-DLC link service.
- Multiple IP-DLC link services can be configured, one for each local IP address on the Host Integration Server 2004 system.
- Multiple IP-DLC connections are supported for each IP-DLC link service. There is one IP-DLC connection for each PU local to Host Integration Server 2004.
- Remote independent LUs are associated with an IP-DLC link service instead of a connection. All remote independent LUs accessible through an IP-DLC link service are associated with the single peer connection for the IP-DLC link service. All independent LU traffic is routed by the APPN network and may traverse any active HPR/IP link.

See Also

Supported Features

Scalability

Key Limitations

IP-DLC Link Service Concepts and Terminology

Supported Features

This topic lists the features that are supported over the IP-DLC link service.

Base SNA Features

The following existing Host Integration Server 2004 SNA features are supported over the IP-DLC link service:

- LU types 0, 1, 2, 3 and 6.2 (dependent and independent)
- LUA, FMI, APPC, and CPI-C APIs
- Dynamically Defined Dependent LUs (DDDLUs)
- Dynamic addition of local LUs, remote LUs, and connections
- Incoming and outgoing calls
- Connection Activation at Server startup, on demand or by administrator
- SNA data compression
- PU concentration with the upstream link over IP-DLC
- NetView RUNCMD/Alerts (note that the IP-DLC link service does not generate alerts)

Because the preceding SNA features are supported, it follows that the following applications are also supported over the IP-DLC link service:

- Host Integration Server 2004-compatible 3270 emulators
- Host Integration Server 2004-compatible 5250 emulators
- APPC - 3270 Session Viewer (including the LU-LU Test feature)
- Host Print Service
- Data Integration Services
- Local and remote administration
- TN3270 server
- TN5250 server
- MSMQ-MQSeries Bridge
- Transaction Integrator

Fault Tolerance Features

Note that because the IP-DLC link service uses the APPN and HPR/IP protocols, it is automatically able to take advantage of the following fault tolerance features:

- Ability to reroute sessions around a failure in the network provided that an alternative route exists.
- Ability for mainframe applications to be moved to a different processor with little or no impact to users when system or application failures occur on the mainframe.

Load Balancing Features

Load balancing for a single IP-DLC link service, with a single local IP address, over multiple adapter cards can be achieved using NIC Teaming at the MAC layer. The IP-DLC link service handles frames arriving out of sequence.

Security Features

Because the IP-DLC link service uses UDP/IP, the Windows IPSec feature can be used to provide end-to-end data security over the IP-DLC link service. Windows handles configuration of IPSec independently. No specific configuration is required for the IP-DLC link service.

Diagnostic Features

The diagnostics provided by the IP-DLC link service are used through the Host Integration Server 2004 Tracer Initiator and Trace Viewer facilities.

See Also

System Overview

Scalability

Key Limitations

IP-DLC Link Service Concepts and Terminology

Scalability

The IP-DLC link service supports the Host Integration Server 2004 capacity of 30,000 simultaneous host sessions per server.

Note Four nodes are required to achieve 30,000 simultaneous host sessions and a single node supports a maximum of 15,000 simultaneous host sessions.

See Also

System Overview

Supported Features

Key Limitations

IP-DLC Link Service Concepts and Terminology

Key Limitations

The key limitations with the IP-DLC link service implementation are as follows:

- The IP-DLC link service cannot be run as a distributed link service (DLS).
- The PU Passthrough and Downstream connections are not supported over IP-DLC connections. It is not possible to have a one-to-one correspondence between upstream and downstream messages where the upstream connection is an IP-DLC connection.
- Each IP-DLC link service must use a different CP name from the SNA node service.
- Each IP-DLC link service requires a unique local IP address. If multiple IP-DLC link services are required, each must have its own unique local IP address.
- A single IP-DLC link service cannot be shared by multiple SNA node services. Each SNA node service must use a different IP-DLC link service for IP-DLC connectivity.

See Also

System Overview

Supported Features

Scalability

Key Limitations

IP-DLC Link Service Concepts and Terminology

The following is a brief introduction to the terminology and concepts that are referred to in this section, including APPN and HPR.

Session

A session is a logical connection between two network accessible units (NAUs). The most common example of an NAU is a logical unit (LU) (for more information, see Logical Unit (LU) later in this topic).

Physical Unit (PU)

The component that manages and monitors the resources (such as attached links and adjacent link stations) associated with a node. This term applies to non-APPN nodes only.

Logical Unit (LU)

A logical unit (LU) is a port through which an application or end user accesses the SNA network to communicate with another application or end user. An LU may be capable of supporting many sessions with other LUs.

There are two types of LUs:

- Dependent LUs require assistance from a mainframe to establish a session with another LU. These are also sometimes referred to as old LUs.
- Independent LUs can establish a session with another LU without the assistance of a mainframe.

APPN

Advanced Peer-to-Peer Networking (APPN) is a network architecture that supports distributed network control. It makes networks easier to configure and use, provides centralized network management, and supports flexible connectivity.

APPN Nodes

APPN nodes include systems of various sizes, such as mainframes using CS/390, Solaris servers running DCLs SNAP-IX, PCs running IBM Communications Server for Windows NT/2000 and IBM AS/400.

In an APPN network, nodes can be one of the following types:

- Network Nodes (NN)
- End Nodes (EN)
- Branch Network Nodes (BrNN)
- Low-entry networking nodes (LEN nodes)

Each node in an APPN network is connected to at least one other node in the APPN network. Where supported, CP-CP (Control Point to Control Point) sessions are established over these connections to adjacent nodes (nodes in the same network that can establish direct connections without going through a third node). CP-CP sessions are used to exchange network topology information, request the location of network resources, and manage sessions. All of the nodes in an APPN network share a common network name.

Network Node

A Network Node provides distributed directory and routing services for all LUs in its domain, where its domain is all directly attached End Nodes and LEN nodes that are using the services of the Network Node. The Network Node is referred to as the Network Node Server (NNS) for those directly attached End Nodes and LEN nodes.

A Network Node provides the following services:

- LU-LU session services for its local LUs.
- Directory searches and route selection for all LUs in its domain.
- Intermediate session routing for sessions between LUs on different nodes.
- Routing for Management Services (MS) data, such as alerts, between a served End Node or LEN node and an MS focal point.

End Node

An End Node is an end point in an APPN network. It maintains directory information only for local resources. An APPN End Node can independently establish sessions between local LUs and LUs on adjacent nodes. For sessions with LUs on nodes not directly connected to the End Node, an End Node requests routing and directory information from its Network Node Server using CP-CP sessions.

End Nodes can register their local LUs with their Network Node Server. This capability means the network operator at the Network Node Server does not have to predefine the names of all LUs on the attached End Nodes to which the Network Node provides services.

An End Node can be attached to multiple network nodes, but it can have CP-CP sessions active with only one Network Node at a time: its Network Node Server. The other Network Nodes can be used only to provide intermediate routing for the end node or as substitute Network Node servers if the main Network Node Server becomes unavailable.

An End Node can also have a direct connection to another End Node or LEN node, but CP-CP sessions are never established between the two nodes.

LEN Node

A LEN Node is a type 2.1 node that uses independent LU 6.2 protocols, but does not support CP-CP sessions. It can be connected to a Network Node or End Node but does not support APPN functions. The existing SNA node of Host Integration Server is a LEN node.

A Network Node can provide routing services for an attached LEN node, enabling the LEN node to participate in an APPN network without requiring links to be defined between the LEN node and all of the nodes in the APPN network.

LUs in the APPN network with which the LEN node may want to establish sessions must be defined to the LEN node as if they reside on the LEN node's Network Node server. The LEN node establishes sessions with LUs defined to be contacted through its Network Node Server. The Network Node routes the session through the APPN network to the node in the network where the LU actually resides.

LUs on the LEN node must be predefined to the Network Node that serves the LEN node. LU resources on LEN nodes (unlike those on End Nodes) cannot be registered on the Network Node Server by the LEN node.

When a LEN node's only link is to an End Node, the LEN node can communicate only with LUs on the End Node through the direct link between the two nodes. This is because an End Node cannot provide intermediate routing.

Branch Network Node

The Branch Network Node (BrNN) combines the functions of a Network Node and an End Node. As the name implies, a BrNN can be used to subdivide a network into a backbone network and attached branch networks. The BrNN provides the following functions:

- To the backbone network, the BrNN appears as an End Node, connected to its Network Node Server (NNS) in the backbone network.
- The nodes in the backbone network are not aware of the nodes within the branch, reducing the amount of topology information that must be stored.
- Because the BrNN appears as an End Node, it does not receive topology information from the backbone network (topology information is transmitted only between Network Nodes) reducing the amount of network overhead traffic flowing into the branch network.The BrNN registers all resources in the branch with its NNS as though they were located on the BrNN itself. This means that the nodes in the backbone network can locate resources in the branch without having to be aware of the separate nodes in the branch.
- To the branch network, the BrNN appears as a Network Node, acting as the NNS for End Nodes and LEN Nodes in the branch.

High Performance Routing

High Performance Routing (HPR) is an extension of the APPN architecture. HPR provides the following functions:

- Rapid Transport Protocol (RTP) minimizes processing cycles and storage requirements for routing network layer packets through intermediate nodes on a session route.
- Automatic network routing (ANR) enables APPN networks to automatically reroute sessions if a portion of the originally computed route fails.

Dependent LU Requester/Server

Dependent LU Requester (DLUR) function enables sessions for dependent LUs to reside on remote nodes across an APPN network, instead of requiring a direct connection to the host.

DLUR works in conjunction with Dependent LU Server (DLUS) at the host. Together, they route sessions across the network from dependent LUs in the APPN network to the DLUS host. The route to the host can span multiple nodes and can take advantage of APPN's network management, dynamic resource location, and route calculation facilities.

If the local node is a Network Node, dependent LUs on downstream computers can also use pass-through DLUR, in the same way that LUs internal to the node do, to access the host across the network.

See Also

System Overview

Supported Features

Scalability

Key Limitations

Managing IP-DLC Link Services

This section gives procedures for creating, configuring, viewing, and deleting IP-DLC link services.

This section contains:

- Creating an IP-DLC Link Service
- Configuring an IP-DLC Link Service
- Viewing Link Services
- Viewing Link Service Properties
- Deleting Link Services
- Link Service and the LnkCfg Utility

Creating an IP-DLC Link Service

You create and configure an IP-DLC link service as you would create any other link service.

To create an IP-DLC link service

1. In the SNA Manager, locate the computer on which you want to create the IP-DLC link service.
2. Right-click the **Link Services** folder under that computer.
3. On the context menu, click **New/Link Service.** The **Insert Link Service** dialog box appears.
4. From the list of available link services, select **IP-DLC Link Service**.
5. Click **Add** to load the **IP-DLC Link Service** properties dialog box.
6. To configure the new link service, follow the steps for Configuring an IP-DLC Link Service.

See Also

Managing IP-DLC Link Services

Viewing Link Services

As with other link services, you can view IP-DLC link services in the list view of the **Link Services** folder.

To view link services

1. In the scope pane of the Microsoft Host Integration Server 2004 MMC snap-in, locate the computer with the link services that you want to view.
2. Expand the list for that computer.
3. Select the **Link Services** folder. The link services for that computer will appear in the right pane.

See Also

Managing IP-DLC Link Services

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Viewing Link Service Properties

As with other link services, you can view IP-DLC link service properties by using the context menu in the list view of the **Link Services** folder.

To view link service properties

1. In the scope pane of the Microsoft Host Integration Server 2004 MMC snap-in, locate the computer with the link services that you want to view.
2. Expand the list for that computer.
3. Select the **Link Services** folder. The link services for that computer will appear in the right pane.
4. Right-click the appropriate link service, and then click **Properties**. The **Link Service Properties** page will appear.
5. Click **Configure**. The properties for this IP-DLC link service appear, and can be viewed or edited.

See Also

Managing IP-DLC Link Services

Deleting Link Services

As with other link services, you can delete an IP-DLC link service in the MMC snap-in.

Note When you delete a link service, all related connections will no longer be associated with any link service. A user might associate such a connection with any other IP-DLC link service that is associated with the node. Deleting a node associated with a link service will break association between these items.

To delete a link service

1. In the scope pane of the Microsoft Host Integration Server 2004 MMC snap-in, locate the computer with the link services that you want to delete.
2. Expand the list for that computer.
3. Right-click the appropriate link service, and then click **Delete**.

See Also

Managing IP-DLC Link Services

Link Service and the LnkCfg Utility

LnkCfg is a useful command-line utility for deploying and managing link services. The format of the command line for configuring the link service is specified as follows.

LINKCFG LINKSVC "Title"

/SERVER:servername

/LSTYPE:"IP-DLC Link Service"

/PRIMARYNNS:NNSServer

/BACKUPNNS:NNSServer

[/LOCALADDRESS:ipaddress] or [/ADAPTER:adaptername]

/NETWORKNAME:networkname

/CPNAME:name

/NODEID:“xxx.xxxxx”

/LENNODE:lennode

The following table describes the command-line parameters.

Property	**Description**	**Content**
"Title"	Title of the link service.	1-128 characters.
/SERVER:servername	Name of the server.	Valid server name.
/PRIMARYNNS:NNSServer	Primary network node server.	DNS name or IP address.
/BACKUPNNS:NNSServer	Backup network node server.	DNS name or IP address.
/ADAPTER:adaptername	Name of the local adapter. /ADAPTER and /LOCALADDRESS arguments should not be used together.	Name of the physical or logical adapter on the computer.
/LOCALADDRESS:ipaddress	Local address. /ADAPTER and /LOCALADDRESS arguments should not be used together.	Valid IP address or server name.
/NETWORKNAME:networkname	Network name of the Branch Network Node implemented by the link service.	1-8 characters SNA Type A string.
/CPNAME:name	Control point name of the Branch Network Node implemented by the link service.	1-8 characters SNA Type A string.
/NODEID:“xxx.xxxxx”	Identity of the Branch Network Node implemented by the link service.	String in format HHH.HHHHH where H is a hexadecimal digit.
/LENNODE:lennode	Name of the associated LEN node.	Name of a LEN node deployed on the local computer.

See Also

Managing IP-DLC Link Services

Managing IP-DLC Link Service Connections

This section gives procedures for creating, configuring, viewing, and deleting IP-DLC link service connections.

This section contains:

- Creating an IP-DLC Connection
- Configuring an IP-DLC Connection
- Viewing Connections
- Defining Dependent LUs
- Connections and the SnaCfg Utility

Creating an IP-DLC Connection

You create and configure an IP-DLC link service connection as you would create any other link service connection.

To create an IP-DLC connection

1. In the scope pane of the Microsoft Host Integration Server 2004 MMC snap-in, locate the computer on which you want to create the IP-DLC link service connection.
2. Under that computer, expand **SNA Service**.
3. Right-click the **Connections** folder under that computer.
4. On the context menu, click **New**, and then click **IP-DLC**.
5. To configure the new link service connection, follow the steps for Configuring an IP-DLC Connection.

See Also

Viewing Connections

Viewing Link Service Properties

Defining Dependent LUs

Connections and the SnaCfg Utility

Secure Deployment of the IP-DLC Link Service

Viewing Connections

As with other connections, you can view IP-DLC link service connections in the list view of the **Connections** folder.

To view connections

1. In the scope pane of the Microsoft Host Integration Server 2004 MMC snap-in, locate the computer with the link services that you want to view.
2. Expand the list for that computer, expand **SNA Service**, and expand **Connections**. The link service connections for that computer will appear in the right pane.

See Also

Creating an IP-DLC Connection

Viewing Link Service Properties

Defining Dependent LUs

Connections and the SnaCfg Utility

Secure Deployment of the IP-DLC Link Service

Viewing Connection Properties

As with other link services, you can view IP-DLC link service properties by using the context menu in the list view of the **Link Services** folder.

To view connection properties

1. In the scope pane of the Microsoft Host Integration Server 2004 MMC snap-in, locate the computer with the link service connections that you want to view.
2. Expand the list for that computer, expand **SNA Service**, and expand **Connections**. The link service connections for that computer will appear in the right pane.
3. Right-click the appropriate link service connection, and then click **Properties**. The **Connection Property** page will appear, and the properties for this connection can be viewed or edited.

See Also

Creating an IP-DLC Connection

Viewing Connections

Defining Dependent LUs

Connections and the SnaCfg Utility

Secure Deployment of the IP-DLC Link Service

Defining Dependent LUs

You can configure dependent LUs (both 3270 and LUA) as you would with any other link service.

See Also

Creating an IP-DLC Connection

Viewing Connections

Connections and the SnaCfg Utility

Secure Deployment of the IP-DLC Link Service

Connections and the SnaCfg Utility

SnaCfg is a useful command-line utility for deploying and managing SNA Server configurations.

The following table describes the command-line parameters.

Property	Description	Validation
/conntype:type	Connection type.	IP-DLC.
/RemoteAddress:adr	Address of the remote DLUS service. This property is not accessible through the user interface. It provides a way of establishing a direct connection with DLUS rather than routing the connection through the NNS.	Valid IP address or DNS name.
/PrimNetworkName:name	Network name of the primary DLUS server.	1–8 characters, SNA Type A string.
/PrimCPName:name	Control point name of the primary DLUS server.	1–8 characters, SNA Type A string.
/BackupNetworkName:name	Network name of the backup DLUS server.	1–8 characters, SNA Type A string.
/BackupCPName:name	Control point name of the backup DLUS server.	1–8 characters, SNA Type A string.
/DLURRetryType:N	DLUR retry type.	0 indicates none 1 indicates infinite 2 indicates limited
/DLURRetryLimit:N	DLUR retry limit. This parameter is invalid unless the DLUR retry type is set to limited.	1–65534
/DLURRetryDelay:N	Delay after a DLUR retry. This parameter is invalid unless the DLUR retry type is set to limited.	1–65535
/RetryLimit:N	Number of the connection retries.	0 indicates unlimited 1–65534 number of retries
/RetryDelay:N	Delay after a connection retry.	0–327670, must be a factor of 5.
/XIDFormat:N	XID type.	Set to: 1 – "Format 3"
/RemoteNetName:name	This value is always set to the network name of the IP-DLC link service.	Must be left blank for a new connection.
/RemoteCPName:name	This value is always set to the control point name of the IP-DLC link service.	Must be left blank for a new connection.

See Also

Creating an IP-DLC Connection

Viewing Connections

Defining Dependent LUs

Secure Deployment of the IP-DLC Link Service

Secure Deployment of the IP-DLC Link Service

The IP-DLC link service takes advantage of the entire Microsoft Host Integration Server 2004 secure deployment feature set, especially the following:

- A typical IP-DLC link service deployment scenario may use Internet Protocol security (IPSec), a firewall, or a virtual private network (VPN) as a security barrier between the Host Integration Server computer and the remote node. (A VPN is advisable if the HPR/IP link spans an insecure IP network.)
- Incoming frames from IP addresses that are not already defined in Host Integration Server are rejected. This isolates the main SNA node service from such attack.
- The IP-DLC link service checks the length of incoming datagrams before copying the data into internal data areas, and discards any that are too long.
- All configuration data—whether from registry entries, COM.cfg, or the SNA node service—is validated for correct value when first accessed. Particular consideration is given to validating lengths to avoid buffer overruns. If any errors are found, the IP-DLC link service logs an event and terminates.

See Also

Creating an IP-DLC Connection

Viewing Connections

Defining Dependent LUs

Connections and the SnaCfg Utility

Configuring IP-DLC

Host Integration Server 2004 offers an efficient means to integrate legacy Systems Network Architecture (SNA) networks with PC based data centers.

Host Integration Server has supported SNA as it has evolved beyond traditional subarea networks. Advanced Peer-to-Peer Networking (APPN) was an enhancement to SNA that brought the ability to move logical units and change routing without coordinated system definition. High Performance Routing (HPR) is an extension of the APPN architecture; it provides the following functions:

- Rapid Transport Protocol (RTP) minimizes processing cycles and storage requirements for routing network layer packets through intermediate nodes on a session route.
- Automatic Network Routing (ANR) enables APPN networks to automatically reroute sessions if a portion of the originally computed route fails.

Host Integration Server 2004 and IP-DLC

Internet Protocol - Data Link Control (IP-DLC) is another evolution of SNA, providing a means for the efficient transport of SNA data across an IP network. IP-DLC, also known as Enterprise Extender (EE) is an industry-standard solution defined by Internet Engineering Task Force (IETF) (RFC 2353). With IP-DLC, the RTP endpoint views its interface with the Universal Datagram Protocol (UDP) layer of the stack as just another data link control, and treats the connection across the IP network the same as it would any SNA connection.

This purpose of this section is to assist mainframe programmers and Host Integration Server 2004 administrators in configuring for IP-DLC. It also serves as a reference for Host Integration Server 2004, to be used in conjunction with online help in diagnosing and troubleshooting connectivity and configuration issues.

This section contains:

- Mainframe IP-DLC Configuration
- Host Integration Server 2004 Configuration
- Supported Features and Limitations
- Supported Configurations
- Troubleshooting
- Example Full Qryipdlc Log
- Automated Configuration

Mainframe IP-DLC Configuration

This section describes how to configure IP-DLC support on an IBM mainframe running the OS/390 or z/OS operating system. IP-DLC is also known as IBM Enterprise Extender.

To support IP-DLC on OS/390, you need OS/390 (version 2.7 or later) or z/OS.

Host Requirements

- IBM Enterprise Extender solution
- OS/390 (V2R7 or higher) or z/OS
- Communication Server for OS/390 V6 or higher

Network Adapter Requirements

- OSA or OSA Express
- Modes
  - SNA and TCP/IP (non-QDIO)
  - TCP/IP only (QDIO)

Configuring the OS/390 VTAM and TCP/IP Components:

1. Switch on the HPR support and CP-CP session support start options in SYS1.VTAMLST(ATCSTR00).
2. Define an External Communications Adapter (XCA) major node for HPR/IP.
3. Enable Virtual Telecommunications Access Method (VTAM) to be a TCP/IP application.
4. Configure switched major nodes for physical units (PUs) SYS1.VTAMST(member)

Each of these configuration steps is described briefly in the following sections. For more detailed explanations on configuring Enterprise Extender as well as additional examples from the VTAM and TCP/IP configuration files (including a switched major node definition for some of the PUs), see the following IBM documentation:

- OS/390 eNetwork Communications Server SNA Resource Definition Reference (SC31-8565-02)
- OS/390 eNetwork Communications Server IP Configuration (SC31-8513-02)**http://www.1.ibm.com/servers/eserver/zseries/library/techpapers/enterprise_extender.html**

The HPR and CP-CPs Session start options are set as follows:

To configure the. HPR and CP-CP Session Start Options(SYS1.VTAMLST(ATCSTR00))

- Add the following line to the start options in SYS1.VTAMLST(ATCSTR00):

  HPR=RTP,CPCP=YES

A typical ATCSTR00 file is displayed below:

```
CONFIG=00,SUPP=NOSUP,
SSCPID=06,NOPROMPT,
HOSTSA=1,SACONNS=YES,
SSCPNAME=P390,HOSTPU=P390$PU,
NETID=APPN,
NODETYPE=NN,CPCP=YES,
DYNLU=YES,CDSERVR=YES,HPR=RTP,CDRDYN=YES,CONNTYPE=APPN,DYNADJCP=YES,
CMPVTAM=4,BN=YES,
DIRTIME=90000S,
CRPLBUF=(208,,15,,1,16),
IOBUF=(400,508,19,,1,20),
LFBUF=(104,,0,,1,1),
LPBUF=(64,,0,,1,1),
SFBUF=(163,,0,,1,1)
*/*
*/* LIB: SYS1.VTAMLST(ATCSTR00)
*/* GDE: CBIPO COMMUNICATIONS
*/* DOC: THIS MEMBER CONTAINS THE ACF/VTAM DEFAULT
*/*      START OPTIONS ON THE MODEL INSTALLATION SYSTEM.
*/*
```

A new dataset member containing an IP-DLC XCA major node definition must be added to SYS1.VTAMLST

To add the XCA major node (SYS1.VTAMLST(member)):

1. Open SYS1.VTAMLST. An example of SYS1.VTAMLST is displayed below:

```
*/* SYS1.VTAMLST(XCAE40EE)
*/* ---------------------------------------------------------------
*/*
*/* ENTERPRISE EXTENDER OVER TOKEN RING ADAPTER1 (E40)
*/*
*/* ---------------------------------------------------------------
*/*
XCAE40EE VBUILD TYPE=XCA
*/*
XPE40EE PORT MEDIUM=HPRIP, -
VNNAME=EEJEB, -
VNGROUP=EEGRPJ, -
LIVTIME=15, -
SRQTIME=15, -
SRQRETRY=9, -
SAPADDR=04
*/*
EEGRPJ GROUP ANSWER=ON, -
AUTOGEN=(64,L,P), -
CALL=INOUT, -
DIAL=YES, -
DYNPU=YES, -
DYNPUPFX=$E, -
ISTATUS=ACTIVE
*/*
```

1. It may be possible to add the new dataset member to the list of nodes that are activated during VTAM startup (SYS1.VTAMLST(ATCCON00). However, in order to do so, the TCP/IP stack first requires initialization. If, when adding the dataset member to the VTAM, startup fails, try adding it to the VTAM application startup list (SYS1.PARMLIB(VTAMAPPL) by appending the following lines:

```
v net,act,id=xcae40ee (id= should be the XCA member name)
Pause 120
```

The **Pause** command is specified in seconds and should be coded with enough time to let TCP/IP initialize on the target platform.

An example of a VTAMAPPL file is displayed below:

```
CommandPrefix=None   /* This is the default value */
/*-----------------------------------------------------------------*/
/* Automatically Start Several VTAM Applications                   */
/*-----------------------------------------------------------------*/
Pause 10      /* Wait for sys to get up first  */
S vlf,sub=mstr
Pause 10      /* Wait for sys to get up first  */
S lla,sub=mstr
S Tcas        /* Time Sharing Option */
/*S rmf*/         /* RMF                 */
S tcpip
/*s irlmproc*/
Pause 10      /* Wait for sys to get up first  */
/* s imwebsrv */
/* s nfss  */
Pause 10      /* Wait extended for TCAS        */
s sdsf
s cicsa
```

```
Pause 135     /* Wait extended for TCAS        */
v net,act,id=xcae40ee
Pause 120
$S LOGON(1)
Pause 30
$s LINE(*)
Pause 30
$s RMT(*)
Pause 60
S BAZ1
Pause 60
F BAZ1,S,ALL
Pause 60
S NVDM
Pause 60
F NVDM,START
/*-START DB2*/
D T                            /* Display Ending time                   */
* Comment lines may also start with a single asterisk.
* Remember - blank lines are a BIG no-no.
*CommandPrefix=)   /* Require all Vtamappl commands to start with ")" */
*@ *--------------------------*
*@ * IPL startup is complete! *
*@ * >>> Have a nice day! <<< *
*@ *--------------------------*
```

To configure VTAM to TCP/IP (TCPIP.PROFILE.TCPIP):

1. The TCP/IP profile file must be updated. Add an IUTSAMEH device and link as shown below so that VTAM can access the TCP/IP stack:

```
DEVICE IUTSAMEH MPCPTP AUTORESTART
LINK samehlnk MPCPTP IUTSAMEH
```

1. Add a VIPA device and link for IP-DLC as shown below:

```
DEVICE VIPADEV2 VIRT 0
LINK P390IP VIRT 0 VIPADEV2
```

1. Add the VIPA link to the head of the **HOME** list as shown below:

```
HOME
172.1.1.1 P390IP
```

An example of a TCPIP.PROFILE.TCPIP file is as displayed below:

```
; TCPIP.PROFILE.TCPIP
; ===================
;
; COPYRIGHT = NONE.
;
; This is a sample configuration file
; for the TCPIP address space.
;
; NOTES:
;
;    The device configuration statements MUST be changed to match your
;    hardware and software configuration.
;
;    The BEGINVTAM section must be changed to match your VTAM
;    configuration.
;
;
```

```
; For more information about this file, see "Configuring the TCPIP
; Address Space" and "Configuring the Telnet Server" in the
; Configuration Guide.
;
; -----------------------------------------------------------------------
;
; The various pool sizes can be customized for your environment.
; Please see the Customization and Administration Guide for details on
; improving your system's overall performance by changing these
; values.
;
; NOTES:
;
;    If you are running Offload, use a data buffer size of 28672.  For
;    example, the statement would be:  DATABUFFERPOOLSIZE 160 28672.
;

 ;ACBPOOLSIZE                 1000
 ;ADDRESSTRANSLATIONPOOLSIZE  1500
 ;CCBPOOLSIZE                 150
 ;DATABUFFERPOOLSIZE          160  32768
 ;ENVELOPEPOOLSIZE            2500   ;750
 ;IPROUTEPOOLSIZE             300
 ;LARGEENVELOPEPOOLSIZE       50    32768
 ;RCBPOOLSIZE                 50
 ;SCBPOOLSIZE                 768    ; default 256
 ;SKCBPOOLSIZE                256
 ;SMALLDATABUFFERPOOLSIZE     1200
 ;TCBPOOLSIZE                 256
 ;TINYDATABUFFERPOOLSIZE      500
 ;UCBPOOLSIZE                 256
;
; -----------------------------------------------------------------------
;
; Inform the following users of serious errors.
;

;INFORM
;    OPERATOR TCPMAINT
;ENDINFORM

; -----------------------------------------------------------------------
; SYSLOCATION is the physical location of this node.  Used for MVS
; agent MIB variable "sysLocation".
;
;
;SYSLOCATION
;   FIRST FLOOR COMPUTER ROOM
;ENDSYSLOCATION
;
; -----------------------------------------------------------------------
; -----------------------------------------------------------------------
;
; Flush the ARP tables every 20 minutes.
;

ARPAGE 20

; -----------------------------------------------------------------------
;
; You can specify DATASETPREFIX in the PROFILE.TCPIP and
; TCPIP.DATA data sets. If this statement is used in a profile or
; configuration data set that is allocated to a client or a server, then
; that client or server dynamically allocates additional required data
; sets using the value specified for DATASETPREFIX as the data set name
; prefix.  The DATASETPREFIX parameter can be up to 26 characters long,
; and the parameter must NOT end with a period.
;
```

```
; For more information please see "Understanding TCP/IP Data Set
; Names" in the Customization and Administration Guide.
;

DATASETPREFIX TCPIP

;
; -----------------------------------------------------------------------
;
; Set Telnet time-out to 10 minutes.
;

TELNETPARMS
    PORT 23
;   INACTIVE 3600
    INACTIVE 0
    TIMEMARK 3600
    SCANINTERVAL 120
    SMFINIT STD
    SMFTERM STD
    WLMCLUSTERNAME TN3270E ENDWLMCLUSTERNAME
ENDTELNETPARMS

;
; ------------------------------------------------------------------------
;
; Reserve low ports for servers
;

TCPCONFIG        RESTRICTLOWPORTS
UDPCONFIG        RESTRICTLOWPORTS

; -----------------------------------------------------------------------
;
; AUTOLOG the following servers.
;

AUTOLOG 5
    FTPD JOBNAME FTPD1   ; FTP Server
;   LPSERVE              ; LPD Server
;   NAMESRV              ; Domain Name Server
;   NCPROUT              ; NCPROUTE Server
    PORTMAP              ; Portmap Server
;   OROUTED              ; RouteD Server
;   RXSERVE              ; Remote Execution Server
;   SMTP                 ; SMTP Server
;   OSNMPD               ; SNMP Agent Server
;   SNMPQE               ; SNMP Client
;   TCPIPX25             ; X25 Server
ENDAUTOLOG

;
; -----------------------------------------------------------------------
;
; Reserve ports for the following servers.
;
; NOTES:
;
;     A port that is not reserved in this list can be used by any user.
;     If you have TCP/IP hosts in your network that reserve ports
;     in the range 1-1023 for privileged applications, you should
;     reserve them here to prevent users from using them.
;
;     The port values below are from RFC 1060, "Assigned Numbers."
;

PORT
     7 UDP MISCSERV            ; Miscellaneous Server
```

```
      7 TCP MISCSERV
      9 UDP MISCSERV
      9 TCP MISCSERV
     19 UDP MISCSERV
     19 TCP MISCSERV
     20 TCP OMVS      NOAUTOLOG ; FTP Server
     21 TCP OMVS                ; FTP Server
     23 TCP INTCLIEN            ; Telnet Server
     25 TCP SMTP                ; SMTP Server
     53 TCP NAMESRV             ; Domain Name Server
     53 UDP NAMESRV             ; Domain Name Server
     69 UDP OMVS                ; OE TFTP SERVER
     80 TCP OMVS                ; OE WEB SERVER
    111 TCP PORTMAP             ; Portmap Server
    111 UDP PORTMAP             ; Portmap Server
    135 UDP LLBD                ; NCS Location Broker
    161 UDP OSNMPD              ; SNMP Agent
    162 UDP SNMPQE              ; SNMP Query Engine
    433 TCP OMVS                ; OE WEB Server
    443 TCP OMVS                ; Secure Server
    446 TCP OMVS                ; DRDA SQL port for DB2
    512 TCP RXSERVE             ; Remote Execution Server
    513 UDP OMVS                ; OE RLOGIN SERVER
    514 UDP OMVS                ; OE syslog server
    514 TCP RXSERVE             ; Remote Execution Server
    515 TCP LPSERVE             ; LPD Server
    520 UDP OROUTED             ; RouteD Server
    580 UDP NCPROUT             ; NCPROUTE Server
    750 TCP MVSKERB             ; Kerberos
    750 UDP MVSKERB             ; Kerberos
    751 TCP ADM@SRV             ; Kerberos Admin Server
    751 UDP ADM@SRV             ; Kerberos Admin Server
;   1021 TCP OMVS                ; OE FTP SERVER
    1023 TCP OMVS                ; OE TELNET SERVER
    1023 UDP OMVS                ; OE TELNET SERVER
    1024 TCP OMVS                ; OE SERVICES
    3000 TCP CICSTCP             ; CICS Socket
    5020 TCP OMVS                ; Resync port for DB2

;
; ----------------------------------------------------------------------
;
; Hardware definitions:
;
; NOTE: To use these device and link statements, update the statements
; to reflect your installation configuration and remove the semicolon
;

;
; LCS1 is a 3172 Model 1 with a Token-Ring and Ethernet adapter.
;

DEVICE LCS1   LCS            E20
LINK P390 IBMTR    1 LCS1
LINK P390X IBMTR    3 LCS1
;LINK ETH1  ETHERNET 1 LCS1

;
; LCS2 is a 3172 Model 2 with a FDDI adapter.
;

;DEVICE LCS2   LCS            BE0
;LINK FDDI1 FDDI     0 LCS2

;
; SNALU0 is an SNA Link.
;
```

```
;DEVICE SNALU0 SNAIUCV SNALINK LU000000 SNALINK
;LINK SNA1 IUCV     1 SNALU0
;
DEVICE IUTSAMEH MPCPTP AUTORESTART
LINK   samehlnk MPCPTP IUTSAMEH
;
;DEVICE XCAMPCEE MPCPTP
;LINK EELINK2 MPCPTP XCAMPCEE
;
DEVICE VIPADEV3 VIRT 0
LINK P390XEE VIRT 0 VIPADEV3
DEVICE VIPADEV2 VIRT 0
LINK P390EE VIRT 0 VIPADEV2
;
; -----------------------------------------------------------------------
;
; HOME Internet (IP) addresses of each link in the host.
;
; NOTE: To use this home statement, update the ipaddress and linknames
; to reflect your installation configuration and remove the semicolon
;
HOME
;172.19.6.170  EELINK2
 172.19.7.31   P390EE
 172.19.4.100  P390
 172.20.6.252  P390X
 172.20.6.253  P390XEE
;9.117.56.221  ETH1
;9.117.142.91  TR1
;  14.0.0.0       LOOPBACK
;  130.50.75.1    TR1
;  193.5.2.1      ETH1
;  9.67.43.110    FDDI1
;  193.7.2.1      SNA1
;
; ---------------------------------------------------------------------
;
; The PRIMARYINTERFACE statement is used to specify which interface
; is the primary interface.
;
; If PRIMARYINTERFACE is not specified, then the first link in the HOME
; statement is the primary interface, as usual.
;
; NOTE: To use this primary statement, update the and linkname
; to reflect your installation configuration and remove the semicolon
;

PRIMARYINTERFACE P390X
;
; -----------------------------------------------------------------------
;
; IP routing information for the host.  All static IP routes should
; be added here.
;
; NOTE: To use this GATEWAY statement, update the addresses and links
; to reflect your installation configuration and remove the semicolon
;

GATEWAY
;
; Direct Routes - Routes that are directly connected to my interfaces.
;
; Network  First Hop  Link Name Packet Size  Subnet Mask  Subnet Value

  172.19       =         P390      1500       0
  172.20       =         P390X     1500       0
; 9            =         ETH1      1500       0.255.255.0  0.117.56.0
; 130.50       =         TR1       2000       0.0.255.0    0.0.10.0
; 193.5.2      =         ETH1      1500       0
; 9            =         FDDI1     4000       0.255.255.0  0.67.43.0
; 193.7.2.2    =         SNA1      2000       HOST

;
; Indirect Routes - Routes that are reachable through routers on my
;                   network.
;
; Network  First Hop  Link Name Packet Size  Subnet Mask  Subnet Value

  defaultnet  172.19.2.55   P390   defaultsize 0
; defaultnet  9.117.56.251  ETH1   defaultsize 0
; 193.12.2 130.50.10.1   TR1       2000       0
; 10.5.6.4 193.5.2.10    ETH1      1500       HOST

;
; Default Route - All packets to an unknown destination are routed
;                 through this route.
;
; Network  First Hop  Link Name Packet Size  Subnet Mask  Subnet Value

; DEFAULTNET 9.67.43.1 FDDI1    DEFAULTSIZE  0

;
; -----------------------------------------------------------------------
;
; orouted Routing Information
;
; if you are using orouted, comment out the GATEWAY statement and
; update the BSDROUTINGPARMS statement to reflect your installation
; configuration and remove the semicolon
;
;    Link     Maxmtu   Metric   Subnet Mask     Dest Addr
; BSDROUTINGPARMS false
;    TR1       2000       0     255.255.255.0   0
;    ETH1      1500       0     255.255.255.0   0
;    FDDI1  DEFAULTSIZE   0     255.255.255.0   0
; ENDBSDROUTINGPARMS
;
; -----------------------------------------------------------------------
;
; Use TRANSLATE to specify the hardware address of a specific IP
; address.  See the Customization and Administration Guide for more
; information.
;

;TRANSLATE
; A null translate statement issues the warning message EZZ0323I

;
; -----------------------------------------------------------------------
;
; Turn off all tracing.  If tracing is to be used, change the following
; line.  To trace the configuration component, for example, change
; the line to ITRACE ON CONFIG 1
;

ITRACE OFF

;
; -----------------------------------------------------------------------
; The ASSORTEDPARMS NOFWD will prevent the forwarding of IP packets
; between different networks.  If NOFWD is not specified, IP packets
; will be forwarded between networks when this host is a gateway.
;
; Even though RESTRICTLOWPORTS was specified on TCPCONFIG and UDPCONFIG,
; ASSORTEDPARMS default would have been to reset RESTRICTLOWPORTS to off
; So it is respecified here.
; If the TCPCONFIG and UDPCONFIG followed ASSORTEDPARMS, RESTRICTLOWPORT
; would not have to be done twice.
;

ASSORTEDPARMS
  NOFWD
  RESTRICTLOWPORTS
ENDASSORTEDPARMS
; NOFWD            issues the informational message EZZ0334I
; RESTRICTLOWPORTS issues the informational message EZZ0338I

;
; -----------------------------------------------------------------------
;
; Define the VTAM parameters required for the Telnet server.
;

BEGINVTAM
    ; Define logon mode tables to be the defaults shipped with the
    ; latest level of VTAM
  TELNETDEVICE 3278-3-E NSX32703 ; 32 line screen - default of NSX32702 is 24
  TELNETDEVICE 3279-3-E NSX32703 ; 32 line screen - default of NSX32702 is 24
  TELNETDEVICE 3278-4-E NSX32704 ; 48 line screen - default of NSX32702 is 24
  TELNETDEVICE 3279-4-E NSX32704 ; 48 line screen - default of NSX32702 is 24
  TELNETDEVICE 3278-5-E NSX32705 ; 132 column screen - default of NSX32702 is 80
  TELNETDEVICE 3279-5-E NSX32705 ; 132 column screen - default of NSX32702 is 80
    ; Define the LUs to be used for general users.
  DEFAULTLUS
       SC0TCP01 SC0TCP02 SC0TCP03 SC0TCP04 SC0TCP05
       SC0TCP06 SC0TCP07 SC0TCP08 SC0TCP09 SC0TCP10
       SC0TCP11 SC0TCP12 SC0TCP13 SC0TCP14 SC0TCP15
       SC0TCP16 SC0TCP17 SC0TCP18 SC0TCP19 SC0TCP20
       SC0TCP21 SC0TCP22 SC0TCP23 SC0TCP24 SC0TCP25
       SC0TCP26 SC0TCP27 SC0TCP28 SC0TCP29 SC0TCP30
  ENDDEFAULTLUS
  LUSESSIONPEND    ; On termination of a Telnet server connection,
                   ; the user will revert to the DEFAULTAPPL
  DEFAULTAPPL TSO   ; Set the default application for all Telnet
                    ; sessions to allow CLSDST Pass
  LINEMODEAPPL TSO ; Send all line-mode terminals directly to TSO.
  ALLOWAPPL SAMON QSESSION  ; SAMON appl does CLSDST Pass to next appl
  ALLOWAPPL TSO* DISCONNECTABLE ; Allow all users access to TSO
             ; applications.
             ; TSO is multiple applications all beginning with TSO,
             ; so use the * to get them all.  If a session is closed,
             ; disconnect the user rather than log off the user.
  RESTRICTAPPL IMS ; Only 3 users can use IMS.
    USER USER1     ; Allow user1 access.
      LU TCPIMS01  ; Assign USER1 LU TCPIMS01.
    USER USER2     ; Allow user2 access from the default LU pool.
    USER USER3     ; Allow user3 access from 3 Telnet sessions,
                   ; each with a different reserved LU.
      LU TCPIMS31 LU TCPIMS32 LU TCPIMS33
  ALLOWAPPL *      ; Allow all applications that have not been
                   ; previously specified to be accessed.

;   Map Telnet sessions from this node to display USSAPC screen.
;   USSTAB USSAPC 130.50.10.1
;
;   Map Telnet sessions from this link to display USSCBA screen.
;   USSTAB USSCBA SNA1
ENDVTAM
;
; ------------------------------------------------------------------------
;
; Start all the defined devices.
;
; NOTE: To use these START statements, update the device name
; to reflect your installation configuration and remove the semicolon
;

; SNMP Configuration - added by NHW
SACONFIG COMMUNITY public
  DISABLED
  AGENT 161
  OSASF 760
  ATMENABLED
  SETSENABLED

START LCS1
START IUTSAMEH
; START XCAMPCEE
; START LCS2
; START OFF1
; START SNALU0
```

Switched Major Nodes for PUs SYS1.VTAMST(member)

It is possible to define each PU to VTAM in a switched major node, however, the recommended method is to configure the VTAM user exit ISTEXCCS to dynamically define PUs as connections made over IP-DLC.

These PU definitions are not specific to IP-DLC and can be used by PUs to connect over any External Communications Adapter (XCA).

1. Follow the example below to to configure the VTAM user exit ISTEXCCS to dynamically define PUs as connections made over IP-DLC

```
*/* SYS1.DYNXID.VTAMLST(WSICSW01)
*/* ----------------------------------------------------------------------
*/*
*/*   SWITCHED NETWORK DEFINITIONS FOR WSIC DEMONSTRATIONS
*/*
*/*   IDBLK=07D/IDNUM=00001:00005
*/*
WSICSW01 VBUILD TYPE=SWNET
*/*
*/*      -  -- ---------------------------------------------- WSICPU01
*/*
WSICPU01    PU PUTYPE=2,MAXDATA=1456,ADDR=01,                          -
               IDBLK=07D,IDNUM=00001,                                  -
               DLOGMOD=DYNAMIC,USSTAB=USSTAB1
*/*
*/* 3278/9 DISPLAY TERMINALS
WSIC0101    LU LOCADDR=1,DLOGMOD=SNX32702
WSIC0102    LU LOCADDR=2,DLOGMOD=SNX32702
WSIC0103    LU LOCADDR=3,DLOGMOD=SNX32702
WSIC0104    LU LOCADDR=4,DLOGMOD=SNX32702
WSIC0105    LU LOCADDR=5,DLOGMOD=SNX32702
WSIC0106    LU LOCADDR=6,DLOGMOD=SNX32702
WSIC0107    LU LOCADDR=7,DLOGMOD=SNX32702
*/* LU TYPE 1 PRINTER
WSIC0108    LU LOCADDR=8,DLOGMOD=SCS,USSTAB=ISTINCDT
*/* RJE TERMINALS
WSIC0109    LU LOCADDR=9,DLOGMOD=BATCHS1,USSTAB=ISTINCDT
WSIC0110    LU LOCADDR=10,DLOGMOD=BATCHS1,USSTAB=ISTINCDT
WSIC0111    LU LOCADDR=11,DLOGMOD=BATCHS1,USSTAB=ISTINCDT
*/* DEPENDENT LU6.2 LUS
WSIC0112    LU LOCADDR=12,DLOGMOD=LU62A,USSTAB=ISTINCDT
WSIC0113    LU LOCADDR=13,DLOGMOD=#INTER,USSTAB=ISTINCDT,LOGAPPL=CICSA
*/* LU TYPE 3 PRINTER TERMINAL
WSIC0114    LU LOCADDR=14,DLOGMOD=DSC4K,USSTAB=ISTINCDT
*/*      -  -- ---------------------------------------------- WSICPU02
WSICPU02    PU PUTYPE=2,MAXDATA=1456,ADDR=01,                          -
               IDBLK=07D,IDNUM=00002,                                  -
```

```
                DLOGMOD=DYNAMIC,USSTAB=USSTAB1
*/* 3278/9 DISPLAY TERMINALS
WSIC0201    LU LOCADDR=1,DLOGMOD=SNX32702
WSIC0202    LU LOCADDR=2,DLOGMOD=SNX32702
WSIC0203    LU LOCADDR=3,DLOGMOD=SNX32702
WSIC0204    LU LOCADDR=4,DLOGMOD=SNX32702
WSIC0205    LU LOCADDR=5,DLOGMOD=SNX32702
WSIC0206    LU LOCADDR=6,DLOGMOD=SNX32702
WSIC0207    LU LOCADDR=7,DLOGMOD=SNX32702
*/* LU TYPE 1 PRINTER
WSIC0208    LU LOCADDR=8,DLOGMOD=SCS,USSTAB=ISTINCDT
*/* RJE TERMINALS
WSIC0209    LU LOCADDR=9,DLOGMOD=BATCHS1,USSTAB=ISTINCDT
WSIC0210    LU LOCADDR=10,DLOGMOD=BATCHS1,USSTAB=ISTINCDT
WSIC0211    LU LOCADDR=11,DLOGMOD=BATCHS1,USSTAB=ISTINCDT
*/* DEPENDENT LU6.2 LUS
WSIC0212    LU LOCADDR=12,DLOGMOD=LU62A,USSTAB=ISTINCDT
WSIC0213    LU LOCADDR=13,DLOGMOD=LU62A,USSTAB=ISTINCDT
*/* LU TYPE 3 PRINTER TERMINAL
WSIC0214    LU LOCADDR=14,DLOGMOD=DSC4K,USSTAB=ISTINCDT
*/*      -  -- --------------------------------------------- WSICPU03
*/*
```

Verifying IP-DLC (Enterprise Extender)

Once IP-DLC has been configured, it must be verified. After IP-DLC activation, issue the following three commands to verify Enterprise Extender is running:

- D TCPIP,TCPIP,NETSTAT,DEV
- D NET,ID=XCAEE
- D NET,ID=PUTO65,E

D TCPIP, TCPIP, NETSTAT, DEV shows the status of Virtual IP Adapter (VIPA) and IUTSAMEH (VTAM) DEVICE is used for Enterprise Extender.

To issue the D TCPIP,TCPIP,NETSTAT,DEV command:

1. Issue the following command:

```
D TCPIP,TCPIP,NETSTAT,DEV
```

1. The returned data should resemble the following:

```
DEVNAME: VIPA DEVTYPE: VIPA
DEVSTATUS: READY
LNKNAME: VLINK LNKTYPE: VIPA LNKSTATUS: READY
NETNUM: 0 QUESIZE: 0
DEVNAME: IUTSAMEH DEVTYPE: MPC
DEVSTATUS: READY
LNKNAME: EELINK LNKTYPE: MPC LNKSTATUS: READY
NETNUM: 0 QUESIZE: 0
```

1. Confirm that the Virtual IP Adapter and IUTSAMEH (VTAM) have a link status of "READY".

D NET,ID=XCAEE,E shows a display of XCAEE (XCA majnode) used for Enterprise Extender.

To issue the D NET,ID=XCAEE,Ecommand:

1. Issue the following command:

```
D NET,ID=XCAEE,E
```

1. The returned data should resemble the following:

```
IST097I DISPLAY ACCEPTED
IST075I NAME = XCAEE, TYPE = XCA MAJOR NODE 222
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1679I MEDIUM = HPRIP
IST1685I TCP/IP JOB NAME = TCPIPD
IST1680I LOCAL IP ADDRESS 172.168.1.2 (VIPA1)
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST170I LINES:
IST232I L0000000 ACTIV
IST232I L0000001 ACTIV
IST232I L0000002 ACTIV
IST232I L0000003 ACTIV
IST314I END
```

1. Ensure the status of the XCA major node is set to ACTIV and that the following has been configured:

```
HPRIP Medium=HPRIP (as opposed to CSMACD, ATM, or RING).
TCPIPD This is the TCP/IP job name.
172.168.1.2 This is the local VIPA.
```

D NET,ID=PU3270,E shows a display of the Physical Unit used for Enterprise Extender.

To issue the D NET,ID=PU3270,Ecommand

1. Issue the following command:

```
D NET,ID=PU3270,E
```

1. The returned data should resemble the following:

```
IST097I DISPLAY ACCEPTED
IST075I NAME = PU33270, TYPE = PU_T2.1 643
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1043I CP NAME = HISERVER, CP NETID = APPN, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I PU3270 AC/R 22 YES 98750000000000000000017100808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = YES
IST1510I LLERP = NOTPREF - RECEIVED = NOTALLOW
IST1680I LOCAL IP ADDRESS 172.168.1.2
IST1680I REMOTE IP ADDRESS 172.168.1.3
IST136I SWITCHED SNA MAJOR NODE = TOKEN01
IST081I LINE NAME = L0000000, LINE GROUP = EEGROUP, MAJNOD = XCA
```

1. Confirm that the following is true:

   PU_T2.1

   The link station is a PU type 2.1, APPN connection between the NNs.

   TGN CP-CP

   The link station is in the APPN topology database CP-CP

   HPR=RTP.

   The level of HPR supported is RTP and the status of the connection.

   LOCAL IP ADDRESS

   172.168.1.2 is the VIPA address of the TCP/IP stack being used by this VTAM.

   REMOTE IP ADDRESS

172.168.1.3 is the VIPA address of the remote NN.

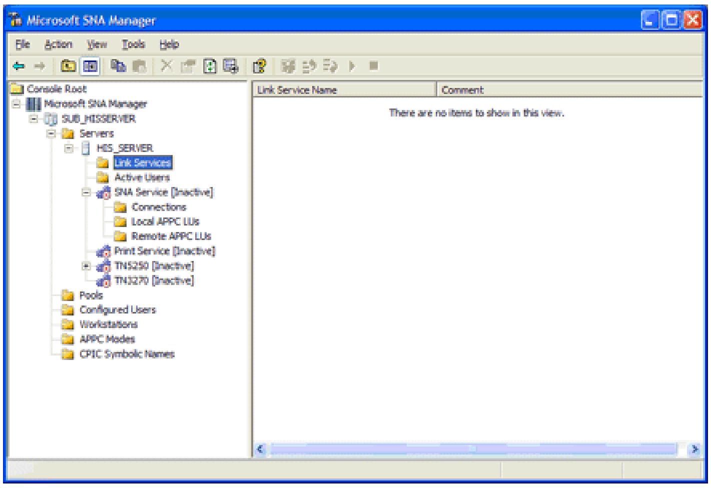
Host Integration Server 2004 Configuration

Host Integration Server 2004 is typically configured through SNA Manager. However, there are automated methods for configuring IP-DLC link service and Connections.

Follow the instructions below to create an IP-DLC Link Service:

To configure the Link Service:

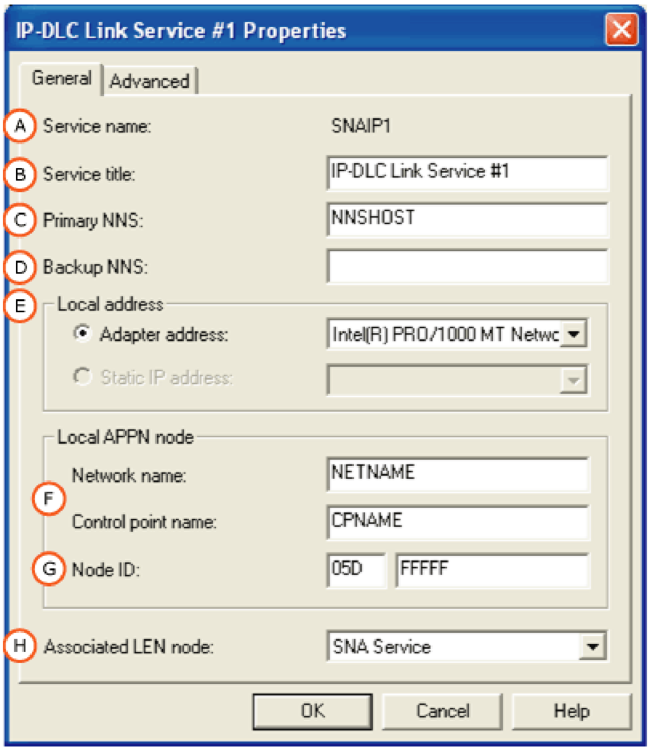
1. Click **Start**, click **Programs**, click **Microsoft Host Integration Server**, and then click **SNA Manager**. The following dialog box will appear.


Microsoft SNA Manager
File Action View Tools Help
Console Root
Microsoft SNA Manager
SUB_HISSERVER
Servers
HIS_SERVER
Link Services
Active Users
SNA Service [Inactive]
Connections
Local APPC LUs
Remote APPC LUs
Print Service [Inactive]
TN5250 [Inactive]
TN3270 [Inactive]
Pools
Configured Users
Workstations
APPC Modes
CPIC Symbolic Names
Link Service Name
Comment

There are no items to show in this view.

2. Right-click **Link Services**, click **New**, and then **Link Service**.
3. Select **IP-DLC Link Service**, then click **Add**. The Link Service Properties dialog will appear.

Use the following illustration as a guideline to configure the IP-DLC Link Service.


IP-DLC Link Service #1 Properties
General
Advanced
A
B
C
D
E
F
G
H
OK
Cancel
Help

Service name: SNAIP1

Service title: IP-DLC Link Service #1

Primary NNS: NNSHOST

Backup NNS:

Local address

● Adapter address: Intel(R) PRO/1000 MT Netwc

○ Static IP address:

Local APPN node

Network name: NETNAME

Control point name: CPNAME

Node ID: 05D FFFFF

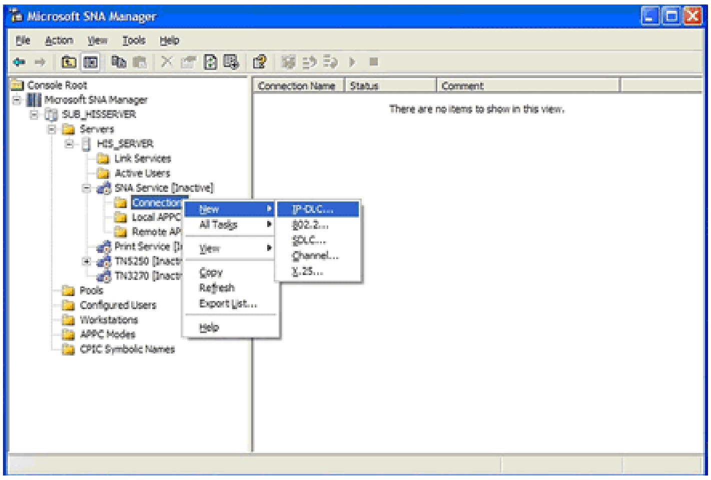
Associated LEN node: SNA Service

Title	Description
A: Service Name	Name of the link service to be configured. For a new link service, the name is predefined as SNAIP#, where # is the ordinal number of the link service.
B: Service title:	A user friendly description up to 128 characters. Default value is IP-DLC Link Service #N, where N is the ordinal number of the link service.
C: Primary NNS:	Enter the IP address, host name, or fully qualified name of the Primary Network Node Server.

D: Backup NNS:	Enter the IP address, host name, or fully qualified name of the Backup Network Node Server. Note: Primary and Backup NNS values can be determined by using /D NET,VTAMOPTS command and locating the IPADDR= parameter.
E: Local Address	Assigns the link service to an IP address. Every link service must be associated with a local IP address or logical connection, and neither the IP address nor the logical connection can be used by another IP-DLC link service on the computer. For multiple IP addresses on a single network adapter, select the Static IP address option and specify the appropriate IP address for the IP-DLC service to use.
F: Network & Control Point Names: Network NAME	Enter the APPN network name for the IP-DLC link service operating as the local APPN node across which the IP-DLC link service will communicate. This value must be text with a maximum of eight characters and comply with the APPN naming convention.
F: Network & Control Point Names: Control Point Name	Enter the APPN control point name for the IP-DLC link service operating as a local APPN node. This value must be text with a maximum of eight characters and comply with the APPN naming convention. There is no default value. The control point name must be unique for this computer on the APPN Network.
G: Node ID:	Typically is it recommended that the Node ID: be left as default and enabled Dynamic PU generation on the host (DynPU=Yes). However, Host Integration Server 2004 can be configured with a static PU ID. Note: The PU definition should not have any LUs defined. IDBLK= & IDNUM= parameters in the PU Definition defined in VTAM.
H: Associated LEN node:	Select the appropriate SNA Service (APPN LEN Node) to associate with the IP-DLC link service. Default value is the first SNA Service on the local computer.

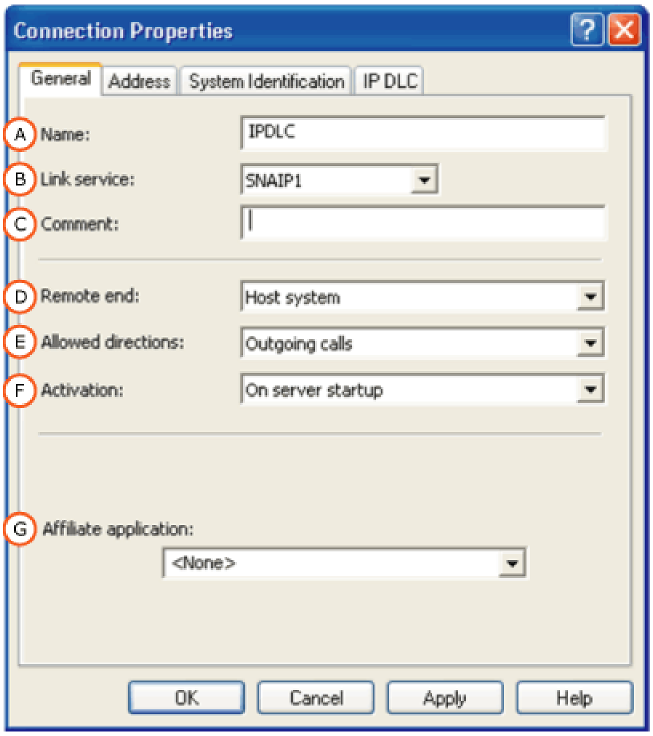
To configure the IP-DLC Connection:

1. From SNA Manager, right-click **Connections**, click **New**, and then click **IP-DLC**.


Microsoft SNA Manager
File
Action
View
Tools
Help
Console Root
Microsoft SNA Manager
SUB_HISSERVER
Servers
HIS_SERVER
Link Services
Active Users
SNA Service [Inactive]
Connection
Local APPC
Remote AP
Print Service [I
TN5250 [Inacti
TN3270 [Inacti
Pools
Configured Users
Workstations
APPC Modes
CPIC Symbolic Names
Connection Name
Status
Comment
New
All Tasks
View
Copy
Refresh
Export List...
Help
IP-DLC...
802.2...
SDLC...
Channel...
X.25...

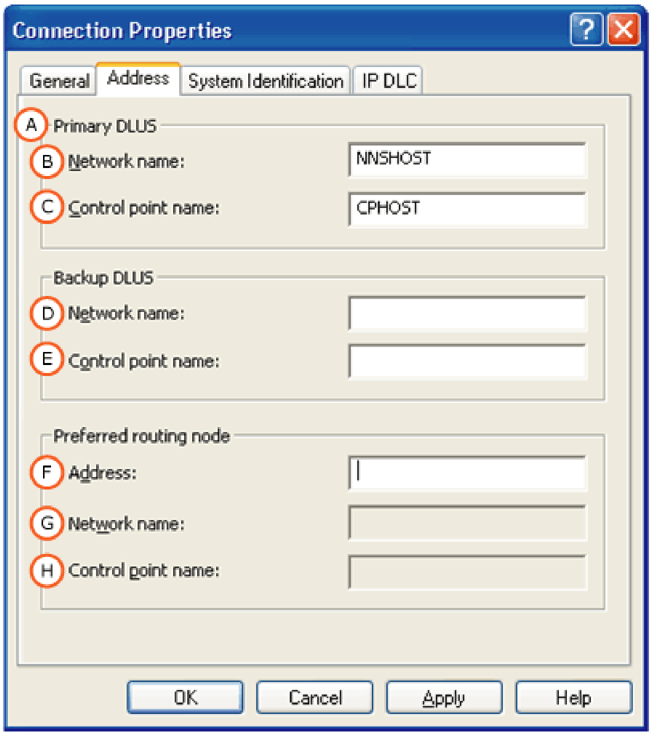
There are no items to show in this view.

2. Use the following illustrations as guidelines to configure the IP-DLC connection.



Name: IPDLC
Link service: SNAIP1
Comment:
Remote end: Host system
Allowed directions: Outgoing calls
Activation: On server startup
Affiliate application: <None>

Title	**Description**
A: Name:	Name of the IP-DLC link service. The name has to be unique to the HIS 2004 Server Subdomain.
B: Link service:	Select the appropriate IP-DLC Link Service from the drop down list.
C: Comment:	Specify Host System for use with dependent LU traffic. Specify Peer System independent APPC LU sessions.
D: Remote end:	Note: You cannot associate dependent 3270 LUs with an IP-DLC connection remote end type of peer system. Because Peer System IP-DLC connections do not support dependent LU traffic, selecting this option will disable all controls on the Address page and the IP-DLC page. Only one peer connection can be associated with an IP-DLC link service. Note: Selecting Peer System automatically sets Activation to On Server Startup and Allowed directions to Both.
E: Allowed directions:	Outgoing calls: Connection is outgoing. Incoming calls: Connection is incoming. Both directions: Connection can be both incoming and outgoing.
F: Activation:	Activation: Specifies conditions under which connection is activated. On server startup: Connection is activated on server startup. On demand: Connection is activated on demand. By administrator: Connection can only be activated by system administrator.
G: Affiliate application:	If you configured Single Sign-On, choose an affiliate application from the list. Enterprise Single Sign-On (SSO) affiliate applications are logical entities that represent a system or sub-system such as a host, back-end system, or line of business application to which you are connecting using SSO.


Connection Properties
General
Address
System Identification
IP DLC
A
Primary DLUS
B
C
Backup DLUS
D
E
Preferred routing node
F
G
H
OK
Cancel
Apply
Help

Network name: NNSHOST

Control point name: CPHOST

Network name:

Control point name:

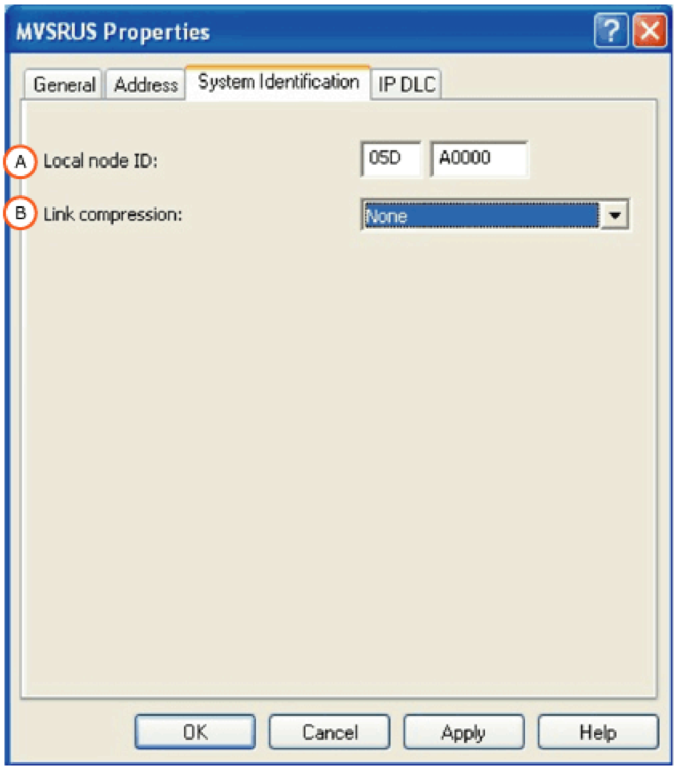
Address:

Network name:

Control point name:

Title	Description
B: Network name:	Enter the name of the APPN network in which to locate the Primary Dependent LU Server (DLUS). Maximum of 8 characters.
C: Control point name:	Enter the control point name of the Primary DLUS. Maximum of 8 characters.
D: Network name:	Enter the name of the APPN network in which to locate the Backup DLUS. Maximum of 8 characters.
E: Control point name:	Enter the control point name of the Backup DLUS. Maximum of 8 characters.
F: Address:	Enter the IP address, host name, or fully qualified name for the NNS as routing server through which to connect to the DLUS.
G: Network Name:	Enter the name of the APPN network in which to locate the DLUS. Maximum of 8 characters.
H: Control point name:	Enter the control point name of the DLUS. Maximum of 8 characters.

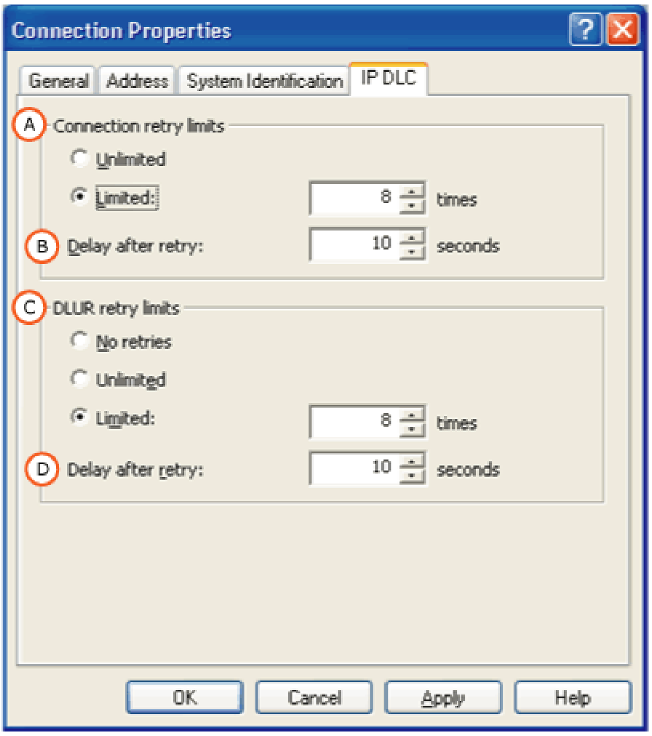
Note Preferred routing node: Using a separate NNS may improve performance by offloading the DLUS host computer from operating as an NNS directory server. The IP-DLC link service will attempt to establish the connection to the DLUS using the preferred route address. If this fails, the link service will request an alternate route from the NNS.


MVSRUS Properties
General
Address
System Identification
IP DLC
A
B
OK
Cancel
Apply
Help

Local node ID: 05D A0000

Link compression: None

Title	Description
A: Local node ID:	Local node ID consists of the IDBLK (first 3 digits) and the IDNUM (last five digits) values configured in PU definition in VTAM.
B: Link compression:	The valid values are: None, Run Length Encoding (RLE), and LZ9. These options offer better compression, but at a higher CPU usage cost.


Connection Properties
General
Address
System Identification
IP DLC
A
B
C
D
OK
Cancel
Apply
Help

Connection retry limits

○ Unlimited

● Limited: 8 times

Delay after retry: 10 seconds

DLUR retry limits

○ No retries

○ Unlimited

● Limited: 8 times

Delay after retry: 10 seconds

Title	Description
A: Connection retry limits	Are used for setting retry limits for activating a connection. Unlimited Continues to retry activating a connection until successful (essentially setting value to infinite). Limited Specifies the number of retries, from 1-65534.
B: Delay after retry:	Specifies the wait period before an activation retry attempt is made. Valid values are 1-327670 seconds. Must be a multiple of five.
C:Dependent LU Requester retry limits	Are used to specify retry action in case the DLUR connection fails.

No retries	Specifies no retry attempts. Unlimited
Specifies an infinite number of retries. Limited	Specifies the number of retries, from 1-65534.
D: Delay after retry:	Specifies the wait period after each retry, from 1-65535

Supported Features and Limitations

This section contains:

- Host Integration Server 2004 Supported Features over IP-DLC
- IP-DLC Link Service Limitations

Host Integration Server 2004 Supported Features over IP-DLC

The following existing Host Integration Server 2004 SNA features are supported over the IP-DLC link service.

Base SNA Features

- LU types 0, 1, 2, 3 and 6.2 (dependent and independent)
- LUA, FMI, APPC and CPI-C APIs
- Dynamically Defined Dependent LUs (DDDLUs)
- Dynamic local LU, remote LU and connection configuration
- Incoming and outgoing calls
- Connection Activation at Server startup, on demand or by administrator
- SNA data compression
- PU concentration with the upstream link over IP-DLC
- NetView RUNCMD/Alerts (note that the IP-DLC link service does not generate alerts)

Since the SNA features above are supported, it follows that the following applications are supported over the new IP-DLC link service.

- Host Integration Server-compatible 3270 emulators
- Host Integration Server-compatible 5250 emulators
- APPC - 3270 Session Viewer (including the LU-LU Test feature)
- Host Print Service
- Data Integration Services
- Local and remote administration
- TN3270 server
- TN5250 server
- MSMQ_MQSeries Bridge
- Transaction Integrator (Formerly known as COMTI)

Fault Tolerance Features

Note that since the IP-DLC link service uses the APPN and HPR/IP protocols, it is automatically able to take advantage of the following fault tolerance features.

- A function of HPR is the ability to reroute sessions around a failure in the network, provided that an alternative route exists.
- IBM's Parallel Sysplex technology and Multi-Node Persistent Sessions (MNPS) features together allow mainframe applications to be moved to a different processor with little or no impact to users when system or application failures occur on the mainframe. Parallel Sysplex is a clustering technology that provides high availability, load balancing and scalable growth to the large mainframe environment. MNPS allows sessions to be restarted on another system in a Parallel Sysplex after hardware or software failure. (See Networking Implications of S/390 Parallel Sysplex, http://go.microsoft.com/fwlink/?LinkId=38994, for further information.)

The IP-DLC link service cannot provide any fault tolerance capabilities to seamlessly handle local adapter failures. However, it may be possible to achieve some fault tolerance for adapter failure on the Host Integration Server 2004 system by using NIC teaming at the MAC layer.

Load Balancing Features

Load balancing for a single IP-DLC link service, with a single local IP address, over multiple adapter cards can be achieved using NIC Teaming at the MAC layer. The IP-DLC link service handles frames arriving out of sequence.

Scalability

The IP-DLC link service contains no hard limits of its own regarding the number of sessions or users. The scalability limits are the same as the existing 802.2 link service. The IP-DLC link service supports the Host Integration Server 2004 capacity of 30,000 simultaneous host sessions per server.

Note Four nodes are required to achieve 30,000 simultaneous host sessions and a single node supports a maximum of 15,000 simultaneous host sessions.

IP-DLC Link Service Limitations

The key limitations with the IP-DLC link service implementation are as follows.

- Some network configurations are not supported. These are documented explicitly in the section Supported Network Configurations with Dependent LUs**.**
- The IP-DLC link service cannot be run as a distributed link service (DLS). However, given that there is an IP connection between the node's server and the APPN network, it is unclear that there is any requirement to implement IP-DLC distributed link service.
- The PU passthrough and downstream connections are not supported over IP-DLC connections. It is not possible to have a one-to-one correspondence between upstream and downstream messages where the upstream connection is an IP-DLC connection.
- Each IP-DLC link service must use a different CP name from the SNA node service. This limitation is a consequence of each IP-DLC link service appearing in the APPN network as a separate node and therefore must have a unique node name. This restriction must be enforced by the SNA Manager Configuration panels.
- Each IP-DLC link service requires a unique local IP address. If multiple IP-DLC link services are required, each must have its own unique local IP address.
- A single IP-DLC link service cannot be shared by multiple SNA node services. Each SNA node service must use a different IP-DLC link service for IP-DLC connectivity.

Supported Configurations

The following sections list network configurations that are supported by IP-DLC.

This section contains:

- Supported Network Configurations with Dependent LUs
- Supported Network Configurations with Independent LUs
- Secure Deployment

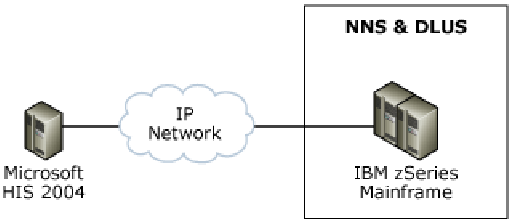
Supported Network Configurations with Dependent LUs

This section shows how Host Integration Server 2004 with IP-DLC can be used to activate dependent LU sessions between Host Integration Server 2004 applications and host applications.

This section contains:

- Direct IP-DLC Connection to Mainframe (DLUS) and NNS
- IP-DLC Connection to Mainframe (DLUS) through Separate NNS
- Separate IP-DLC Connections to Mainframe (DLUS) and NNS
- Simultaneous IP-DLC Connections to Multiple Mainframe Hosts
- PU Concentration with Multiple IP-DLC Host Connections

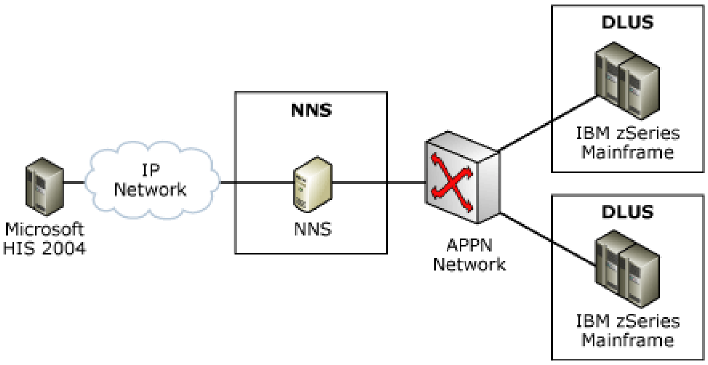
Direct IP-DLC Connection to Mainframe (DLUS) and NNS



This configuration shows a single Host Integration Server 2004 node with a direct IP-DLC connection to a host running CS/390. In this scenario, the mainframe is providing NNS to the Host Integration Server 2004 node as well as providing the DLUS support required to support dependent LUs over the IP-DLC link service. Host Integration Server 2004 applications such as 3270 emulators can establish sessions with applications such as TSO/E on the mainframe system.

It is possible to define multiple Host Integration Server 2004 internal PUs, each having its own IP-DLC connection. All of these PUs are multiplexed over the single HPR/IP link to the same DLUS on the same CS/390.

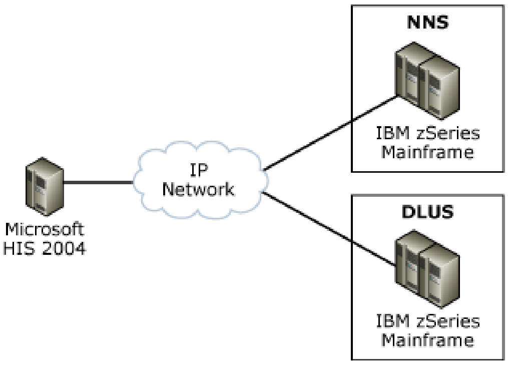
IP-DLC Connection to Mainframe (DLUS) through Separate NNS


DLUS
IBM zSeries Mainframe
NNS
IP Network
NNS
Microsoft HIS 2004
APPN Network
DLUS
IBM zSeries Mainframe

This scenario is similar to the previous one, except that NNS are provided by another APPN NNS (for example, Data Connection Limited (DCL) SNAP-IX) rather than the mainframe running the DLUS. Dependent LU support is provided through the NNS. The key requirement here is that the NNS and mainframe must be part of the same reachable APPN network so that SNA sessions can be activated between them.

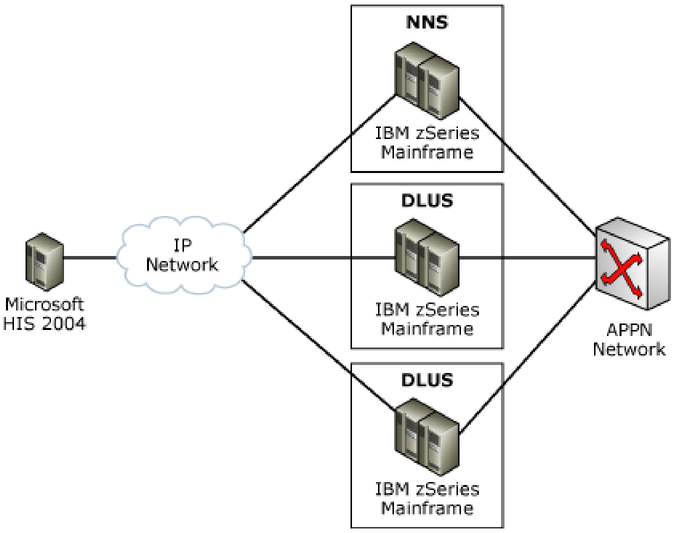
To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Separate IP-DLC Connections to Mainframe (DLUS) and NNS


NNS
IBM zSeries Mainframe
IP Network
Microsoft HIS 2004
DLUS
IBM zSeries Mainframe

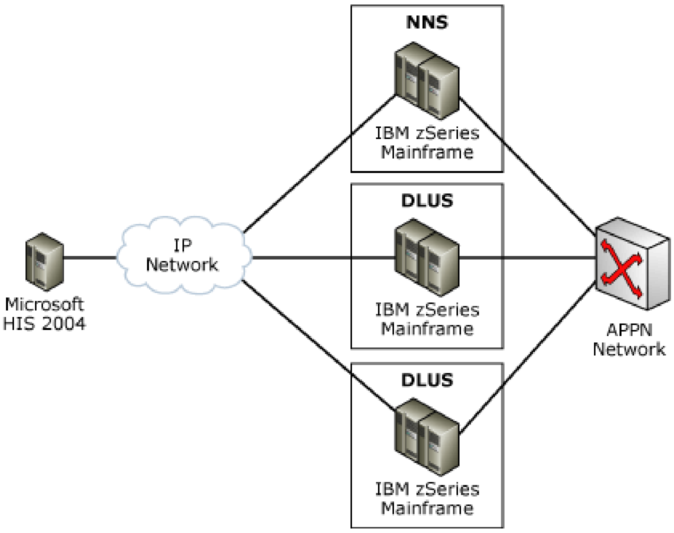
This scenario is similar to the previous one, except that the Host Integration Server 2004 node also has a direct APPN link to the mainframe that is running the DLUS and on which the host applications reside. This allows the dependent LU traffic to flow directly between the Host Integration Server 2004 machine and the mainframe where the host applications are running, which avoids making the APPN NNS a bottleneck.

Simultaneous IP-DLC Connections to Multiple Mainframe Hosts


NNS
IBM zSeries Mainframe
DLUS
IBM zSeries Mainframe
DLUS
IBM zSeries Mainframe
Microsoft HIS 2004
IP Network
APPN Network

In this configuration, the Host Integration Server 2004 IP-DLC link service is supporting multiple internal Host Integration Server 2004 PUs but to different DLUS on different CS/390s. One mainframe is providing NNS and there are separate IP paths to each CS/390. Again, there is a requirement that all of the CS/390s must be part of the same APPN network.

PU Concentration with Multiple IP-DLC Host Connections


NNS
IBM zSeries Mainframe
DLUS
IBM zSeries Mainframe
DLUS
IBM zSeries Mainframe
Microsoft HIS 2004
IP Network
APPN Network

Again, this setup is similar to the last one except that the Host Integration Server 2004 machine is providing PU concentration support for several downstream PUs (DSPUs). 3270 applications on the downstream PUs can communicate, through Host Integration Server 2004, with applications on all of the mainframe machines.

No specific provision is required in the IP-DLC link service for this and it can be configured in the usual way. However, note that the link service used by the DSPUs cannot be IP-DLC.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

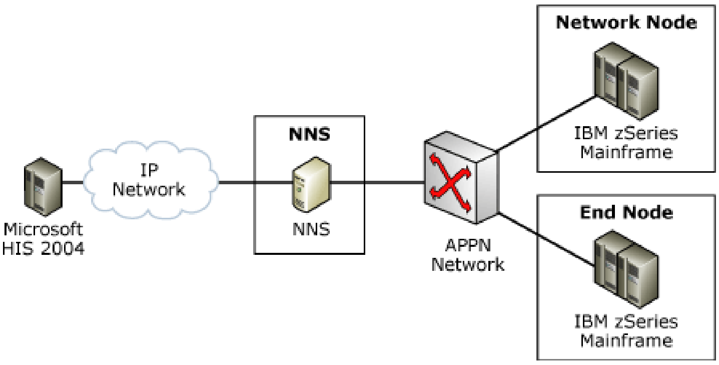
Supported Network Configurations with Independent LUs

This section shows how Host Integration Server 2004 with IP-DLC can be used to activate independent LU sessions between Host Integration Server 2004 applications and applications on peer systems.

This section contains:

- IP-DLC Connection to the Entire APPN Network
- IP-DLC Connection to APPN with Two Host Integration Server 2004 Nodes

IP-DLC Connection to the Entire APPN Network

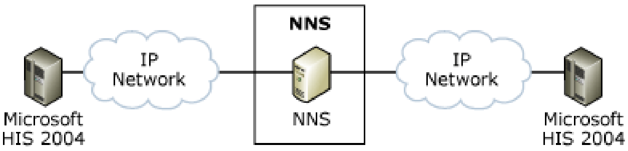

Network Node
IBM zSeries Mainframe
NNS
IP Network
Microsoft HIS 2004
NNS
APPN Network
End Node
IBM zSeries Mainframe

In this configuration, the NNS provides access to the entire APPN network. Therefore, Host Integration Server 2004 is able to activate independent LU 6.2 sessions with any reachable node in that network.

Advanced Program-to-Program (APPC) and Common Programming Interface for Communications (CPI-C) transaction programs on Host Integration Server 2004 can communicate with partner transaction programs on any other node in the APPN network.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IP-DLC Connection to APPN with Two Host Integration Server 2004 Nodes


NNS
Microsoft
HIS 2004
IP
Network
NNS
IP
Network
Microsoft
HIS 2004

This configuration is similar to the last but also shows that two Host Integration Server 2004 nodes can communicate by way of the same (or possibly different) NNS.

Secure Deployment

This section contains:

- UDP Sockets for HPR/IP Protocol Traffic
- Firewall Configuration
- Securing Host Integration Server 2004 IP-DLC Connections

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

UDP Sockets for HPR/IP Protocol Traffic

There are two specific concerns at the UDP sockets level:

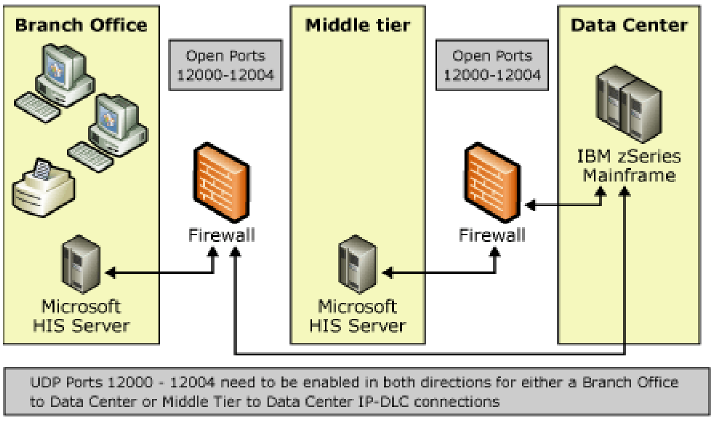
- Attempts to activate connections that are not defined to Host Integration Server 2004.
- Denial of Service attacks by flooding the IP-DLC link service with datagrams or by sending large datagrams.

Any incoming frames from IP addresses that are not defined in Host Integration Server 2004 configuration are rejected at the earliest point in the IP-DLC link service code. This prevents the main SNA node service from being attacked.

When receiving datagrams, the IP-DLC link service checks the length before copying the data into internal data areas and discards any that are too long.

Firewall Configuration

The IP-DLC protocol is based on five hard coded UDP ports. These ports are 12000-12004. The traffic should be enabled in both directions.


Branch Office
Open Ports 12000-12004
Middle tier
Open Ports 12000-12004
Data Center
IBM zSeries Mainframe
Firewall
Firewall
Microsoft HIS Server
Microsoft HIS Server
UDP Ports 12000 - 12004 need to be enabled in both directions for either a Branch Office to Data Center or Middle Tier to Data Center IP-DLC connections

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Securing Host Integration Server 2004 IP-DLC Connections

Since the IP-DLC link service uses UDP/IP, the Microsoft Windows® IPSec feature can be used to provide end-to-end data security over the IP-DLC link service. Configuration of IPSec is handled independently by Windows. No specific configuration is required for the IP-DLC link service.

Troubleshooting

The IP-DLC link service uses several methods of logging and tracing which are fully integrated with the existing Host Integration Server 2004 diagnostic functions. They are controlled by the SNA Trace Utility and can be viewed with the Host Integration Server 2004 Trace Viewer.

The problem determination facilities range from high-level event logging to detailed tracing for administrators and developers. Also included are off-line debugging aids that can be used in the event of a crash. Moreover, Host Integration Server 2004 includes performance counters which can be used for troubleshooting purposes.

This section contains:

- Event Logs
- Diagnostic Gathering Tool
- Performance Monitor Statistics

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Event Logs

The IP-DLC link service uses the Windows event log to record events which may be of interest to administrators in troubleshooting problems.

There are four types of IP-DLC event logs. Each is uniquely identified by Event Category (Base, Tools, APPN, LDLC) and Event ID.

- Fatal (unrecoverable error) - severity event log
- Problem (degrades link service operation) – error event log.
- Exception (may degrade link service operation) – warning event log.
- Audit (normal event, for admin use) – informational event log.

This section contains:

- Typical IP-DLC Link Service Event Log Entry
- UDP Trace
- Internal Trace
- Crash Dumps

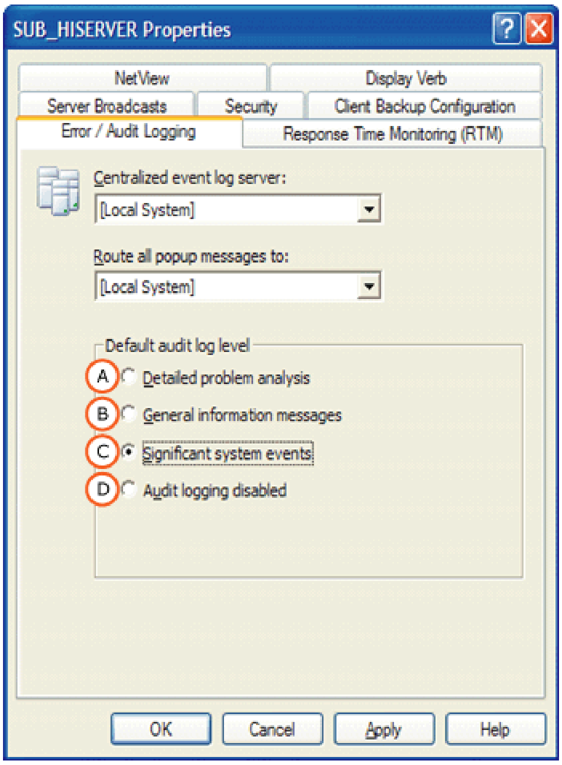
To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Typical IP-DLC Link Service Event Log Entry

The following is a Typical IP-DLC Link Service Event Log:

```
Event Type:   Warning
Event Source:   SNA IP-DLC Link Service
Event Category:   APPN
Event ID:   585
Date:      8/12/2004
Time:      6:06:15 PM
User:      HISERVER\HISADMIN
Computer:   HISERVER
Description:
CPSVRMGR pipe session failure
  DLUS partner                    = MVSRUS.P390SSCP
  Sense Code                      = 0x08a00008

 Cause:
 CPSVRMGR pipe failed to specified DLUS.  This error may occur during normal deactivation of
the CPSVRMGR pipe when the DLUS no longer requires it.  Note that this message could be logge
d during normal node shutdown.


Effect:
Any PUs using the specified DLUS are deactivated (that is, DACTPU(cold)) is sent.  DLUR may a
ttempt to contact one or more backup DLUSs, if configured.

 Action:
 If a pipe with backup DLUS is not initiated automatically manually restart any required PUs


For more information, see Help and Support Center at http://go.microsoft.com/fwlink/events.as
p.
Data:
0000: 53 4e 41 49 50 31 2c 20   SNAIP1,
0008: 31                        1
```

Note Administrators can either allow or suppress event logs based on severity by changing the Default Audit Log Level on the **Subdomain Properties: Error / Audit Logging** property sheet in SNA Manager. No changes are required to the configuration interface. This is shown in the following figure.



SUB_HISERVER Properties
NetView
Display Verb
Server Broadcasts
Security
Client Backup Configuration
Error / Audit Logging
Response Time Monitoring (RTM)
OK
Cancel
Apply
Help

Centralized event log server: [Local System]

Route all popup messages to: [Local System]

Default audit log level
A ○ Detailed problem analysis
B ○ General information messages
C ● Significant system events
D ○ Audit logging disabled

Title	Description
A: Detailed problem analysis	Select this option to record all events that can be recorded.
B: General Information messages	Select this option to record general activity but not all events.
C: Significant system events	Select this option to record only major events.
D: Audit logging disabled	Select this option to turn off all audit logging.

UDP Trace

The IP-DLC link service traces the contents of all UDP packets that it sends and receives over the IP network. This trace appears in the Host Integration Server 2004 Message Trace files, LINKMSGX.ATF.

UDP tracing is configured by the Host Integration Server 2004 Trace Initiator on a per link service basis (Message Trace, Level 2 Messages).

Internal Trace

The internal tracing from the IP-DLC link service uses the standard Host Integration Server 2004 internal tracing mechanism and appears in the Host Integration Server 2004 Internal Trace files, LINKINTX.ATF. It is configured by the Host Integration Server 2004 Trace Initiator on a per link service basis.

Crash Dumps

In the event of a crash, Dr. Watson can generate a dump of the IP-DLC link service process data. Crash Dumps can be very useful to diagnose problems which cannot be determined by through other diagnostic forms. Crash Dumps can be sent to Product Support Services (PSS) upon request.

Diagnostic Gathering Tool

Configuration errors are typically diagnosed by examining the application event log. PSS may also request IP-DLC link service traces to help diagnose the issue.

The Detailed Diagnostics Tool is a separate executable that queries the current state of an IP-DLC link service and then outputs the information to a text file. The two methods of running the detailed diagnostics tool are by using a command line, and from the diagnostic tool.

To run qryipdlc from the command line use the following:

```
C:\Program Files\Microsoft Host Integration Server\system qryipdlc
```

The syntax of this command is:

```
QRYIPDLC [/S server-name] [/L link-service-names] [/A] /O output-file-name
QRYIPDLC /?
```

This usage message is printed:

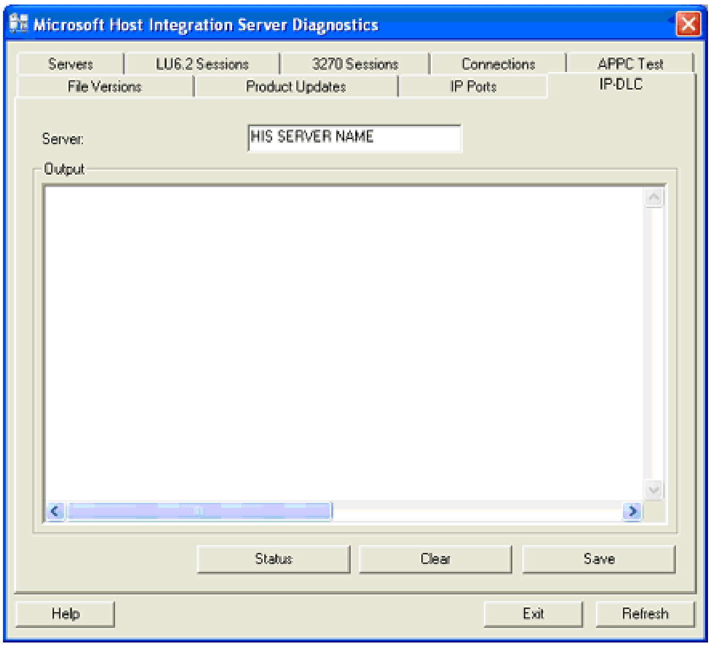
```
  /S server-name
            The name of the server on which the IP-DLC link services
            are running.  If omitted, the local machine is assumed.

  /L link-service-names
            The names of the IP-DLC link services to query, separated
            by semicolons (e.g. snaip1;snaip2).  If omitted, all IP-DLC
            link services will be queried.
  /A        Append to the output file.

  /O output-file-name
            The name of the file to write the diagnostics to.
```

An example of a typical command line syntax, if running on the Host Integration Server 2004 machine is shown below:

```
Qryipdlc /L SNAIP1 /O IPDLCLOG.txt
```

Running Qryipdlc from the Diagnostics Tool (Display.exe)

You can execute Qryipdlc using the Diagnostics Utility from the **Tools** menu in SNA Manager. Configure the server name or IP address in the appropriate field and click **Status**. The Diagnostics tool will automatically query all link services configured on the server. A copy of the log file is automatically saved to the traces directory with the name of QueryIPDLC.txt.


Microsoft Host Integration Server Diagnostics
Servers
LU6.2 Sessions
3270 Sessions
Connections
APPC Test
File Versions
Product Updates
IP Ports
IP-DLC
Output
Status
Clear
Save
Help
Exit
Refresh

Server: HIS SERVER NAME

QRYIPDLC Sample Output

The Qryipdlc utility interrogates the selected link service(s) and prints detailed state information either to a file specified using the command line or QueryIPDLC.txt by way of the Diagnostics tool.

Note This information is intended for use by Product Support Services (PSS) to aid in problem diagnosis. The file is retained on disk so that it can be sent to PSS if necessary.

The following is an excerpt from a Qryipdlc log.

```
Detailed Diagnostics for IP-DLC Link Service SNAIP1 on HISERVER Created at Tue Aug 03 2004 16
:46:52 Pacific Time.

Link Service Status
Create parameters:
  Node type                                             Branch Network Node
  FQCP name                                             MYNET.HISERVER
  CP alias                                              HISERVER
  Node ID (IDBLK/IDNUM)                                 X'05D.FFFFF'

Network Node Server Status
LS name  | State            | Adjacent CP name  | Default NNS | Remote address
---------+------------------+-------------------+-------------+--------------------
@N000001 | Active           | MVSRUS.P390SSCP   | Yes         | MVSRUS

Peer Connection Status

Host Connection Status
Connection name | Internal LS state | External LS state | External LS name | Preferred route
----------------+-------------------+-------------------+------------------+-------
MVSRUS          | Active            | N/A               | None             | None

Internal Link Station Status
Link station name                                       MVSRUS
Determined data:
  Link station state                                    Active
  Link station sub-state                                Active
  Adjacent CP name                                      IPDLCNET.@C000001
  Adjacent CP type                                      End Node

External Link Station Status

RTP Connection Status
RTP connection name | First hop LS name | Destination node name | COS name | # active session
s
--------------------+-------------------+-----------------------+----------+-------
@R000001            | @N000001          | MVSRUS.P390SSCP       | CPSVCMG  | 2
```

```
@R000002            | @N000001          | MVSRUS.P390SSCP      | SNASVCMG | 2
@R000003            | @N000001          | MVSRUS.P390SSCP      | RSETUP   | 0
@R000007         | @N000001          | MVSRUS.P390SSCP      | #CONNECT | 1
```

Performance Monitor Statistics

The IP-DLC link service supports performance monitor counters. The following Host Integration Server 2004 performance monitor counters are included when installing an IP-DLC link service:

- TotalBytesThroughput
- TotalFramesThroughput
- TotalBytesReceived
- TotalBytesTransmitted
- TotalFramesReceived
- TotalFramesTransmitted
- SuccessfulConnects
- ConnectionFailures
- AdapterFailures.

> **Note** All of the counters above are visible in the Windows performance monitor while the IP-DLC link service is running.

Example Full Qryipdlc Log

```
Detailed Diagnostics for IP-DLC Link Service SNAIP1 on HISERVER
Created at Tue Aug 03 2004 16:46:52 Paci

Link Service Status
===================
Create parameters:
  Node type                                             Branch Network Node
  FQCP name                                             MYNET.HISERVER
  CP alias                                              HISERVER
  Node ID (IDBLK/IDNUM)                                 X'05D.FFFFF'
  Mode to COS mapping supported                         No
  MDS and MS capabilities supported                     No
  Maximum locates                                       1000
  Directory cache size                                  1000
  Maximum directory entries                             Unlimited
  Locate timeout                                        540 seconds
  Register resources with NN                            All
  Size of MDS send alert queue                          16
  Size of COS database weights cache                    8
  Size of topology database routing tree cache          8
  Maximum number of uses of a cache tree                1
  Maximum number of nodes in topology database          Unlimited
  Maximum number of TGs in topology database            Unlimited
  Maximum ISR sessions                                  30000
  Upper threshold for ISR sessions                      29000
  Lower threshold for ISR sessions                      28000
  Maximum ISR RU size                                   61440 bytes
  ISR receive pacing window size                        63
  NN route additional resistance                        0
  HPR support                                           Control flows
  Program Temporary Fix (PTF) array                     X'060000000000001E8000'
  Disable branch awareness                              No
Uptime                                                  4931.85 seconds
Memory available                                        226993 KB
Memory used                                             353 KB
NN status                                               Uncongested
NN resource sequence number                             2
Good XIDs for defined link stations                     2
Bad XIDs for defined link stations                      0
Good XIDs for dynamic link stations                     0
Bad XIDs for dynamic link stations                      0
NNS support for registration of DLUS-served LUs         Yes
NNS support for receipt of different owning CP name     No
Network node server name                                MVSRUS.P390SSCP
Current ISR sessions                                    0


Network Node Server Status
==========================
LS name  | State            | Adjacent CP name  | Default NNS | Remote address
---------+------------------+-------------------+-------------+------------------------
@N000001 | Active           | MVSRUS.P390SSCP   | Yes         | MVSRUS

Link station name                                       @N000001
Determined data:
  Link station state                                    Active
  Link station sub-state                                Active
  Adjacent CP name                                      MVSRUS.P390SSCP
  Adjacent CP type                                      Network Node
  TG number                                             21
  Link station statistics:
    XID bytes received                                  825
    Message bytes received                              92898
    XID frames received                                 5
    Message frames received                             964
    XID bytes sent                                      565
    Message bytes sent                                  70868
    XID frames sent                                     6
    Message frames sent                                 1040
    Invalid frames received                             0
    Control frames received                             0
    Control frames sent                                 0
    Echo responses received                             0
    Current delay                                       0 ms
    Maximum delay                                       0 ms
    Minimum delay                                       0 ms
    Time since maximum delay                            0.00 seconds
    Successful XID exchanges                            1
    Unsuccessful XID exchanges                          0
  Start time                                            0.30 seconds
  Stop time                                             0.00 seconds
  Uptime                                                4931.55 seconds
  Time in current state                                 4931.55 seconds
  Deactivation cause                                    None
  Auto activation support                               By remote node
  Link station role                                     Secondary
  Adjacent node ID (IDBLK/IDNUM)                        X'FFF.186DF'
  Maximum send BTU size                                 1493 bytes
  Local address                                         157.59.127.143 (LSAP 4)
  Adjacent CP is a BrNN                                 No
  HPR support                                           Control flows
  ANR label                                             X'90FF'
  Reverse ANR label                                     X'80A7006001000000'
Defined data:
  Adjacent CP type                                      Network Node
  Destination address                                   IPv4: MVSRUS (172.30.252.27) (LSAP 4)
  Limited resource                                      No
  Default NNS                                           Yes
  CP-CP sessions supported                              Yes
  Auto activation support                               No
  Link station attributes                               X'00000000'
  Target pacing count                                   7
  Maximum send BTU size                                 1493 bytes
  Maximum receive BTU size                              1493 bytes
  Link station role                                     Negotiable
  Maximum I-frames that can be received                 7
  Maximum activation attempts                           Unlimited
  Activation delay timer                                25 seconds


Peer Connection Status
======================

Host Connection Status
======================
Connection name | Internal LS state | External LS state | External LS name | Preferred route
----------------+-------------------+-------------------+------------------+-------
MVSRUS          | Active            | N/A               | None             | None

Connection name                                         MVSRUS
Internal LS state                                       Active
External LS state                                       N/A
External LS name                                        None
Defined data:
  Address:
    Primary DLUS name                                   MVSRUS.P390SSCP
    Backup DLUS name
    Preferred route                                     None
  System Identification:
    Local node ID                                       X'05D.A003A'
  IP-DLC:
    DLUR retry limit                                    8
    Delay after retry                                    10 seconds


  Internal Link Station Status
  ============================
  Link station name                                      MVSRUS
  Determined data:
    Link station state                                   Active
    Link station sub-state                               Active
    Adjacent CP name                                     IPDLCNET.@C000001
    Adjacent CP type                                     End Node
    Link station statistics:
      XID bytes received                                 300
      Message bytes received                             3560
      XID frames received                                3
      Message frames received                            278
      XID bytes sent                                     178
      Message bytes sent                                 41111
      XID frames sent                                    3
      Message frames sent                                227
      Invalid frames received                            0
      Control frames received                            30
      Control frames sent                                22
      Echo responses received                            0
      Current delay                                      0 ms
      Maximum delay                                      0 ms
      Minimum delay                                      0 ms
      Time since maximum delay                           0.00 seconds
      Successful XID exchanges                           1
      Unsuccessful XID exchanges                         0
    Start time                                           4.71 seconds
    Stop time                                            0.00 seconds
    Uptime                                               4927.14 seconds
    Time in current state                                4927.14 seconds
    Deactivation cause                                   None
    Auto activation support                              By local node, By remote node
    Link station role                                    Primary
    Adjacent node ID (IDBLK/IDNUM)                       X'05D.A003A'
    Maximum send BTU size                                1493 bytes
    Currently active sessions                            7
    Currently active ISR sessions                        0
    Currently active LU-LU sessions                      1
    Currently active SSCP sessions                       6
  Defined data:
    Adjacent CP name                                     IPDLCNET.@C000001
    Adjacent node ID (IDBLK/IDNUM)                       X'05D.A003A'
    Local node ID (IDBLK/IDNUM)                          X'000.00000'
    Adjacent CP type                                     Back Level LEN Node
    DSPU name                                            @C000001
    DLUS name                                            MVSRUS.P390SSCP
    Backup DLUS name
    DLUS retry timeout                                   10 seconds
    DLUS retry limit                                     8
    Auto activation support                              Yes
    Link station attributes                              X'00000000'
    Target pacing count                                  7
    Maximum send BTU size                                1493 bytes
    Maximum receive BTU size                             1493 bytes
    Link station role                                    Primary
    Maximum I-frames that can be received                7
    Maximum activation attempts                          10
    Activation delay timer                               25 seconds


  External Link Station Status
  ============================
Directory Status
================
Maximum number of cache entries                         1000
Current cache entry count                               0
Current home entry count                                8
Current registered entry count                          0
Current directory entry count                           8
Cache hits                                              0
Cache misses                                            0
Locates in                                              0
Broadcast locates in                                    1
Locates out                                             1
Broadcast locates out                                   0
Unsuccessful locates                                    0
Unsuccessful broadcast locates                          0
Total outstanding locates                               0

Resource name     | Resource type        | Resource location
------------------+----------------------+------------------
MYNET.HISERVER      | NNCP resource        | Local
MYNET.HISERVER      | LU resource          | Local
APPN.L3163A02     | DLUR LU resource     | Local
APPN.L3163A03     | DLUR LU resource     | Local
APPN.L3163A04     | DLUR LU resource     | Local
APPN.L3163A05     | DLUR LU resource     | Local
APPN.L3163A06     | DLUR LU resource     | Local

Resource name                                           MYNET.HISERVER
Resource type                                           NNCP resource
Parent name
Parent resource type                                    None
Directory entry type                                    Local resource
Resource location                                       Local
Real owning CP type                                     None
Real owning CP name
Supplier CP type                                        None
Supplier CP name

Resource name                                           MYNET.HISERVER
Resource type                                           LU resource
Parent name                                             MYNET.HISERVER
Parent resource type                                    NNCP resource
Directory entry type                                    Local resource
Resource location                                       Local
Real owning CP type                                     None
Real owning CP name
Supplier CP type                                        None
Supplier CP name

Resource name                                           APPN.L3163A02
Resource type                                           DLUR LU resource
Parent name                                             MYNET.HISERVER
Parent resource type                                    NNCP resource
Directory entry type                                    Local resource
Resource location                                       Local
Real owning CP type                                     None
Real owning CP name
Supplier CP type                                        None
Supplier CP name

Resource name                                           APPN.L3163A03
Resource type                                           DLUR LU resource
Parent name                                             MYNET.HISERVER
Parent resource type                                    NNCP resource
Directory entry type                                    Local resource
Resource location                                       Local
Real owning CP type                                     None
Real owning CP name
```

```
Supplier CP type                                        None
Supplier CP name

Resource name                                           APPN.L3163A04
Resource type                                           DLUR LU resource
Parent name                                             MYNET.HISERVER
Parent resource type                                    NNCP resource
Directory entry type                                    Local resource
Resource location                                       Local
Real owning CP type                                     None
Real owning CP name
Supplier CP type                                        None
Supplier CP name

Resource name                                           APPN.L3163A05
Resource type                                           DLUR LU resource
Parent name                                             MYNET.HISERVER
Parent resource type                                    NNCP resource
Directory entry type                                    Local resource
Resource location                                       Local
Real owning CP type                                     None
Real owning CP name
Supplier CP type                                        None
Supplier CP name

Resource name                                           APPN.L3163A06
Resource type                                           DLUR LU resource
Parent name                                             MYNET.HISERVER
Parent resource type                                    NNCP resource
Directory entry type                                    Local resource
Resource location                                       Local
Real owning CP type                                     None
Real owning CP name
Supplier CP type                                        None
Supplier CP name


DLUS Status
===========
DLUS name          | Pipe state         | # active PUs
-------------------+-------------------+-------------
MVSRUS.P390SSCP    | Active             | 1

DLUS name                                               MVSRUS.P390SSCP
Pipe state                                              Active
Number of active PUs                                    1
DLUS pipe statistics:
  REQACTPUs sent                                        1
  REQACTPU responses received                           1
  ACTPUs received                                       1
  ACTPU responses sent                                  1
  REQDACTPUs sent                                       0
  REQDACTPU responses received                          0
  DACTPUs received                                      0
  DACTPU responses sent                                 0
  ACTLUs received                                       6
  ACTLU responses sent                                  5
  DACTLUs received                                      0
  DACTLU responses sent                                 0
  SSCP-PU MUs received                                  0
  SSCP-PU MUs sent                                      0
  SSCP-LU MUs received                                  55
  SSCP-LU MUs sent                                      71
Persistent pipe support                                 Not supported
Persistent pipe                                         No


DLUR Status
```

```
===========
PU name  | PU identifier | Active DLUS name  | PU status               | DLUS


session status
---------+---------------+-------------------+-------------------------+-----------
@C000001 | X'05D.A003A'  | MVSRUS.P390SSCP   | Active                  | Active

LU name  | PU name  | NAU address | Primary LU name
---------+----------+-------------+----------------
L3163A02 | @C000001 | 2           |
L3163A03 | @C000001 | 3           |
L3163A04 | @C000001 | 4           |
L3163A05 | @C000001 | 5           | MVSRUS.A06TSO01
L3163A06 | @C000001 | 6           |

PU name                                                 @C000001
Defined DLUS name                                       MVSRUS.P390SSCP
Backup DLUS name
PU identifier (IDBLK/IDNUM)                             X'05D.A003A'
Active DLUS name                                        MVSRUS.P390SSCP
ANS support                                             Stop
PU status                                               Active
DLUS session status                                     Active
FQPCID used on pipe                                     X'E32F2405AD4D24C2' (MYNET.HISERVER
)
DLUS retry timeout                                      10 seconds
DLUS retry limit                                        8


Session Status
==============
FQPCID              | COS name | ISR session state | Primary LS name | Secondary LS name
--------------------+----------+-------------------+-----------------+-------------
FQPCID              | COS name | ISR session state | Primary LS name | Secondary LS name
--------------------+----------+-------------------+-----------------+-------------
X'DD238E7F72E3A732' | #CONNECT | Active            | @R000007        | MVSRUS

FQPCID                                                  X'DD238E7F72E3A732' (MVSRUS.P390SSCP
)
Transmission priority                                   Medium
Class of Service name                                   #CONNECT
Limited resource                                        No
Primary hop session statistics:
  Session receive RU size                               1024 bytes
  Session send RU size                                  3840 bytes
  Maximum send BTU size                                 1359 bytes
  Minimum send BTU size                                 1464 bytes
  Maximum send pacing window size                       1
  Current send pacing window size                       1
  Send residual pacing count                            0
  Maximum receive pacing window size                    63
  Current receive pacing window size                    63
  Receive residual pacing count                         62
  Number of data frames sent                            0
  Number of FMD data frames sent                        0
  Number of data bytes sent                             0
  Number of FMD data bytes sent                         0
  Number of data frames received                        2
  Number of FMD data frames received                    2
  Number of data bytes received                         1121
  Number of FMD data bytes received                     1121
  Session ID high byte                                  2
  Session ID low byte                                   0
  ODAI bit set                                          1
  Link station name                                     @R000007
  Type of pacing in use                                 Adaptive
Secondary hop session statistics:
  Session receive RU size                               3840 bytes
  Session send RU size                                  1024 bytes
  Maximum send BTU size                                 1493 bytes
  Minimum send BTU size                                 1493 bytes
  Maximum send pacing window size                       1
  Current send pacing window size                       1
  Send residual pacing count                            0
  Maximum receive pacing window size                    0
  Current receive pacing window size                    0
  Receive residual pacing count                         0
  Number of data frames sent                            2
  Number of FMD data frames sent                        2
  Number of data bytes sent                             1121
  Number of FMD data bytes sent                         1121
  Number of data frames received                        0
  Number of FMD data frames received                    0
  Number of data bytes received                         0
  Number of FMD data bytes received                     0
  Session ID high byte                                  1
  Session ID low byte                                   5
  ODAI bit set                                          0
  Link station name                                     MVSRUS
  Type of pacing in use                                 None
ISR session state                                       Active


RTP Connection Status
=====================
RTP connection name | First hop LS name | Destination node name | COS name | # active session
s
--------------------+-------------------+-----------------------+----------+-------@R000001
| @N000001          | MVSRUS.P390SSCP       | CPSVCMG  | 2
@R000002            | @N000001          | MVSRUS.P390SSCP       | SNASVCMG | 2
@R000003            | @N000001          | MVSRUS.P390SSCP       | RSETUP   | 0
@R000007            | @N000001          | MVSRUS.P390SSCP       | #CONNECT | 1

RTP connection name                                     @R000001
LS name of first hop                                    @N000001
Destination node name                                   MVSRUS.P390SSCP
ISR boundary function                                   No
Class of Service name                                   CPSVCMG
Maximum BTU size                                        1464 bytes
Liveness timer                                          0 seconds
Local TCID                                              X'0000000001000000'
Remote TCID                                             X'1A05404C0000013B'
RTP statistics:
  Bytes sent                                            1332
  Bytes received                                        1021
  Bytes resent                                          0
  Bytes discarded                                       0
  Packets sent                                          446
  Packets received                                      444
  Packets resent                                        0
  Packets discarded                                     0
  Gaps detected                                         0
  Current send rate                                     2663 Kbits/s
  Maximum send rate                                     4915 Kbits/s
  Minimum send rate                                     9 Kbits/s
  Current receive rate                                  0 Kbits/s
  Maximum receive rate                                  33 Kbits/s
  Minimum receive rate                                  0 Kbits/s
  Burst size                                            16646 bytes
  Total uptime                                          4931 seconds
  Smoothed round-trip time                              164 ms
  Last round-trip time                                  20 ms
  SHORT_REQ timer duration                              880 ms
  Number of SHORT_REQ timeouts                          1
  Number of liveness timeouts                           0
```

```
    Invalid SNA frames received                             0
    SC frames received                                      2
    SC frames sent                                          2
  Number of active sessions                                 2
  ARB mode                                                  Responsive mode

  RTP connection name                                       @R000002
  LS name of first hop                                      @N000001
  Destination node name                                     MVSRUS.P390SSCP
  ISR boundary function                                     No
  Class of Service name                                     SNASVCMG
  Maximum BTU size                                          1464 bytes
  Liveness timer                                            0 seconds
  Local TCID                                                X'0000000002000000'
  Remote TCID                                               X'1A05404E00000141'
  RTP statistics:
    Bytes sent                                              10444
    Bytes received                                          17817
    Bytes resent                                            0
    Bytes discarded                                         0
    Packets sent                                            179
    Packets received                                        160
    Packets resent                                          0
    Packets discarded                                       0
    Gaps detected                                           0
    Current send rate                                       200 Kbits/s
    Maximum send rate                                       200 Kbits/s
    Minimum send rate                                       102 Kbits/s
    Current receive rate                                    0 Kbits/s
    Maximum receive rate                                    13 Kbits/s
    Minimum receive rate                                    0 Kbits/s
    Burst size                                              5000 bytes
    Total uptime                                            4926 seconds
    Smoothed round-trip time                                313 ms
    Last round-trip time                                    30 ms
    SHORT_REQ timer duration                                7752 ms
    Number of SHORT_REQ timeouts                            6
    Number of liveness timeouts                             0
    Invalid SNA frames received                             0
    SC frames received                                      2
    SC frames sent                                          2
  Number of active sessions                                 2
  ARB mode                                                  Responsive mode

  RTP connection name                                       @R000003
  LS name of first hop                                      @N000001
  Destination node name                                     MVSRUS.P390SSCP
  ISR boundary function                                     No
  Class of Service name                                     RSETUP
  Maximum BTU size                                          1464 bytes
  Liveness timer                                            0 seconds
  Local TCID                                                X'0000000003000000'
  Remote TCID                                               X'1A05404D0000012E'
  RTP statistics:
    Bytes sent                                              1415
    Bytes received                                          1225
    Bytes resent                                            0
    Bytes discarded                                         0
    Packets sent                                            18
    Packets received                                        19
    Packets resent                                          0
    Packets discarded                                       0
    Gaps detected                                           0
    Current send rate                                       4915 Kbits/s
    Maximum send rate                                       4915 Kbits/s
    Minimum send rate                                       4915 Kbits/s
    Current receive rate                                    0 Kbits/s
    Maximum receive rate                                    0 Kbits/s
  Minimum receive rate                                 0 Kbits/s
  Burst size                                           30720 bytes
  Total uptime                                         4927 seconds
  Smoothed round-trip time                             109 ms
  Last round-trip time                                 90 ms
  SHORT_REQ timer duration                             626 ms
  Number of SHORT_REQ timeouts                         0
  Number of liveness timeouts                          0
  Invalid SNA frames received                          0
  SC frames received                                   0
  SC frames sent                                       0
Number of active sessions                              0
ARB mode                                               Responsive mode

RTP connection name                                    @R000007
LS name of first hop                                   @N000001
Destination node name                                  MVSRUS.P390SSCP
ISR boundary function                                  No
Class of Service name                                  #CONNECT
Maximum BTU size                                       1464 bytes
Liveness timer                                         0 seconds
Local TCID                                             X'0000000007000000'
Remote TCID                                            X'1A05405200000140'
RTP statistics:
  Bytes sent                                           210
  Bytes received                                       1330
  Bytes resent                                         0
  Bytes discarded                                      0
  Packets sent                                         13
  Packets received                                     10
  Packets resent                                       0
  Packets discarded                                    0
  Gaps detected                                        0
  Current send rate                                    200 Kbits/s
  Maximum send rate                                    200 Kbits/s
  Minimum send rate                                    200 Kbits/s
  Current receive rate                                 36 Kbits/s
  Maximum receive rate                                 36 Kbits/s
  Minimum receive rate                                 0 Kbits/s
  Burst size                                           5000 bytes
  Total uptime                                         480 seconds
  Smoothed round-trip time                             391 ms
  Last round-trip time                                 50 ms
  SHORT_REQ timer duration                             8392 ms
  Number of SHORT_REQ timeouts                         1
  Number of liveness timeouts                          0
  Invalid SNA frames received                          0
  SC frames received                                   2
  SC frames sent                                       1
Number of active sessions                              1
ARB mode                                               Responsive mode


Topology Information
====================
TG destination node | TG number | Branch link type   | Operative | CP-CP sessions active
--------------------+-----------+--------------------+-----------+-----------------
MVSRUS.P390SSCP     | 21        | Uplink             | Yes       | Yes
IPDLCNET.@C000001   | 1         | Downlink           | Yes       | No

TG destination node                                    MVSRUS.P390SSCP
TG destination node type                               Network Node
TG number                                              21
Resource Sequence Number                               0
TG status                                              HPR, RTP, CP-CP sessions, Operative
TG characteristics:
  Effective capacity                                   94 Mbits/s
  Connection cost                                      0
```

```
    Byte cost                                             0
    Security                                              No security
    Propagation delay                                     384 microseconds
    Modem class                                           0
    User-defined parameter 1                              128
    User-defined parameter 2                              128
    User-defined parameter 3                              128
  CP-CP sessions active                                   Yes
  Branch link type                                        Uplink
  Branch TG                                               No

  TG destination node                                     IPDLCNET.@C000001
  TG destination node type                                End Node
  TG number                                               1
  Resource Sequence Number                                0
  TG status                                               Operative
  TG characteristics:
    Effective capacity                                    94 Mbits/s
    Connection cost                                       0
    Byte cost                                             0
    Security                                              No security
    Propagation delay                                     384 microseconds
    Modem class                                           0
    User-defined parameter 1                              128
    User-defined parameter 2                              128
    User-defined parameter 3                              128
  CP-CP sessions active                                   No
  Branch link type                                        Downlink
  Branch TG                                               No
```

Automated Configuration

There are three methods of automating the configuration of the IP-DLC feature in Host Integration Server 2004.

- LinkCFG
- SNACFG
- Windows Management Interface (WMI)

LinkCFG

LinkCfg is a useful command line utility for deploying and managing link services. The format of the command line for configuring the link service is specified below.

```
LINKCFG LINKSVC "title"
/SERVER:servername
/LSTYPE:"IP-DLC Link Service"
/PRIMARYNNS:NNSServer
[/BACKUPNNS:NNSServer]
/LOCALADDRESS:ipaddress OR /ADAPTER:adaptername
/NETWORKNAME:networkname
/CPNAME:name
[/NODEID:xxx.xxxxx]
/LENNODE:lennode
/DOMAIN:domain
/USERID:user
/PASSWORD:password
[/RECEIVEACK:number]
[/LIVETIME:number]
[/CMDMAXRETRY:number]
[/MAXACTIVATION:number]
[/ACTIVATIONDELAY:number]
[/MAXBTUSEND:number]
[/MAXBTURCV:number]
```

The description of the command line parameters is specified in the table below:

Property	Description	Content
"Title"	The title of the link service	1-128 symbols
/SERVER:servername	The name of the server	Valid server name
/PRIMARYNNS:NNSServer	The primary network node server	DNS name or IP Address
/BACKUPNNS:NNSServer	Backup network node server	DNS name or IP Address
/ADAPTER:adaptername	Name of the local adapter	Name of the physical or logical adapter on the machine
/LOCALADDRES:ipaddress	Local address	Valid IP address or server name
/CPNAME:name	Control point name of the Branch Network Node implemented by the link service	1-8 characters, must be unique in APPN Network & must comply with the APPN naming convention.
/NODEID:"xxx.xxxxx"	The identity of the Branch Network Node implemented by the link service	String in format HHH.HHHHH where H is a hexadecimal digit
/LENNODE:lennode	The name of the Associated LEN node	Name of a LEN node deployed on the local machine
/DOMAIN:domain	The Domain Name which to authenticate in order to add a link service.	Valid Domain Name
/USERID:user	The Userid which to authenticate in order to add a link service.	Valid User ID
/PASSWORD:password	The Password which to authenticate in order to add a link service.	Valid Password
/NETWORKNAME:name	Network name of the Branch Network Node implemented by the link service	1-8 characters & must comply with the APPN naming convention.

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SNACFG

SnaCfg utility is a command line tool for managing SNA Server configuration. The format of the command line for configuring the link service is specified below.

```
SNACFG CONNECTION /LIST
SNACFG CONNECTION connectionname
SNACFG CONNECTION connectionname /PRINT
SNACFG CONNECTION connectionname /ADD [options]
SNACFG CONNECTION connectionname [options]
SNACFG CONNECTION connectionname /DELETE
```

Available options are:

```
/SERVER:Text
/COMMENT:""
/COMPRESSION:None
/ACTIVATION:{ OnServerStartup | OnDemand | ByAdministrator }
/CALLDIRECTION:{ Incoming | Outgoing | Both }
/CPNAME: Text
/NETNAME: Text
/REMOTEBLOCKNO:hex string
/REMOTENODENO: hex string
/LOCALBLOCKNO:hex string
/LOCALNODENO:hex string
/LINKSERVICE:text
/REMOTEEND:{ Host | Peer }
/CONNTYPE:IP-DLC
/DLUSPRIMNETWORKNAME: Text
/DLUSPRIMCPNAME: Text
/DLUSBACKUPNETWORKNAME: Text
/DLUSBACKUPCPNAME: Text
/PREFERREDROUTE: Text
/DLURRETRYTYPE:{ NONE | INFINITE | LIMITED }
/DLURRETRYLIMIT: Value, default is 8
/DLURRETRYDELAY: Value, default is 10
/XIDTYPE:Must be Format3
/ACTIVATEDELAY:Default is 10s, must be multiple of 5s i.e. 5, 10, 15, 20 & etc.
/ACTIVATERETRYLIMIT:Default is 8
/AFFILIATEAPP:text
```

The description of the command line parameters is specified in the table below:

Property	**Description**	**Validation**
/conntype:type	The connection type	IPDLC connection type will be added to the list of types
/RemoteAddress:adr	The address of the remote DLUS service.	Valid IP address or DNS name
/PrimNetworkName:name	The network name of the primary DLUS server.	1-8 characters & must comply with the APPN naming convention.
/PrimCPName:name	The control point name of the primary DLUS server	1-8 characters and must comply with the APPN naming convention.
/BackupNetworkName:name	The network name of the backup DLUS server	1-8 characters and must comply with the APPN naming convention.
/BackupCPName:name	The control point name of the backup DLUS server	1-8 characters and must comply with the APPN naming convention.
/DLURRetryType:N	DLUR retry type	0 – none 1 – infinite 2 – limited

/DLURRetryLimit:N	DLUR retry limit. Ignored unless the DLUR retry type is set to limited	1-65535
/DLURRetryDelay:N	Delay after a DLUR retry. Ignored unless the DLUR retry type is set to limited	1-65534
/RetryLimit:N	Number of the connection retries.	0 – unlimited 1-65534 number of retries
/RetryDelay:N	Delay after a connection retry	0-327670 Must be a factor of 5
/XIDFormat:N	XID Type.	Should be 1 – Format 3
/RemoteNetName:name	Remote net name is hard coded to the network name of the link service	For a new connection, must be left blank
/RemoteCPName:name	Remote control point name is hard coded to the CP name of the link service	For a new connection, must be left blank

WMI

The **MsSna_LinkService_IPDLC** class has been added to the WMI provider. The class has the following properties:

Property	**Type**	**Description**	**Content**
Name	String	This read only property contains the name of the link service. The name will be assigned automatically for a new link service.	1-8 characters US_ASCII String
Title	String	The title of the link service	1-128 symbols
PrimaryNNS	String	The primary network node server	DNS name or IP Address
BackupNNS	String	Backup network node server.	DNS name or IP Address
AddressType	Uint32	Local address type	1 – Adapter address 2 – Static IP Address
LocalAddress	String	Local network adapter or address	Depending on the value of the AddressType property, this field contain ether a valid network adapter name or static IP address
NetworkName	String	Network name of the Branch Network Node implemented by the link service	1-8 characters & must comply with the APPN naming convention.
CPName	String	Control point name of the Branch Network Node implemented by the link service	1-8 characters & must comply with the APPN naming convention.
NodeId	String	The identity of the Branch Network Node implemented by the link service	String in format HHH.HHHHH where H is a hexadecimal digit
LENNode	String	The name of the Associated LEN node	Name of a LEN node deployed on the local machine

SNA Service

The core of the power of Microsoft® Host Integration Server 2004 is its ability to provide a wide range of host connectivity services. Host Integration Server 2004 uses client/server architecture to distribute communications processing. This architecture maximizes the power of the host, Host Integration Server 2004, and individual client computers. Within the context of Host Integration Server 2004, a connection is the data communication path between a Host Integration Server 2004 computer and an IBM host (mainframe or AS/400). A connection is what makes it possible for a client computer on a local area network (LAN), using standard LAN protocols, to communicate with a host by means of one or more Host Integration Server 2004 computers. Each server supports up to 3,000 users operating 30,000 concurrent sessions, 8,000 split stock users per node, four nodes per server.

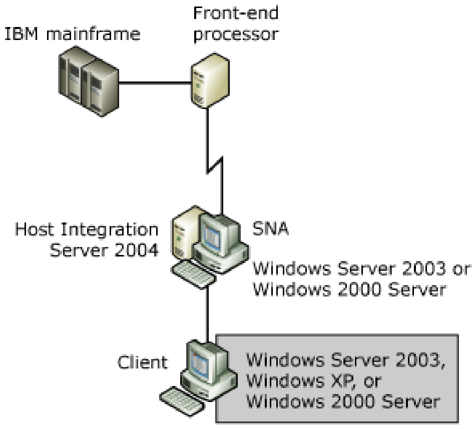
This section contains:

- Communication Between Host Integration Server 2004 Computers and a Host Computer.
- Communication Between Multiple Host Integration Server 2004 Computers.
- Communication Between Host Integration Server 2004 Computers and Client Computers.

Communication Between Host Integration Server 2004 Computers and a Host Computer

Within the context of Host Integration Server 2004, a connection is the data communication path between a Host Integration Server 2004 computer and an IBM host (mainframe or AS/400). A connection corresponds to a physical unit (PU) definition on a mainframe or an APPC controller definition on an AS/400. The connection is what makes it possible for a personal computer on the LAN to communicate with a host by means of a Host Integration Server 2004 computer. Note that SNA connections do not use BISYNC, an older IBM standard for communications.

The following figure shows a Host Integration Server 2004 network connected to an IBM mainframe.


IBM mainframe
Front-end processor
Host Integration Server 2004
SNA
Windows Server 2003 or Windows 2000 Server
Client
Windows Server 2003, Windows XP, or Windows 2000 Server

For each physical adapter or connection, an appropriate link service is installed and configured within Host Integration Server 2004. The link service is a Windows server service or device driver that is used to control server-to-host communication adapters supported by Host Integration Server 2004. The link service provides the SNA data link-level protocol used by the Host Integration Server 2004 computer to communicate with the host.

After being configured, the link service is available for use not only on the configured Host Integration Server 2004, but also on any Host Integration Server 2004 computer in the subdomain using the Distributed Link Service feature of Host Integration Server 2004.

After a link service is configured, you can create connections. A link service may support multiple links to one or more hosts.

In SNA terms, the combination of a connection and the link service it uses is equivalent to a PU. In hierarchical SNA networks, Host Integration Server 2004 provides PU 2.0 functionality. For peer-oriented SNA networks, Host Integration Server 2004 provides PU 2.1 LEN node functionality.

See Also

SNA Service

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Physical Unit (PU)

Although the name physical unit (PU) strongly implies a hardware component, a PU is an IBM naming convention for hardware and software combinations that perform a specific task in an SNA network. For example, PU 5 represents not only the mainframe itself, but also the mainframe software components (such as SSCP and VTAM) within the SNA network.

The following table lists the SNA defined PU types and a brief description of each.

PU number	Description
PU 1	Terminal Controller (IBM 6670, 3767)
PU 2	Cluster controller running configuration support programs (IBM 3174, 3274, 4701, 4702)
PU 2.1	Peer-to-Peer (APPN), used primarily in AS/400 networks
PU 4	IBM Front End Processor, usually running ACF and the Network Control Program (IBM 3754, 3725, 3720, 3745, 3746)
PU 5	IBM Host (mainframe) system

See Also

SNA Service

Logical Unit (LU)

A logical unit (LU) is a configurable unit of software that contains the information needed to specify the type of communications session with the host computer or peer system. Thus, an LU is a point of access to the Host Integration Server 2004 network. There are several types of LUs:

- APPC
- 3270
- Downstream
- Logical unit application (LUA)

LUs represent a set of functions that manage the exchange of data between users and applications, acting as intermediaries between the user and the network. Host Integration Server 2004 protocols identify several LUs on host computers that represent specific functions. The following table is a list of LU numbers and a brief functional description.

LU number	Description
LU 0 (also LU/A or LUA, logical unit application)	General purpose LU for development of specialized applications such as TN3270. Used for program-to-program communications in hierarchical networks.
LU 1	LU 1 handles the transmission of printer data to network and system printers in SNA character string format. IBM 3287-type printers and Host Integration Server 2004 Host Print service that allows you to redirect print data streams to LAN printers. Used to communicate with multiple-device terminals.
LU 2	IBM monochrome terminals 3278 (3270) IBM Color graphic terminals 3279/3179 Host Integration Server 2004 displays
LU 3	IBM 3284-style printers and Host Integration Server 2004 Host Print service, which allows you to redirect print data streams to LAN printers. LU 3 is a simple printing protocol that uses the 3270 data stream format to communicate with a single printer.
LU 4	IBM 6670 information distributor and is not supported through Host Integration Server 2004.
LU 5	Not defined.
LU 6	LU 6.2 is most common revision. IBM 5250 devices and Host Integration Server 2004 local and remote APPC LUs. Provides peer-to-peer communication through Advanced Program-to-Program Communication (APPC) and (Common Programming Interface for Communications (CPI-C).
LU 7	IBM 5250 display terminal. Used mainly on System 3.x but not on AS/400 systems.

On Host Integration Server 2004 computers, you can configure LUs to emulate the 3270 data streams needed to communicate with the mainframes or 5250 data streams for AS/400 systems.

A 3270 LU is a dependent LU that requires the mainframe to function. It has a fixed designation, such as a display LU, printer LU, logical unit application (LUA) LU, or downstream LU. Each type of LU has a specific number assigned to it. A 3270 LU on Host Integration Server 2004 has an LU number, and a corresponding resource must be defined on the host computer. The 3270 LU name is arbitrary and does not have to match the name of the resource on the host.

Additional information about APPC is available later in this section.

See Also

SNA Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Choosing a Connection Type

A Host Integration Server 2004 computer can use any of the types of connections described in this section. To choose a connection type for your servers, you should first contact the host administrator and find out the type of connection available to the mainframe or AS/400. If more than one type is available, choose a type based on comparisons of cost and speed.

For demonstration purposes, you can install the Demo SDLC Link Service, which receives messages from Host Integration Server 2004 and responds to them itself from a prerecorded script.

The various adapters in a computer must be configured to work together so that there are no interrupt, port address, or direct memory access (DMA) conflicts. When you install a new adapter in your computer, you may need to study the configuration of the new and old adapters to make sure that there are no conflicts.

The following connection types are available:

- 802.2 Data Link Control (DLC 802.2)

  Token ring, Ethernet, or Fiber Distributed Data Interface (FDDI) connections use the IEEE 802.2 protocol. With a mainframe, an 802.2 connection goes to a 37*xx* front-end processor (FEP) or a 3174 communications controller (or, rarely, to an adapter in the mainframe). With an AS/400 system, an 802.2 connection goes directly to the AS/400.

  These connections are generally faster than other connections, except for channel connections. The following table provides details.

Type of 802.2 connection	**Common speeds**
Token ring	4 megabits per second (Mbps) or 16 Mbps.
Ethernet/Fast Ethernet	10–100 Mbps.
FDDI	100 Mbps (or more); however, the FDDI line communicates through a front-end processor that is channel-attached to the mainframe, and this may limit the overall speed of communications.

  DLC 802.2 also has certain limitations. The 802.2 link service cannot support more than one 802.2 connection to the same MAC address and destination SAP (that is, to the same host) at the same time, whether the connections originate from the local or a remote SNA Server computer. The 802.2 protocol specification does not permit two distinct connections to have the same Source MAC, Source SAP, Destination MAC, and Destination SAP. The 802.2 link service is bound to a particular LAN adapter and source SAP value, and therefore uses the same source MAC and SAP for all connections. To support multiple connections, you can:

  - Connect to different network adapters on the host.
  - Configure multiple 802.2 link services, all bound to the same LAN adapter but specifying different source SAPs.
  - Support multiple connections to a given host through the same 802.2 link service. Verify that the host is configured to accept 802.2 connections on multiple SAPs. This can be configured to mainframe FEPs (but is rarely used). AS/400s support multiple SAPs by default. These SAP values are configured as the remote SAP value on the Host Integration Server 2004 connection, which is configured on the Host Integration Server 2004 computer using the Distributed Link Service.

  This limitation applies to connections based on the 802.2 link service in general.

  When you make an 802.2 link service available to Distributed Link Service on other Host Integration Server 2004 computers, it cannot be used by the local Host Integration Server 2004 computer, and is not visible in SNA Manager Console.

- Synchronous Data Link Control (SDLC)

  SDLC uses a standard phone line, which can be leased or switched and can be point-to-point or multi-drop. An SDLC line is used with a modem or other type of data circuit -terminating equipment (DCE) at each end. With a mainframe, an SDLC line travels through a modem or other DCE to a 37*xx* front-end processor (FEP), 3174 communications controller, or integrated synchronous adapter. With an AS/400 system, an SDLC line goes through a modem or other DCE, and then directly to the AS/400.

  An SDLC connection is slower than an 802.2 or channel connection. Common speeds for SDLC connections are listed in the following table.

Type of transmission	**Common speeds**
Analog (conventional phone line)	9600–56000 bits per second
Digital Data System (DDS)	56 kilobits per second (kbps) (sometimes 64 kbps)
Integrated Services Digital Network (ISDN)	56 kbps (can be more)
T1 carrier system (digital)	1.544 megabits per second (Mbps)
E1 carrier system (digital)	2.048 Mbps

SDLC connections are useful for wide-area connections between geographically disparate locations, or when bandwidth and usage requirements are low. Because of these factors, SDLC is ideally suited for branch-type deployment strategies.

Host Integration Server 2004 supports SDLC connections using the link support that is included with it or through an SDLC link service available through various third-party vendors. Not all supported SDLC adapters support all link speeds listed in preceding table.

- X.25

  X.25 is the Comite Consultatif Internationale de Telegraphie et Telephonie (CCITT) standard used for communication over a packet-switching network. X.25 uses the qualified logical link control (QLLC) protocol. With a mainframe, an X.25 line goes to a 37*xx* front-end processor (FEP), 3174 communications controller, or integrated synchronous adapter. With an AS/400 system, an X.25 line goes directly to the AS/400.

  An X.25 connection is slower than 802.2-type connections and is comparable to an SDLC connection. This makes X.25 suitable for branch-type deployment strategies. These connections tend to be more common at European sites than at North American installations.

  Host Integration Server 2004 supports X.25 connections using the link support included with Host Integration Server 2004, or through an X.25 link service available through various third-party vendors. Not all supported X.25 adapters support all link speeds listed in the preceding table.

- Channel

  Channel connections provide direct channel attachment to a mainframe and are significantly faster than DLC 802.2 connections. There are two types of channel connections: older Bus & Tag channel connections, which can reach speeds of up to 4.5 megabytes per second (MBps), and newer Enterprise System Connection (ESCON) connections, which can reach speeds approaching 17 MBps.

  Bus & Tag channel attachments use parallel copper cable and offer a flexible, high-speed mainframe connection solution. Many hardware vendors produce SNA Open Gateway Architecture (SOGA)-compliant Bus & Tag products, allowing you to choose a solution that best fits your needs.

  ESCON channel attachments use standard fiber cable and increase throughput significantly. ESCON is the best choice for high-performance, high-bandwidth connections and is currently the fastest host connection method available between Host Integration Server 2004 computers and mainframe systems.

  ESCON is an ideal connection method in centralized or distributed deployments, where users require high performance and responsiveness.

  Support for channel connections is limited to adapters supported natively through Host Integration Server 2004.

- Distributed Link Service

  The Distributed Link Service feature provides a method for a Host Integration Server 2004 computer to connect to a host using a link service installed on a different Host Integration Server 2004 computer. The network connecting SNA Server computers need not support any SNA link level protocol such as DLC 802.2 or SDLC.

  Distributed Link Service is configured in two parts: by installing the Distributed Link Service on one SNA Server computer and by marking a real link service on another computer as distributable. The Distributed Link Service acts as a proxy for sharing the distributable link service. It supports load balancing across multiple, distributed link services. It also supports hot backup because the Distributed Link Service can select alternate remote servers when a remote link fails. It allows a branch SNA Server computer to connect to the host over a wide area network (WAN). This supports only routable internetworking protocols such as TCP/IP, rather than requiring an SNA WAN protocol such as SDLC or bridged DLC.

  Distributed Link Services provide the following benefits:

  - The branch-based Host Integration Server 2004 computers provide split-stack SNA gateway service for local client computers, simplifying configuration of the client computers. This conserves PUs and concentrates traffic on behalf of several client computers, which saves valuable network bandwidth.

- The branch-based Host Integration Server 2004 computer communicates with the central-site Host Integration Server 2004 computers through a native TCP/IP connection, which eliminates DLC 802.2 time-out problems associated with traditional SNA encapsulation methods.
- Because the central site servers provide the equivalent of PU pass-through service for the branch-based servers, the host operator sees each branch-based server as a PU and can manage the branches through standard NetView alerts and RunCmds.
- The branch-based servers can connect to the host through multiple centralized servers, load-balancing among the multiple central-site servers at connect time.
- Should a central-site server fail for any reason, the branch-based servers will automatically establish a new connection through an alternate centralized server for hot backup.
- Should the WAN fail for any reason, the branch-based Host Integration Server 2004 computers can be configured to connect to the host through a direct dial-up SDLC connection as a backup that will be activated automatically upon the host connection failure. It is actually activated upon the first request after a failure.
- The routers at the branches only need to route TCP/IP, which provides for simplicity of WAN management and cost savings.
- Because the branch-based servers rely on WAN services provided by the leading networking vendors, the Distributed Link Service will work over all existing and future WAN technologies, including leased lines, X.25, frame relay, and ATM networks.
- Unlike other native TCP/IP solutions such as TN3270, the Distributed Link Service is not limited in SNA functionality. Each branch-based Host Integration Server 2004 computer provides full SNA access for the local personal computers, including PU 2.0, PU 2.1, and APPN LEN service, as well as LU 0, LU 1, LU 2, LU 3, and LU 6.2 support. Both mainframe and AS/400 access are supported.
- Although the majority of customers are moving to TCP/IP networks, the Distributed Link Service also fully supports IPX protocols.

When Host Integration Server 2004 is set up to use more than one client/server protocol, Distributed Link Service first attempts to establish communication between the servers using TCP/IP, if available. If that fails, Distributed Link Service next attempts to connect using IPX/SPX. To designate a protocol other than TCP/IP as the primary protocol to be used by Distributed Link Service, use the Registry Editor to add or modify the values in the Windows registry. For an example of the registry entry, see the *Host Integration Server 2004 Administrator's Reference*.

By default, when you make a link service available to Distributed Link Service on other servers, it will permit a connection from Distributed Link Service running on any remote server that is configured to connect to it. This is similar to the level of access control permitted by traditional pass-through gateways. Any downstream device that is configured for the correct MAC address can use the gateway.

However, you can restrict access to the Distributed Link Service, requiring the remote Distributed Link Service to provide a valid Windows server username and password. The procedure requires coordination between the upstream and remote servers.

See Also

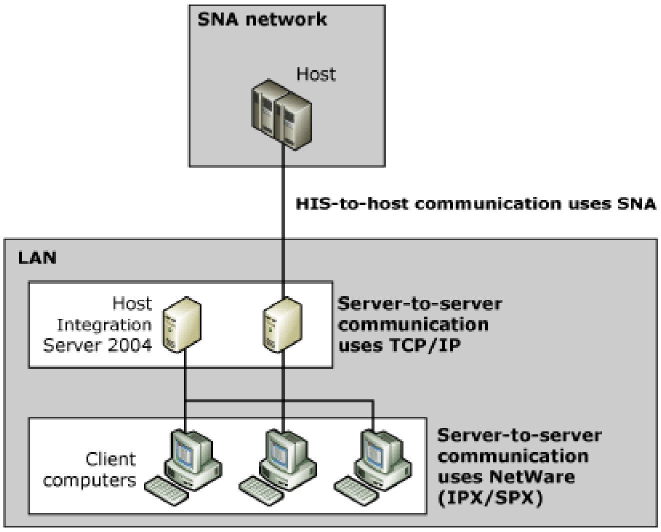
SNA Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Communication Between Multiple Host Integration Server 2004 Computers

Host Integration Server 2004 computers communicate with each other using mail slot or datagram broadcast messages. They use the SnaBase service to keep track of names of servers, client computers, and available transaction programs (TPs), which are the programs used for communication through Advanced Program-to-Program Communications (APPC) or Common Programming Interface for Communications (CPI-C).

Microsoft® Windows Server™ 2003 and Windows® 2000 Server support multiple protocols simultaneously, but there is no need to send the same Host Integration Server 2004 broadcasts over all available protocols. Using the SNA Manager Console, you can specify the network protocol for server broadcasts. You must make sure that one protocol is available on all Host Integration Server 2004 computers in the SNA subdomain, and use that protocol for server broadcasts. For more information, see Configuring a Server Broadcast. The following figure shows a network in which TCP/IP is used for server-to-server communications and IPX/SPX is used for client-to-server communications.


SNA network
Host
HIS-to-host communication uses SNA
LAN
Host Integration Server 2004
Server-to-server communication uses TCP/IP
Client computers
Server-to-server communication uses NetWare (IPX/SPX)

Separate protocol used for server-to-server and client-to-server communications

It is recommended that you use only one protocol for server broadcasts. Using multiple server-to-server transport protocols can add to network overhead because every server broadcast must be sent out through all the protocols selected.

Server broadcasts need to be configured only once for a subdomain; the configuration affects all servers in the subdomain.

The mean time between server broadcasts is specified in number of seconds, with the default being 60 seconds. Specifying a smaller value brings heavier demands on the network because the broadcasts occur more often.

See Also

SNA Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring a Server Broadcast

You can configure a server broadcast to ensure that your servers use the appropriate protocols for your network configuration.

To configure a server broadcast

1. In the SNA Manager tree, select the subdomain that you want to configure.
2. On the **Action** menu, click **Properties**.
3. Click the **Server Broadcasts** tab, fill in the options, and then click **OK** to exit.
4. On the **Action** menu, click **Save configuration**.

See Also

SNA Service

Communication Between Host Integration Server 2004 Computers and Client Computers

Client computers locate the resources of the Host Integration Server 2004 computer in either one of two ways:

- Sponsor connection
- Active Directory® directory service

A sponsor connection is created when a client computer makes a request to communicate with a Host Integration Server 2004 computer and an initial connection is established. The first Host Integration Server 2004 computer to respond to the request (called the sponsor computer) provides the client computer with all the names of Host Integration Server 2004 computers in the subdomain. From these names, the client computer locates an available LU or LU pool.

In a similar way, a client computer that is configured to use Active Directory makes a request to the Active Directory database. Active Directory responds to the request and provides the client computer with all the names of Host Integration Server 2004 computers in the Organizational Unit.

For client/server protocols to operate properly with Host Integration Server 2004, both client computers and servers must have the network software and the Host Integration Server 2004 software installed properly. The network protocols available for use by various client operating systems are listed in the following table.

Operating system on client computer	Client/server protocols
Windows Server 2003 or Windows 2000	Microsoft Networking (Named Pipes) Novell NetWare (IPX/SPX) TCP/IP

See Also

SNA Service

Host Integration Server 2004 Client and SNA Communications

When a client computer makes an SNA request, the client computer must direct that request to a domain or to one or more Host Integration Server 2004 computers. The appropriate way for a client computer to direct requests depends on the protocol used and the relative location of client computers and servers. The following table lists the ways that client computers direct SNA requests, and the information that will be requested by Setup during client software installation.

Network protocol used on client	**How the client directs SNA requests**	**Information to find out before running client setup**
Microsoft Networking	Either to the local domain (if the Host Integration Server 2004 computers are in the same domain as the client computer), or to one or two specific Host Integration Server 2004 computers in a remote domain.	Whether the client computer is in the same domain as the Host Integration Server 2004 computers, and if not, one or two names of Host Integration Server 2004 computers.
Novell NetWare (IPX/SPX)	To a specific domain. The Host Integration Server 2004 computers must be located in this domain for the client computer to locate them.	The name of the SNA subdomain in which the Host Integration Server 2004 computers are located.
TCP/IP	Either to a domain name or to a specific server name, depending on what is specified in the SNA Client Mode or Host Integration Server 2004 Location dialog box.	Contact your network administrator for additional information regarding a specific IP address for Host Integration Server 2004.

When a client computer first makes a request for communication with the SNA network, it establishes an initial connection (the sponsor connection) with a Host Integration Server 2004 computer. The client computer then requests a logical unit (LU), either by name or by requesting an LU from a particular pool of LUs. If the request is for a particular LU, the sponsor server responds by providing the name of the Host Integration Server 2004 computer that contains the LU. If the request is for an LU pool, the sponsor server responds by providing the client computer with all the names of Host Integration Server 2004 computers in its subdomain that support the pool. From these names, the client computer picks a server at random.

Host Integration Server 2004 computers and client computers keep track of the names of servers in the SNA subdomain through the SnaBase service (formerly known as the network access protocol, or NAP). For client computers, the sponsor connections, along with the SnaBase provide a view into the server subdomain.

See Also

SNA Service

Host Print Service

Host Print service provides server-based 3270 and 5250 print emulation, allowing mainframe and AS/400 applications to print to a LAN printer supported by Microsoft® Windows Server™ 2003 and Windows® 2000. Microsoft® Host Integration Server 2004 Host Print service enables centralized control of LU print resources. You can administer all Host Print service functions using SNA Manager, including margin control, fonts, and characters per line. Host Print service also supports print-to-file with auto-incrementing file names. You can configure the file naming scheme for each printer LU.

The following three methods of printing host information are available:

- **Screen printing.** This method allows any 3270 or 5250 emulator to print what is on the display using print screen features of the client operating system. The printer output can be directed to a printer attached to the client computer or the network.
- **Client-redirected printing.** This method delivers an SNA host printer data stream (such as 3287) to the appropriate emulation application running on a Host Integration Client 2000 computer. The client software converts the data stream into data that can be printed locally or to a network printer.
- **Server-based redirected printing.** This method uses a server process to convert SNA host printer data streams into data that can be directed to a local or network printer.

This section contains:

- Using Host Print Services
- Mainframe Printing
- Configuring Host Print Service
- AS/400 (APPC) Printing
- Printer Definition Files

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Using Host Print Services

Host Print service is a Windows Server service, and is found as SnaPrint in the Services utility in Windows Control Panel. To access network printers, the SnaPrint service must run in a domain account with administrative privileges. This account is created for you during Host Integration Server 2004 setup if you are logged onto the Windows Server 2003 or Windows 2000 domain with domain administrative privileges and choose the Domain account option. If you choose the System account option during setup, you will only be able to install local printers for use with Host Print service.

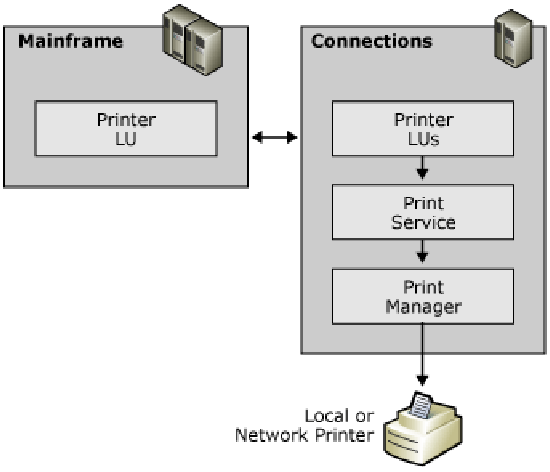
See Also

Host Print Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Mainframe Printing

Mainframe printing supports both LU 1 and LU 3 data streams. It also includes pass-through support from the host for Intelligent Printer Data Stream (IPDS). Using IPDS, mainframe print jobs can be printed on LAN printers without changing either the print job or the host application.



Host Print service provides print emulation for three LU types: LU 3, LU 1, and LU 6.2 (APPC). The LU type defines the characteristic of the host data stream. LU 3 and LU 1 printing use a 3270 data stream over a session to a mainframe. APPC printing uses a LU 6.2 data stream over a session to an IBM AS/400. The following sections provide an overview of LU 3 and LU 1 printing. APPC printing is discussed under the AS/400 section later in this section.

The Host Print service must run in a user account that has permission to access the defined network printer (or printers). For example, if you are printing to a printer attached to a Novell NetWare system, the Host Print service must run in an account that is recognized by NetWare.

See Also

Host Print Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

LU 3 Printing

LU 3 printing is the simplest of the three types of host printing. The LU 3 data stream closely resembles that for 3270-display emulation. It consists of a write command code and a write control character (WCC) followed by the print job. These print jobs contain printable characters and only four simple formatting orders (new line, form feed, carriage return, and end of medium). No other control of the print output is available. This form of printing is similar to printing a text file from a personal computer. If more print formatting is required, an LU 1 print session should be used. For more information, see the section LU 1 Printing.

In SNA Manager, the 3270 Print Session properties Page Layout tab includes specifications for the number of characters per line and the number of lines per inch. Host print jobs using the LU 3 data stream also provide defaults for these parameters. The defaults may be different depending on the settings.

For LU 3, the settings in the host print job normally override the Print Service session settings. However, if you leave the host settings at their defaults of 6 lines per inch and 132 columns per row, the Print service session settings are used.

After the defaults for lines per inch and page width have been determined, the Print service chooses a font for the print job that will accommodate this size print output on the paper loaded in the printer.

There are no transparent sections in LU 3 print jobs, so Transparency is ASCII does not apply. LU 3 print jobs do not have SCS codes, but do have NL, CR, FF, and LF characters and do have commands to allow you to position print data on the page. The Print service uses these to build an internal representation of the page before printing it out. When a PDT file is used, Print service uses the definitions of NL, CR, FF, and LF from the PDT file to allow it to format the printout correctly. If no PDT file is configured, Print service uses the Windows GDI.

Command Code

The write command codes are not unique values, but are identified by occupying the first byte in the Request Unit (the message format used in an SNA network, also known as an RU). In addition there can be only one command code per RU. For LU 3 printing, the most commonly used command code is Erase/Write '0xF5'. Read command codes, which would be normal for display sessions, are not valid for LU 3 printing, and will be rejected with a sense code of '1003'.

Write Control Character (WCC)

Following the write command code is the write control character (WCC). This byte is also identified by its position, second byte in the RU. With LU 3 printing, bits 2 and 3 of the WCC define the printout format.

Write Control Character (WCC) Codes

Bit	Explanation
0,1	Ignored by the printer.
2,3	Defines printout format.
none	00 NL or CR orders define the print line length, EM indicates the end of the message.
none	01 Indicates 40-character lines.
none	10 Indicates 64-character lines.
none	11 Indicates 80-character lines.
4	Start-printer bit.
6	Keyboard reset.
7	Reset MDT bit.

Format Control Orders

There are four control codes used only for printing known as Format Control Orders.

Format Control Orders

Abbreviation	Order	EBCDIC
NL	New Line	0x15
EM	End of Medium	0x19
FF	Form Feed	0x0C
CR	Carriage Return	0x0D

NL, CR, and EM are valid only when the write operation does not specify a line length format in the WCC byte. FF is valid in any write operation.

3270 Orders

The 3270 data stream can contain sequences, called 3270 Orders, which provide additional control functions. The two most commonly used in LU 3 printing are Set Buffer Address (SBA) and Repeat to Address (RA). Note that the buffer address used in these commands is relative to each write. The print buffer in LU 3 allows a maximum of 4 KB of data, and often only 2 KB. This may require multiple write commands to be sent for a full page of text. The first write command will start at the top of the page. Its first buffer address will also be at the top of the page. Subsequent writes will continue where the first left off. Their first buffer address will also start where the previous write ended, unless it was ended with a form feed. For the examples below, it is assumed that these are the first write commands.

SBA is indicated by a '0x11' followed by a two-byte buffer address. This order sets the cursor position to the location specified in the two-byte buffer address. In LU 3 printing, this sets the print position. The data following the SBA will be printed starting from this location. For example:

114040 Sets the print position to row 1 and column 1.

RA is indicated by a '0x3C' followed by a two-byte stop buffer position and the character to be repeated. This order causes a character to be repeated from the current buffer address up to but not including the stop buffer address specified in the RA. For example:

3C40D3C1 Repeats the character 'A' ('0xC1') to row 1 and column 20.

Data

For LU 3 printing the data or printable characters must have values between '0x40' and '0xFE'. The only valid values outside this range are the 3270 Orders.

Example: 15C1C2C3 Prints a new line followed by 'ABC'

Example: 1BC1C2C3 Rejected because '0x1B' is an invalid value

Sample Host Data

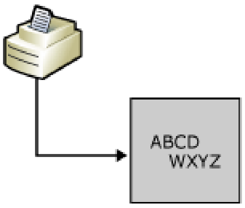
Following is sample data from a host along with an explanation of the data and resulting printout.

```
F5C81140 40151515 C1C2C3C4 15404040
E6E7E8E9 19
```

This sample data is analyzed in the following table.

3270 LU 3 Sample Data

Data	Interpretation
F5	Command code Write/Erase
C8	WCC with bits 2, 3 specifying that NL, EM and CR orders determine the print line length.
114040	SBA sets print position to row 1 column 1
15	New line
15	New line
15	New line
C1C2C3C4	EBCDIC hex values for ABCD
15	New line
404040	EBCDIC hex values for three spaces
E6E7E8E9	EBCDIC hex values for WXYZ
19	End Medium



See Also

Host Print Service

LU 1 Printing

LU 1 printing allows the host to specify formatting for a print job. This is accomplished through the use of SNA Character String (SCS) control codes. The SCS codes encompass the 3270 format orders (FF, CR, and NL), as well as providing additional control codes to format the print output. Through the SCS codes, the host application can set the margins, characters per line, and lines per inch. In addition to the format of the print job, SCS code allows the host application to send a transparent section. By using an SCS code, the host can mark a section of data as transparent. This will cause the print emulator (the Host Print service in this case) to not scan this section for SCS control codes but to pass it to the print output untouched. Transparent sections are most commonly used to embed printer control codes, such as the HP PCL, in the print job. Unlike LU 3 printing, there is no write command code or WCC. The first byte of the RU is either an SCS code or data.

Data Stream Flags

The BIND sent by the host for a LU 1 session indicates what SCS control codes are valid for this session. These Data Stream Flags are set in byte 18 of the BIND.

Data Stream Flags

Bit	Value	Description
0		**Base SCS code support**
	0	**Base support** (NL & FF only)
	1	**Full Base** includes Base plus the following:
		BS (back space)
		CR (carriage return)
		LF (line feed)
		ENP (enable presentation)
		INP (inhibit presentation)
		HT (horizontal tab)
		VT (vertical tab)
1		**Set Horizontal Format** (SHF)
	0	not supported
	1	supported
2		**Set Vertical Format** (SVF)
	0	not supported
	1	supported
3		**Vertical Channel Select** (VCS)
	0	not supported
	1	supported
4		**Set Line Density** (SLD)
	0	not supported
	1	supported
5		**Reserved**
6		**Bell** (BEL)
	0	not supported
	1	supported
7		**Transparent** (TRN) & **Interchange Record Separator** (IRS)
	0	not supported
	1	supported

SCS Codes

The SCS control codes are fully documented in the IBM Host Print Guide (document number SC31-7145). All of the SCS control codes fall within the range of '0x00'–'0x3F.' These codes range from single byte codes, such as Subscript '0x38', to multiple byte codes followed by several parameters, such as Set Horizontal Format '0x2BC1...'

The following are some of the more common SCS control codes used.

> **Note** **[L]**=length and **(Abv)** represents one-byte parameters in the SCS control code.

Set Horizontal Format (SHF) — '0x2BC1[L](MPP)(LM)(RM)(T1)(. . .)(Tn)'

[L] — Length of the parameters, including the length byte

MPP — Maximum Presentation Position; defines the characters per line

LM — Left Margin; column value for the left most print position

RM — Right Margin; column value for the right most print position

T1 — Horizontal tab stop; column value for a tab stop

Tn — Additional tab stops, which can be added in any order

Example

2BC1068401840542

2BC1 — SHF

06 — length of the parameters is 6 bytes including the length byte

84 — MPP is set to 132 characters per line

01 — LM is set to column 1

84 — RM is set to column 132

05 — T1 is set to column 5

42 — T2 is set to column 66

Set Vertical Format (SVF) — '0x2BC2[L](MPL)(TM)(BM)(T1)(. . .)(Tn)'

[L] — Length of the parameters, including the length byte

MPL — Maximum Presentation Line; defines the lines per page

TM — Top Margin; line number of top most print position

BM — Bottom Margin; line number of the bottom most print position

T1 — Vertical Tab Stop; line number for a tab stop

Tn — Additional Tab Stops, which can be added in any order

Example

2BC20642053D0A21

2BC2 — SVF

06 — length is 6 bytes

42 — MPL is set to 66 lines per page

05 — TM is set to line 5

3D — BM is set to line 61

0A — T1 is set to line 10

21 — T2 is set to line 33

Set Line Density (SLD) — '0x2BC6[L](Point)'

[L] — length, including length byte. Value of '0x01' denotes default.

Point — Distance to be moved vertically for a single line. The number is indicated in typographic points (one point is equal to 1/72 inch). Setting a value of '0x0C' will result in 6 lines per inch, a value of '0x09' will result in 8 lines per inch. Value of '0x00' denotes default a value of 6 lines per inch.

Example

2BC6020C

2BC6 — SLD

02 — length is 2

0C — 12 points or 6 lines per inch

Set Print Density (SPD) '0x2BD2[L]29(CharDensity)(Resv)'

[L] — length, including length byte. Value of 0x02 denotes default characters per inch (cpi) of 10

CharDensity — value indicating the numbers of cpi

Resv — Reserved (not used)

Example

2BD204290A00

2BD2 — SPD

04 — length is 4 bytes

29 — type

0A — 10 cpi

00 — reserved

Transparent (TRN) — '0x35[L](P1)(. . .)(Pn)'

This SCS control code indicates a section of data that is not scanned for SCS codes, but passed to the print output untouched. The extent of the section of data is denoted by the length byte.

Example

35051B28313055

35 — TRN

05 — length of transparent section, not including the length byte

1B28313055 — transparent section, HP PCL code for PC-8 symbol set 'Esc(10U'

> **Note** In this example, the transparent section is in ASCII. This would require that the "Transparent is ASCII" box be selected in the Print Services printer session properties in the SNA Manager.

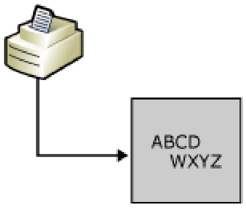
Sample Host Data

Following is sample data from a host along with an explanation of the data and resulting printout.

```
35021B45 2BC10684 01840542 2BC20642
04420A21 C1C2C3C4 15404040 E6E7E8E9
```

3270 LU 1 Sample Data

Data	Interpretation
35021B45	Transparent section, send 'Esc E', a Reset in HP PCL, to printer
2BC1068401840542	SHF, 132 characters per line, LM 1, RM 132
2BC2064204420A21	SVF, 66 lines per page, TM 4, BM 66
C1C2C3C4	EBCDIC hex values for ABCD
15	New line
404040	EBCDIC hex values for three spaces
E6E7E8E9	EBCDIC hex values for WXYZ



See Also

Host Print Service

Configuring Host Print Service

Configuring Host Print service involves the following steps:

- Creating Link Services
- Creating Connections
- Creating a 3270 Printer LU
- Configuring Host Print Service

In addition, a print demonstration using a script is available. The following procedures will create and configure the print demonstration:

Configuring Host Print service for a 3270 connection

1. In SNA Manager, expand the server on which you want to add print services.
2. Right-click **Print Service**, point to **New**, and then click **3270 Session**.
3. The **Properties** page for this session appears.
4. On the **General** tab, type a session name.
5. Click **Printer**, and then configure a printer.
6. Click the **3270** tab, choose an LU Name to use for this print session. If there are no LU names in the drop-down list, you will need to insert a printer LU on the 3270 connection to be used for this print session (To create a print LU, see the earlier procedure).
7. Configure other parameters as desired.
8. Click **OK** to add this print session.
9. In the console tree, right-click **Print Service**, and then click **Save Configuration**.
10. Right-click **Print Service** again, and then click **Start**.

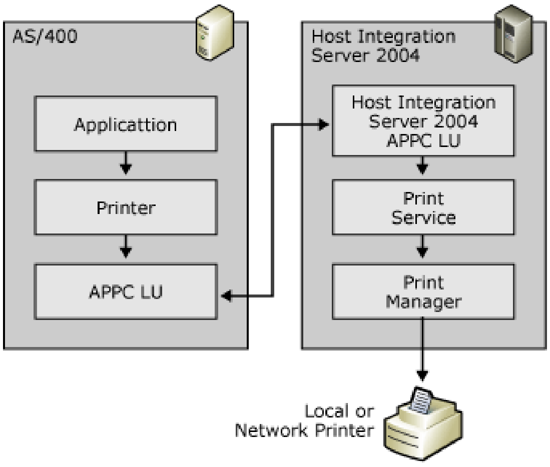
The Host Print service is configured with startup set to Manual. To start the Host Print service at system startup, go to the **Services** icon of Control Panel. Select the service name. Click **Startup**. Change the service activation type from Manual (the default) to Automatic for this service.

SNA Manager will only lock the configuration file when you initiate a configuration change. If the lock is obtained, the status bar will flash **'CONFIG LOCK'**. When you complete the change and save the configuration file, the lock will be released and the status bar will be cleared. The status bar will display **'OUT OF DATE'** on other servers in the domain. To refresh the status on the **'OUT OF DATE'** servers, SNA Manager must be closed and reopened.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

AS/400 (APPC) Printing

APPC printing, like LU 1 printing, uses SCS control codes in the data stream. The set of SCS control codes available for use in APPC printing is more extensive, and allows more formatting options than the set described for LU 1 printing. The IBM AS/400 also provides an additional method for formatting print jobs called Host Print Transform (HPT). With HPT enabled, the AS/400 takes responsibility for rendering the print job into data the printer can understand.



Host Print Transform (HPT)

When SCS control codes are used by the host to format the print output, a print emulator is responsible for translating the SCS codes and characters into data that the printer can understand, through the Windows printer driver and Windows Print system. With HPT enabled, the AS/400 converts the data to printer control codes before sending the data to Host Integration Server 2004. This output from the host requires no further processing after it leaves the AS/400. The print emulator's only responsibility is submitting the data to the printer.

HPT is enabled on the AS/400 in the Device description for the print session. When HPT is enabled, pre-rendered print jobs are sent to the Host Integration Server 2004 in marked ASCII Transparent (ATRN) sections using the SCS control code '0x03.' The ATRN control code provides the same function as the Transparent (TRN) control code detailed in the LU 1 printing section. In addition to indicating that the block of data that should be dealt with as transparent, ATRN also indicates that the data is ASCII; therefore it is not converted from EBCDIC to ASCII.

To enable the host transform feature using the default 5224 print device

1. Stop the print writer associated with the print device.
2. Vary off the print device.
3. Issue the following command:

   ```
   chgdevprt devd(<print device>) transform(*YES) mfrtypmdl(<LAN printer type>)
   ```

   Common LAN printer types include: *HP4, *HPIII, *HPII, *IBM4039. To see a complete list of available options, prompt (F4) on the MFRTYPMDL parameter.

4. Vary on the print device.
5. Start the print writer.

For more details on the Host Print Transform feature, see the "OS/400 Printer device programming" manual (SC41-3713), or the "AS/400 Printing IV" redbook (GG24-4389). Both are available from IBM.

SCS Codes

The SCS control codes are fully documented in the *IBM Host Print Guide* (document number SC31-7145). All of the SCS control codes fall within the range of '0x00'–'0x3F.' These codes range from single-byte codes, such as Subscript '0x38' to multiple-byte codes followed by several parameters, such as Set Horizontal Format '0x2BC1...'

The following are some of the more common SCS control codes used.

Note **[L]**=length and **(Abv)** represents one-byte parameters in the SCS control code

ASCII Transparency (ATRN) — '0x03[L](P1)(. . .)(Pn)'

This SCS control code indicates a section of data that is not scanned for SCS codes, but passed to the print output untouched. In addition, this control code indicates that the data is ASCII. The extent of the section of data is denoted by the length byte. With HPT jobs, the length byte will commonly be '0xFF'.

Example

030441424344

03 — ATRN

04 — length of 4

41424344 — ASCII hex values for ABCD

SCS Control Code Formatted (Non-HPT)

If HPT is disabled in the Device description for the print session, SCS control codes will be used for the formatting of the print job. The SCS control codes, SHF, SVF, SLD, and SPD detailed earlier for LU 1 printing are also supported in APPC printing. Also commonly used in APPC printing is the SCS control code Presentation Position (PP) '0x34.' This control code allows the print position to be moved either horizontally or vertically, relative to the previous position or to an absolute position.

The following are the four forms of the Presentation Position SCS control code.

Absolute Horizontal Presentation Position (AHPP) '0x34C0(nn)'

nn — column number the print position is set to.

Example

34C00F

34C0 — AHPP

0F — column number 15

Relative Horizontal Presentation Position (RHPP) '0x34C8(nn)'

nn — number of columns to move from the current print position.

Example

34C80F

34C8 — RHPP

0F — 15 columns

Absolute Vertical Presentation Position (AVPP) '0x34C4(nn)'

nn — line number the print position is set to.

Example

34C40F

34C4 — AVPP

0F — line number 15

Relative Vertical Presentation Position (RVPP) '0x344C(nn)'

nn — number of lines to move from the current print position.

Example

344C0F

344C — RVPP

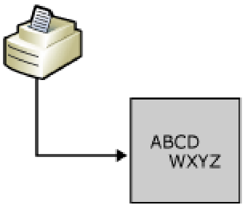
0F — 15 lines

Sample Host Data

Following is sample data from a host along with an explanation of the data and resulting printout.

```
2BC10684 01840542 2BC20642 04420A21
34C404 C1C2C3C4 344C01 34C004 E6E7E8E9
```

Data	Interpretation
2BC1068401840542	SHF, 132 characters per line, LM 1, RM 132
2BC2064204420A21	SVF, 66 lines per page, TM 4, BM 66
34C404	AVPP sets print position to line 4
C1C2C3C4	EBCDIC hex values for ABCD
344C01	RVPP sets print position down one line
34C004	AHPP sets print position to column 4
E6E7E8E9	EBCDIC hex values for WXYZ



See Also

Host Print Service

Configuring Host Print Service for an AS/400 Computer

Configuring AS/400 print service involves the following steps:

- Creating Link Services
- Creating Connections
- Creating LUs

To create a print LU

1. In SNA Manager, expand **SNA Service** for the server that you are working with, and then expand **Connections**.
2. Right-click the appropriate connection, point to **New**, and then click **Printer LU**.
3. Define your printer LU. You can keep the default for the **LU Number** or assign your own. Although the LU number is meaningful to the connection itself, the number is not very useful, so you can add a user-friendly name in the **LU Name** box.
4. Click **OK**.

To configure Host Print service for an AS/400 Connection

1. In SNA Manager, expand the server on which you want to add print services.
2. Right-click **Print Service**, point to **New**, and then click **APPC Session**.
3. The **Properties** page for this session appears.
4. On the **General** tab, type a session name, click **Printer**, and then configure a printer.
5. On the **APPC** tab, provide an **AS/400 Device Name**, a **Local LU Alias**, a **Mode Name**, and a **Remote LU** to use for this print session.
6. If the **AS/400 Device Name** you specify does not exist on the AS/400, it will be created.
7. On the **Security** tab, configure security for this print session.
8. Configure other parameters as desired.
9. Click **OK** to add this print session.
10. In the console tree, right-click **Print Service**, and then click **Save Configuration**.
11. Right-click **Print Service** again, and then click **Start**.

The Print Service feature of Host Integration Server 2004 supports print jobs from an AS/400 that contain basic formatting options. Some print jobs require special formatting. To properly print these jobs, the Host Print Transform feature of the AS/400 must be enabled. Host Print Transform is a feature of the AS/400 operating system (V3R1 and later) that translates print jobs in the SNA character string (SCS) data stream into an ASCII data stream (such as PCL). The data stream is specific to a particular make and model of ASCII printer, which must be defined at the time Host Print Transform is enabled.

Custom Host Code Page

Host Integration Server 2004 allows a custom host code page to be used for a printer session. The host code page is used for the translation between ASCII and EBCDIC. By default, a printer session will use the standard language code page provided by Windows Server 2003 or Windows 2000. As an alternative, a custom code page can be specified to allow a different translation. For example, using the default code page, the EBCDIC letter "A" ('0xC1') would be translated to an ASCII letter "A" ('0x41'). With a custom code page, it would be possible to have the EBCDIC "A" translated to any value. The custom code pages are text files that can be modified with a hex editor. Samples are included in the PRINTSERVERADDONS directory on the Host Integration Server 2004 CD-ROM. The code page file contains 512 bytes. The first 256 bytes represent what the EBCDIC characters are translated to. The second 256 bytes are what the ASCII characters are translated to. Logically each section is a 16-column by 16-row block.

Bytes 0-255: Data from Host

```
   | 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
 00| 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
 10| 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
 20| 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
 30| 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
 40| 20 a0 e2 e4 e0 e1 e3 e5 e7 f1 a2 2e 3c 28 2b 7c
 50| 26 e9 ea eb e8 ed ee ef ec df 21 24 2a 29 3b ac
 60| 2d 2f c2 c4 c0 c1 c3 c5 c7 d1 a6 2c 25 5f 3e 3f
 70| f8 c9 ca cb c8 cd ce cf cc 60 3a 23 40 27 3d 22
 80| d8 61 62 63 64 65 66 67 68 69 ab bb f0 fd de b1
 90| b0 6a 6b 6c 6d 6e 6f 70 71 72 aa ba e6 b8 c6 a4
 a0| b5 7e 73 74 75 76 77 78 79 7a a1 bf d0 dd fe ae
 b0| 5e a3 a5 b7 a9 a7 b6 bc bd be 5b 5d af a8 b4 d7
 c0| 7b 41 42 43 44 45 46 47 48 49 ad f4 f6 f2 f3 f5
 d0| 7d 4a 4b 4c 4d 4e 4f 50 51 52 b9 fb fc f9 fa ff
 e0| 5c f7 53 54 55 56 57 58 59 5a b2 d4 d6 d2 d3 d5
 f0| 30 31 32 33 34 35 36 37 38 39 b3 db dc d9 da 00
```

Bytes 256-511: Data to Host

```
   | 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
 00| 00 01 02 03 37 2d 2e 2f 16 05 25 0b 0c 0d 0e 0f
 10| 10 14 24 04 b6 15 32 26 18 19 00 27 1c 1d 1e 1f
 20| 40 5a 7f 7b 5b 6c 50 7d 4d 5d 5c 4e 6b 60 4b 61
 30| f0 f1 f2 f3 f4 f5 f6 f7 f8 f9 7a 5e 4c 7e 6e 6f
 40| 7c c1 c2 c3 c4 c5 c6 c7 c8 c9 d1 d2 d3 d4 d5 d6
 50| d7 d8 d9 e2 e3 e4 e5 e6 e7 e8 e9 ba e0 bb b0 6d
 60| 79 81 82 83 84 85 86 87 88 89 91 92 93 94 95 96
 70| 97 98 99 a2 a3 a4 a5 a6 a7 a8 a9 c0 4f d0 a1 00
 80| 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 90| 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 a0| 41 aa 4a b1 9f b2 6a b5 bd b4 9a 8a 5f ca af bc
 b0| 90 8f ea fa be a0 b6 b3 9d da 9b 8b b7 b8 b9 ab
 c0| 64 65 62 66 63 67 9e 68 74 71 72 73 78 75 76 77
 d0| ac 69 ed ee eb ef ec bf 80 fd fe fb fc ad 8e 59
 e0| 44 45 42 46 43 47 9c 48 54 51 52 53 58 55 56 57
 f0| 8c 49 cd ce cb cf cc e1 70 dd de db dc 8d ae df
```

The value being translated is matched to its new value using the first number in the hex value as the row and the second as the column. For example, to find what the EBCDIC character "Z" ('0xE9') is translated to in the sample code page count down to row E and over to column 9. This position has the value '0x5A', which is the ASCII value for a "Z".

Sample Host Code Page (as seen in a Hex editor)

```
20 20 20 20 20 20 20 20-20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20-20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20-20 20 20 20 20 20 20 20
```

```
20 20 20 20 20 20 20 20-20 20 20 20 20 20 20 20
20 A0 E2 E4 E0 E1 E3 E5-E7 F1 A2 2E 3C 28 2B 7C
26 E9 EA EB E8 ED EE EF-EC DF 21 24 2A 29 3B AC
2D 2F C2 C4 C0 C1 C3 C5-C7 D1 A6 2C 25 5F 3E 3F
F8 C9 CA CB C8 CD CE CF-CC 60 3A 23 40 27 3D 22
D8 61 62 63 64 65 66 67-68 69 AB BB F0 FD DE B1
B0 6A 6B 6C 6D 6E 6F 70-71 72 AA BA E6 B8 C6 A4
B5 7E 73 74 75 76 77 78-79 7A A1 BF D0 DD FE AE
5E A3 A5 B7 A9 A7 B6 BC-BD BE 5B 5D AF A8 B4 D7
7B 41 42 43 44 45 46 47-48 49 AD F4 F6 F2 F3 F5
7D 4A 4B 4C 4D 4E 4F 50-51 52 B9 FB FC F9 FA FF
5C F7 53 54 55 56 57 58-59 5A B2 D4 D6 D2 D3 D5
30 31 32 33 34 35 36 37-38 39 B3 DB DC D9 DA 00
00 01 02 03 37 2D 2E 2F-16 05 25 0B 0C 0D 0E 0F
10 14 24 04 B6 15 32 26-18 19 00 27 1C 1D 1E 1F
40 5A 7F 7B 5B 6C 50 7D-4D 5D 5C 4E 6B 60 4B 61
F0 F1 F2 F3 F4 F5 F6 F7-F8 F9 7A 5E 4C 7E 6E 6F
7C C1 C2 C3 C4 C5 C6 C7-C8 C9 D1 D2 D3 D4 D5 D6
D7 D8 D9 E2 E3 E4 E5 E6-E7 E8 E9 BA E0 BB B0 6D
79 81 82 83 84 85 86 87-88 89 91 92 93 94 95 96
97 98 99 A2 A3 A4 A5 A6-A7 A8 A9 C0 4F D0 A1 00
00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
41 AA 4A B1 9F B2 6A B5-BD B4 9A 8A 5F CA AF BC
90 8F EA FA BE A0 B6 B3-9D DA 9B 8B B7 B8 B9 AB
64 65 62 66 63 67 9E 68-74 71 72 73 78 75 76 77
AC 69 ED EE EB EF EC BF-80 FD FE FB FC AD 8E 59
44 45 42 46 43 47 9C 48-54 51 52 53 58 55 56 57
8C 49 CD CE CB CF CC E1-70 DD DE DB DC 8D AE DF
```

See Also

AS/400 (APPC) Printing

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Formatting Print Jobs

Host Print service can format print jobs by either using the Windows Server 2003 or Windows 2000 printer driver or by using a Printer Definition Table.

By default, print jobs submitted by Host Print service to a Windows Server 2003 or Windows 2000 Server print queue rely on the Windows Server 2003 or Windows 2000 printer driver to format the print data and send to the physical printer. Formatting the print data is done by the Windows Graphical Device Interface (GDI).

In addition to the Windows GDI, Host Integration Server 2004 Host Print service supports the use of a Printer Definition Table (PDT), which bypasses the formatting function of the Windows Server 2003 or Windows 2000 printer driver. The PDT file provides a function similar to a printer driver, in that it translates Graphic Device Interface (GDI) calls to control codes specific for a printer.

Selecting PDT causes the Windows Server 2003 or Windows 2000 Host Print service to treat all received data as transparent. All data is passed directly to the printer, except SCS codes, which are treated differently. Using a PDT, the SCS codes will be translated using the PDT before they are passed to the printer. For more information about Printer Definition Files, see Printer Definition Files.

The PDT is created in two steps.

1. A source text file is created and called the Printer Definition File (PDF) that defines the codes that can be used to control the printer.
2. A program is used to compile the information in the PDF into a binary file, the PDT that is used by Host Print service.

For example, if the host sends a byte indicating a new line ('0x15'), the PDT could be used to convert this to a carriage return, line feed ('0x0D0A').

For more information about creating a PDT, see Printer Definition Files.

To enable GDI

1. In SNA Manager, expand the server, and then click **Print Service**.
2. Right-click a print service displayed in the details pane, and then click **Properties**.
3. Click the **Job Format** tab, and then select **GDI**.

To select a PDT for printing

1. In SNA Manager, expand the server, and then click **Print Service**.
2. Right-click a print service displayed in the details pane, and then click **Properties**.
3. Click the **Job Format** tab, select **PDT**, and then click **PDT File**. The **Select Compiled Printer Definition File** dialog box appears.
4. Select the PDT that you want to use, and then click **Open**.
5. Click **OK**.

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Transparency

Transparency sets a flag that indicates that transparent data from the host is in ASCII and needs no translation from EBCDIC to ASCII. Selecting **Transparency is ASCII** causes the Windows Server 2003 or Windows 2000 Host Print service not to put the received data through an EBCDIC to ASCII translation table before printing.

Check **Transparency Custom Byte** to send the data stream in transparent mode. **Transparency Custom Byte** indicates the character designated to start a sequence of transparent data (the transparent data may or may not be ASCII). The IBM standard is 0x35, but if the host print job uses another value (for example, 0x36), this should be specified.

To select Transparency

1. In SNA Manager, expand the server, right-click **Print Service**, and then click **Properties**.
2. Click the **Advanced** tab, click **Transparency Custom Byte**, enter the byte data, and then click **OK**.

See Also

Formatting Print Jobs

Printer Definition Files

Host Print service enables you to specify the capabilities of a printer to override the defaults provided by the Windows printer driver.

By default, jobs submitted by Host Print service to a Windows print queue rely on the printer's Windows driver to send to the physical printer the data required to perform such formatting tasks as breaking lines and starting a new page.

Applications that bypass the formatting function of the Windows printer driver can use codes specified in a printer definition file to control the physical printer for a particular printer session under Host Print service. To use the file, open the properties page of the printer session, click the **Printing** tab, select **PDT**, and then type the fully qualified path of the file in the box. For more information about using the PDT file, click **Help** on the printer session properties dialog box.

Creating a printer definition file consists of two steps: First, you create a source text file that defines the codes that can be used to control the printer. Second, you run a program to compile the information in the text file into a binary file that can be used by Host Print service.

This section contains:

- Creating the Source Text File

Creating the Source Text File

You can use any text editor (such as Notepad) to create the source text file. The conventional file extension for the source text file is .pdf (which stands for Printer Definition File).

The PDF file consists of two sections:

- The Macro Definition Section
- The Parameter Definition Section

All text bounded by the C-language comment markers (**/*** and ***/**) is treated as comments and ignored by the compiler.

The next two sections describe the PDF sections currently supported by Host Print service.

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Macro Definition Section

The macro definition section is bounded by **BEGIN_MACROS** and **END_MACROS** statements and consists of lines with the following syntax.

macro_name **EQU** *control_character_list*

The macro name can be any alphanumeric string that does not contain spaces, and the control character list consists of one or more two-digit hexadecimal values representing the data to be sent to the printer.

For example, the following macro defines the NUL character.

```
NUL EQU 00
```

For an example macro definition, see Sample Source Text File.

Parameter Definition Section

The parameter definition section immediately follows the macro definition section and consists of one or more lines with the following syntax.

parameter_name=*value_list*

The parameter name can be any character string that does not contain spaces. The compiler ignores parameter names not supported by Host Print service.

The value list can be empty or can contain one or more of the following:

- A three-digit decimal value.
- A two-digit hexadecimal value.
- A one-char character value.
- The name of a macro specified in the macro definition section.

For example, the following shows a parameter defining the control sequence to be sent to the printer to begin a new line.

```
NEW_LINE = CRR LFF
```

In this example, CRR and LFF are the names of macros specified in the macro definition section.

Host Print service currently supports the following parameters (definitions of unsupported parameters are ignored).

Parameter name	**Description**
START_JOB	Control sequence to be sent at the start of a print job.
END_JOB	Control sequence to be sent at the end of a print job.
CARRIAGE_RETURN	Control sequence for a carriage return.
LINE_FEED	Control sequence for a line feed.
FORM_FEED	Control sequence for a form feed.
NEW_LINE	Control sequence for a new line.
SET_6_LINES_PER_INCH	Control sequence to specify 6 LPI.
SET_8_LINES_PER_INCH	Control sequence to specify 8 LPI.
START_HIGHLIGHT_INTENSE	Control sequence to begin bold printing.
END_HIGHLIGHT_INTENSE	Control sequence to end bold printing.
START_HIGHLIGHT_UNDERLINE	Control sequence to begin underline printing.
END_HIGHLIGHT_UNDERLINE	Control sequence to end underline printing.
KANJI_CODE?	Control sequence of Kanji code for a printer, either JIS or SHIFT_JIS.
KANJI_ON	Control sequence to start printing Kanji.
KANJI_OFF	Control sequence to end printing Kanji.
SET_PAGE_LENGTH	Control sequence to set number of lines per page.
LEFT_MARGIN	Control sequence to set left margin in number of characters.
RIGHT_MARGIN	Control sequence to set right margin in number of characters.
TOP_MARGIN	Control sequence to set top margin in number of lines.
SET_HORIZONTAL_POSITION	Control sequence to set row position.
SET_VARIABLE_LINE_DENSITY	Control sequence to set line density.
SET_VARIABLE_PRINT_DENSITY	Control sequence to set number of characters per inch.
SET_FONT_SIZE	Control sequence to set font size in points.

See Also

Printer Definition Files

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Sample Source Text File

The sample PDF file, HPLJ2.PDF, is provided on the Host Integration Server 2004 CD-ROM in the \SDK\Samples\SNA\PrintDefFile directory.

See Also

Printer Definition Files

Compiling the Source Text File

After you have created the source text file, the next step is to compile the file using the Pdfcomp (PDFCOMP.EXE) utility located in the *platform*\SYSTEM\PRINTSRV directory of the Host Integration Server 2004 CD-ROM. To run Pdfcomp, type the following at the command prompt.

```
pdfcomp input_file output_file
```

You must specify the full name (including file extensions) of the input and output files.

For example, to compile the sample PDF file, copy PDFCOMP.EXE and HPLJ2.PDF to a directory on the server's hard disk, open a Command Prompt window and change the current directory to the directory containing the copied files. Then, type the following at the command prompt.

```
pdfcomp hplj2.pdf hplj2.pdt
```

This creates the binary PDT file in the current directory. Specifying this file in the properties of a printer session allows Host Print service to send preformatted data to the printer, bypassing the formatting function of the Windows printer driver.

Compilation of the PDF file into a PDT is not strictly necessary. If an uncompiled PDF file is selected in a Print Session under the SNA Manager, the compilation is performed automatically each time the print session is used. This feature has a performance overhead and is available mainly for ease of development. For production systems, it is strongly recommended that you pre-compile PDF files.

See Also

Printer Definition Files

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TN Service

TN Service, which is based on the Telnet protocol, enables a user at one site to connect and interact with a remote system at another site using the TCP/IP network protocol. When connecting to a remote computer, the initiating computer acts as a terminal for the remote computer. Microsoft® Host Integration Server 2004 supports TN3270-style and TN5250-style sessions in addition to native Host Integration Server 2004 client 3270 and 5250 sessions.

This section contains:

- TN3270
- Administering TN3270
- TN5250

TN3270

TN3270 service utilizes the features of Host Integration Server 2004 to obtain mainframe access and to address issues such as security and redundancy. TN3270 service supports the TN3270, TN3287, and TN3270E protocols, providing terminal emulation and printing capabilities.

To provide for TN3270 service, in Host Integration Server 2004 you create connections and LU definitions that map to the mainframe. TN3270 communicates with Host Integration Server 2004 using the logical unit application (LUA) API. Therefore, all LUs configured for use with the TN3270 service must be LUA LUs. The LUA LUs and LUA pools defined for the Host Integration Server 2004 computers can then be assigned to the TN3270 service using the drag-and-drop method. When the system is activated, the LUA LUs become available for TN3270 clients to access mainframe applications.

Redundancy involves SNA local nodes and link services. Each Microsoft® Windows Server™ 2003 or Windows® 2000 domain can contain one or more SNA subdomains. LUA LUs from multiple servers can be assigned to the TN3270 service. This results in client sessions distributed among the participating servers in the subdomain, balancing the load. This also allows redundancy between Host Integration Server 2004 computers. If one server goes down, a client computer can then access LUA LUs on a different server.

Similarly, a server can be configured with redundant host links to increase fault tolerance and bandwidth.

In this version of Host Integration Server 2004, Secure Sockets Layer (SSL) and Transport-Level Services (TLS) allow a network administrator using the TN3270 Service to increase the overall security of the enterprise network when accessing mainframe terminal and printer resources, including authentication of access to mainframe sessions and encryption of data between client emulator and TN3270 server.

Although the Microsoft 3270 Client (emulator) does not support SSL or TLS, many third-party software vendors offer 3270 emulators that support this functionality, including Attachmate, IBM, NetManage, and WRQ.

This section contains:

- IP Settings
- Administering TN3270
- TN3270 and Single Sign-On
- TN3270 Configuration

IP Settings

The IP settings assigned to an LUA LU or pool will allow TN3270 clients to connect to that LUA LU or pool. By default, the LUA LU or pool is not assigned an IP address or a subnet mask. This will allow any TN3270 client to use the LUA LUs or pools.

If you want to restrict an LUA LU or pool to one or more specific TN3270 clients, you should determine the IP address or host name of the client computers that will use these LUA LUs or pools. For client computers using Windows Server 2003 or Windows 2000, you can determine the IP address, subnet mask, and host name by typing **ipconfig/all** from the command prompt on the client computer.

If a workstation has a name that can be resolved using name resolution, it can be used in place of IP addresses. For example, if a workstation name is Giraffe and if the IP name list contains that name, it will map to the correct IP address. Name resolution works with WINS, DHCP, or similar name resolution services. For more information regarding WINS and DHCP, see your Windows Server 2003 or Windows 2000 documentation.

You can modify, delete, or add IP addresses and subnet masks within LUA LUs or pools. If you want to change the configuration of multiple LUA LUs, you can only change properties such as display types, the IP address, and subnet mask that the LUA LUs have in common. You cannot change properties such as the LUA LU name or number, because these values are unique for each LUA LU.

You can add new IP addresses and subnet masks to a range of LUA LUs. If the new IP address or subnet mask already exists on some of the LUA LUs, but not on others, the addition will occur without duplication in the ones that already have the IP address or subnet mask. You can also modify or delete the IP addresses that the LUA LUs have in common and that appear on the IP address list.

Configuration changes are apparent only to users who establish a connection after the changes are saved. Users who were connected at the time the configuration changes were made will not be affected.

See Also

TN3270

Administering TN3270

Using SNA Manager, you can view client addresses, LU names, and the state of each defined client computer. The session status information is useful if you need to stop, pause, or modify TN3270.

You can monitor network activity, including the state of each LU. An LU or pool will display one of the following states.

State	Description
CONNECTED	The TN client has established a connection to TN3270 service.
SSCP-LU	The TN client has established a connection to VTAM.
LU-LU	The LU is bound to a host application.
TERM	The connected session is terminating.

To add LUs or pools to TN3270 service

1. Before LUs can be added to the TN3270 service, you must first create application (LUA) LUs on an appropriate connection.
2. Select the LUs on the connection.

   A contiguous range of LUs can be selected by using the mouse to select the first item in the range you want to add, holding down the SHIFT key, and using the mouse to select the last item in the range that you want to add.

   A noncontiguous range of LUs can be selected by using the mouse to select each item in the range that you want to add, while holding down the CTRL key.

3. Drag the LUs into the desired server icon in the TN3270 Service folder.

   The LU appears in the list frame when the server icon in the TN3270 Service folder is highlighted. The icon for the LUs will change to a TN icon both in the TN3270 service and in the connection list.

   By default, the LU will be assigned an IP address of 0.0.0.0 and a subnet mask of 0.0.0.0. This will allow any TN3270 client to use this LU.

4. Specify one or more client IP addresses for this LU.
5. On the **Action** menu, click **Save Configuration** to put the changes into effect.

By adding an LU, you are defining Host Integration Server 2004 resource access to TN3270 service and you are defining logmode entries that are associated with a Host Integration Server 2004 resource.

Configuration changes are apparent only to users who establish a connection after the configuration changes are saved. Users who were connected at the time that the configuration changes were made will not be affected.

You can modify, delete, or add IP addresses and subnet masks to LUA LUs. If you want to change the configuration of multiple LUA LUs, you can only change properties such as display types, the IP address, and subnet mask that the LUA LUs have in common. You cannot change properties such as the LUA LU name or number, because these values are unique for each LUA LU.

You can add new IP addresses and subnet masks to a range of LUA LUs. If the new IP address or subnet mask already exists on some of the LUA LUs, but not on others, the addition will occur without duplication in the ones that already have the IP address or subnet mask. You can also modify or delete the IP addresses that the LUA LUs have in common and that appear on the IP address list.

You can assign a 3270 LU pool to a workstation, not an LUA pool. LUA pools can be assigned to the TN3270 service.

To edit a TN3270 LU configuration

1. In the **SNA Manager** console tree, select the LU that you want to view or modify.
2. Right-click the LU name, and then click **Properties**.
3. Click **OK** to exit.

To override the default port value for a session

TN services listen on multiple ports simultaneously. You can set a default port number for the TN service (assign the port number to the server) and override this number on a per session basis (assign the port number to the LU session), allowing a single client computer to connect to multiple host computers.

1. Select an LU.
2. Right click, and then click **Properties**. The **TN3270 LU Properties** dialog box appears.

3. Click **Use**, and then type a port number other than the default used for the server. The LU port assignment will override the default port assigned to the server.

To start, pause, continue, and stop TN3270 service

- Right-click **TN3270**, and then click **Start** or **Stop**.

  - or -

- In the **Services** utility of the Windows Server 2003 or Windows 2000 **Administrative Tools or Windows Control Panel**, select **TN3270 Service**, and right-click **Start**, **Pause**, **Continue**, or **Stop**.

The TN3270 service is set to start manually by default. You can change this to automatic if you are not running either the TN5250 service or the Telnet daemon on this server, or if you have configured the TCP ports for more than one of these services.

Once TN3270 service has stopped, it can no longer be accessed. You may need to start the TN3270 service after you have paused or stopped it. TN3270 service can be restarted only on the local system.

Pausing allows you to prevent new users from establishing a connection with TN3270 service without disconnecting current users. You can then view TN3270 service session status and notify connected users to disconnect from TN3270 service.

Before stopping TN3270 service, notify all connected users that they will be disconnected within a specified time period. Stop the service after expiration of your warning period.

Tips

- To start TN3270 service from a command prompt, type

  net start tn3270

- To pause TN3270 service from a command prompt, type

  net pause tn3270

- To continue TN3270 service from a command prompt, type

  net continue tn3270

- To stop TN3270 service from a command prompt, type

  net stop tn3270

To use TN3270 service with TN5250 service or Telnet service

TN3270, TN5250, and Telnet services all default to the well-known TCP port number 23. If you plan to install more than one of these services, perform the following steps.

1. Configure the services to use unique port numbers.
2. Reconfigure all your TN3270 clients or TN5250 clients to use the new port numbers.

To remove TN3270 service

1. To pause TN3270 service, use the **Services** utility in Windows Server 2003 or Windows 2000 Control Panel.
2. Pausing TN3270 service allows you to notify connected users to disconnect from TN3270 service before you stop and remove the application.
3. To stop TN3270 service, use the **Services** utility in Windows Server 2003 or Windows 2000 Control Panel.
4. Open **Control Panel**, and double-click **Add/Remove Programs**.
5. Click **Host Integration Server 2004**, and then click **Change**. The **Add/Remove Application** dialog box appears.
6. In the **Add/Remove** dialog box, click **Add/Remove**.
7. Click the **TM3270 Service** icon, and then click **Entire Feature will be unavailable**.
8. Click **Continue**.

> **Note** You can remove TN3270 service anytime you wish to do so. However, removing TN3270 service deletes the TN3270 service files from your computer, including TN3270 service configuration data. To use TN3270 service again, you must run **Host Integration Server 2004 Setup** to reinstall TN3270 service files.

See Also

- TN3270 and Single Sign-On

TN3270 and Single Sign-On

The TN3270 service does not work with Single Sign-On. You should not enable the TN3270 service to run under a user account for which you have a Single Sign-On mapping. If you access the host through the TN3270 service by typing **MS$SAME** for your logon, you will get the user ID and password of the user under which the TN3270 service is running (for example, SNAUSER). If you use an Administrator-level account and change the password, SNA services will fail to start after the password change.

TN3270 Configuration

This section describes the management and configuration of certificates necessary for running TN3270 on Host Integration Server 2004.

This section contains:

- Managing Certificates
- Configuring Certificates
- Notes Section

Managing Certificates

The SChannel API uses certificates to provide its security features.

This section contains:

- Server Authentication
- Client Authentication
- Obtaining and Creating Certificates

Server Authentication

For server authentication, the server requires a valid certificate with the following properties:

- Type X509
- Suitable for Server Authentication
- Associated private key
- Stored in the Personal or My certificate store for the service account used by the TN3270 service
- By default, a TN3270 server will look for a certificate with a Common Name (CN) matching the host name of the computer running the TN3270 server. This default can be changed by using a registry entry. For details, see Changing the Default Server Authentication Certificate Common Name (CN).

This certificate will be sent to the client as part of the handshake negotiation when the connection is established. For the client to accept the certificate:

- The certificate (and its issuing chain) must be current (for example, not outside of its valid dates).
- The issuing chain must lead to a certification authority (CA) that appears in the client's Trusted Root CA List.
- The certificate (or any part of its issuing chain) should not appear on a certificate revocation list (CRL) of its issuer.
- Most clients offer strict certificate checking, which if selected, will reject connections if the server certificate's common name does not match its host name.

Note If the certificate on the server is changed, the TN3270 server must be stopped and restarted.

Client Authentication

For client authentication, the client requires a valid certificate with the following properties:

- Type X509
- Suitable for Client Authentication
- Associated private key

You might not want to grant access to some of these certificate settings. It is recommended that you check the list of default Trusted Root Certification Authorities on the server, and remove any you do not want.

How the certificate is stored and selected depends on the client program. The certificate will be passed to the server as part of the handshake process. For the server to accept the certificate:

- The certificate (and its issuing chain) must be current.
- The issuing chain must lead to a CA that appears in the server’s Trusted Root CA list.
- The certificate (or any part of its issuing chain) should not appear on a CRL of its issuer.

See Also

Server Authentication

Obtaining and Creating Certificates

Obtaining and Creating Certificates

It is recommended that you use the Microsoft Certificate Services and certification authorities to manage their certificates.

When a certificate is issued, it includes a certificate and a private key. When the certificate is transmitted for verification purposes, only the certificate part is sent (and not the private key). The server needs a certificate and a private key for the server authentication certificate. The server needs a copy of the client authentication certificate for its root CA.

Obtaining Certificates

Certificates are obtained from certification authorities. Because these CAs are widely trusted organizations, the certificate will be recognized widely.

Certificate Creation

Windows Server 2003 and Windows 2000 Server feature a certification authority program that allows a local CA to be set up. The local CA may depend on a certificate obtained from an external, well-trusted CA, or it may be a stand-alone CA.

This system can be used if the root certificate (on the CA program) is copied to the Trusted Root CAs store on all the computers using the certificates. The local CA can then issue client and server authentication certificates, and each will be recognized by the other.

See Also

Server Authentication

Client Authentication

Configuring Certificates

A new **Port/Security** tab now exists on the **TN3270 Server properties** dialog box, which allows you to configure the ports to be available to the TN3270 server. The security parameters are then configured on a port-by-port basis.

The following issues are required to implement security support:

- A client that attempts to connect to a port that has not been configured on the TN3270 server will be unsuccessful.
- The default port defined in SNA Manager does not affect the security configuration. Either a port security record is found (in which case it is used), or it is not found (in which case the client fails to connect).
- A port with security level Unsecured means that TLS/SSL will be fully disabled on that port. There will be no exchange of certificates on that port.
- All the changes made to the configuration are dynamic.
- Server authentication certificates may not be dynamically changed.

This section contains:

- Switching on Security and Changing Certificates
- Changing the Default Values of the Security Parameters
- Changing the Default Server Authentication Certificate Common Name (CN)

Switching on Security and Changing Certificates

To support security, the TN server needs to load a server authentication certificate. This is done when a TN server receives a configuration requiring security (for example, at least one port is configured to a security level other than Unsecure) for the first time. After a certificate has been loaded successfully, the certificate cannot be changed without restarting the TN server.

If the certificate-loading process fails (for example, if the certificate is not found or is invalid), any ports requiring security will not be available to the TN server and an error will be logged. The user must then fix the certificate and try again.

Note The certificate-loading process incorporates several stages, such as opening a certificate store, finding the certificate, and acquiring credentials based on the certificate.

Obtaining credentials involves three steps:

- Opening the server's certificate store (using **CertOpenStore**)
- Obtaining the server authentication certificate (using **CertFindCertificateInStore**)
- Getting a credential for each security setting (using **AcquireCredentialHandle**)

The credential contains all the security options supported by the credential (such as maximum and minimum encryption strength, and algorithms supported). Client authentication is not a credential property. The credential is linked to the server authentication certificate.

If security is specified but the TN3270 server fails to get the credentials, any ports that are defined as secure will be unavailable to clients. An error will be logged and the user can try to reload the credentials again.

See Also

Configuring Certificates

Changing the Default Values of the Security Parameters

Changing the Default Server Authentication Certificate Common Name (CN)

Changing the Default Values of the Security Parameters

By default, the security levels are:

- High = 168-bit encryption (minimum)
- Medium = 128-bit encryption (minimum)
- Low = 40-bit encryption (minimum)
- Unsecured = TLS/SSL fully disabled

The default values of the first three of these levels can be overridden by the following registry entries (stored in **HKEY_LOCAL_MACHINE/SYSTEM/CurrentControlSet/Services/TN3270/Parameters**):

- **SSLHighSecurity**
- **SSLMediumSecurity**
- **SSLLowSecurity**

Each registry entry will contain a numeric (DWORD) value. The registry is checked for entries only when the TN3270 server is started. For any changes in the registry entries to take effect, the TN3270 server must be restarted.

See Also

Configuring Certificates

Switching on Security and Changing Certificates

Changing the Default Server Authentication Certificate Common Name (CN)

Changing the Default Server Authentication Certificate Common Name (CN)

By default, the TN3270 server will look for a certificate with a common name that matches its host name, for example, the name returned by **gethostname**.

The certificate common name can be changed from the SNA Manager TN3270 Properties Tab. It will then be necessary to restart the TN3270 server.

See Also

Configuring Certificates

Switching on Security and Changing Certificates

Changing the Default Values of the Security Parameters

TN5250

TN5250 acts as a gateway that allows an AS/400 access to TN5250 clients providing 5250 terminal emulation.

To provide for TN5250 service, you must create TN5250/AS400 definitions that map to the AS/400. TN5250/AS400 definitions include local and remote APPC LUs, the mode (the default is QPCSUPP), AS/400 user name and password, terminal type, and IP address and subnet mask.

TN5250 supports multiple sessions up to the limits of the mode used in the TN5250/AS400 definition.

IP Settings

IP settings assigned to TN5250/AS400 definitions allow TN5250 clients to connect to the AS/400. By default, the TN5250/AS400 definition is not assigned an IP address or a subnet mask. This will allow any TN5250 client to connect to the AS/400.

If you want to restrict the use of a TN5250/AS400 definition to one or more specific TN5250 clients, you should determine the IP addresses or host names of the client computers that will use the TN5250/AS400 definition. For client computers using Windows Server 2003 or Windows 2000, you can determine the IP address, subnet mask, and host name by typing **ipconfig/all** from the command prompt on the client computer.

If a workstation's name can be resolved using name resolution, it can be used in place of IP addresses. For example, if a workstation name is Giraffe and if the IP name list contains that name, it will allow that workstation access. Name resolution works with WINS, DHCP, or similar name-resolution services. For more information regarding WINS and DHCP, see your Windows Server 2003 or Windows 2000 documentation.

You can modify, delete, or add IP addresses and subnet masks within a TN5250/AS400 definition. If you want to change the configuration of multiple TN5250/AS400 definitions, you can only change the properties of items that the TN5250/AS400 definitions have in common. You cannot change the name of remote LUs.

You can add new IP addresses and subnet masks to multiple TN5250/AS400 definitions. If the new IP address or subnet mask already exists on some of the TN5250/AS400 definitions, but not on others, the addition will occur without duplication in the ones that already have the IP address or subnet mask. You can also modify or delete the IP addresses that the TN5250/AS400 definitions have in common and that appear on the IP address list.

Configuration changes are apparent only to users who establish a connection after the changes are saved. Users who were connected at the time the configuration changes were made will not be affected.

This section contains:

Administering TN5250

Administering TN5250

The local LU, remote LU, and mode must match the configuration information in Host Integration Server 2004.

To enable an APPC session with the AS/400, the user ID and password must be provided for conversation security. Contact your AS/400 administrator for the correct information.

The TN5250 requires TN5250/AS400 definition terminal names to allow TN5250 service to accept client requests from client computers emulating those types of terminals.

To set up Host Integration Server 2004 for TN5250 access

1. Open **SNA Manager** console tree.
2. Install and configure a link service, if this has not been done.
3. Insert a connection to an AS/400 that the TN5250 clients will access. Configure the connection with Remote End as Peer System.
4. Configure a local LU and a remote LU for access to an AS/400, making sure the mode for the remote LU is QPCSUPP.
5. On the **File** menu, click **Save Configuration** to put the changes into effect.

To add and configure LUs for TN5250 service

1. Before LUs can be added to the TN5250 service, you must first install a link service, add a connection to an AS/400 on this link service, and create local and remote LUs for accessing this AS/400.
2. Right-click **TN5250**, point to **New**, and then click **TN5250 AS/400 Definition**.
3. Configure the properties of this TN5250 AS/400 definition.

   If you do not specify an IP address for an LU, the default value will allow any TN5250 client computer access to this LU.

   Click **Help** for information on the property options.
4. Click **OK** to close the **AS/400 Definition Properties** dialog box.
5. On the **Action** menu, click **Save Configuration** to put the changes into effect.

Configuration changes are apparent only to users who establish a connection after the configuration changes are saved. Users who were connected at the time that the configuration changes were made will not be affected.

You can modify, delete, or add IP addresses and subnet masks to AS/400 definitions. If you want to change the configuration of multiple AS/400 definitions, you can only change properties such as display types, the IP address, and subnet mask that the AS/400 definitions have in common. You cannot change properties such as the local or remote LUs, because these values are unique for each AS/400 definition.

You can add new IP addresses and subnet masks to a range of AS/400 definitions. If the new IP address or subnet mask already exists on some of the AS/400 definitions, but not on others, the addition will occur without duplication in the ones that already have the IP address or subnet mask. You can also modify or delete the IP addresses that the AS/400 definitions have in common and that appear on the IP address list.

To edit an AS/400 definition for TN5250 service

- In the SNA Manager console tree, select the TN5250 service AS/400 definition that you want to view or modify, right-click, and then click **Properties**.

To delete AS/400 definitions from TN5250 service

1. In the SNA Manager console tree, select the icon for the AS/400 definition that you wish to delete.
2. Click **Delete**.
3. Click **Save** to save your configuration changes.

   Note Configuration changes are apparent only to users who establish a connection after the configuration changes are saved. Users who were connected at the time that the configuration changes were made will not be affected.

To start, pause, continue, and stop TN5250 service

- Right-click **TN5250**, and then click **Start** or **Stop**.

  - or -

- In the **Services** utility of the Windows Server 2003 or Windows 2000 **Administrative Tools**, select **TN5250 Service** and click **Start**, **Pause**, **Continue**, or **Stop**.

The TN5250 service is set to start manually by default. You can change this to automatic if you are not running either the TN5250 service on this server, or if you have configured the TCP ports for more than one of these services.

After TN5250 service has stopped, it can no longer be accessed. You may need to start the TN5250 service after you have paused or stopped it. TN5250 service can be restarted only on the local system.

Pausing allows you to prevent new users from establishing a connection with TN5250 service without disconnecting current users. You can then view session status in the Active TN5250 Sessions folder and notify connected users to disconnect from TN5250 service.

Before stopping TN5250 service, notify all connected users that they will be disconnected within a specified time period. Stop the service after expiration of your warning period.

Tips

- To start TN5250 service from a command prompt, type

  net start tn5250

- To pause TN5250 service from a command prompt, type

  net pause tn5250

- To continue TN5250 service from a command prompt, type

  net continue tn5250

- To stop TN5250 service from a command prompt, type

  net stop tn5250

Pausing or removing TN5250 service

1. To pause TN5250 service, use the **Services** utility in Windows Server 2003 or Windows 2000 Control Panel.

   Pausing TN5250 service allows you to notify connected users to disconnect from TN5250 service before you stop and remove the application.

2. To stop TN5250 service, use the **Services** utility in Windows Server 2003 or Windows 2000 Control Panel.
3. Open **Control Panel**, and then double-click **Add/Remove Programs**.
4. Click **Host Integration Server 2004**, and then click **Change**. The **Add/Remove Programs** dialog box appears.
5. In the **Add/Remove Application** dialog box, click **Add/Remove**.
6. Click the **TN5250 Service** icon, and then click **Entire feature will be unavailable**.
7. Click **Continue**.

   Note You can remove TN5250 service anytime you wish to do so. However, removing TN5250 service deletes the TN5250 service files from your computer, including TN5250 service configuration data. To use TN5250 service again, you must run Host Integration Server 2004 Setup to reinstall TN5250 service files.

See Also

TN5250

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Active Directory Services

Microsoft® Active Directory® is the Microsoft Windows Server™ 2003 or Windows® 2000 directory service.

A directory service is an object-oriented information database of network resources. It also provides the services that locate, use, and manage the database and the network resources. These network resources are known as objects and can include network servers, users, printers, computers, databases, and security policies.

Active Directory provides the following services and benefits:

- **Simplified administration.** Active Directory provides a single point of administration for all network resources. It also provides a single point of logon for network users.
- **Network security.** Security policies can be implemented and enforced to keep information and resources safe, and at the same time, make information and resources available to the right people.
- **Scalability.** The Active Directory database can be expanded by dividing it into partitions. A partition is a logical division of objects. Using partitions, Active Directory can scale from small installations with a few objects, to large installations containing millions of objects.
- **Directory replication and distribution.** Replicating and distributing the directory to other servers in the network ensures its availability and redundancy.
- **Open standards.** Active Directory supports industry standard naming conventions, such as the Domain Name System (DNS), and protocols, such as the Lightweight Directory Access Protocol (LDAP). This allows Active Directory to be integrated into networks that already have a directory. It also allows you to unify and manage the multiple namespaces that may exist in the heterogeneous environments of corporate networks.

Complete Active Directory services information is available from many sources, including the Windows Server 2003 and Windows 2000 Help.

This section contains:

- How Host Integration Server 2004 Uses Active Directory
- Configuring Active Directory During Host Integration Server 2004 Installation
- Administration of Host Integration Server 2004 Active Directory

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

How Host Integration Server 2004 Uses Active Directory

Host Integration Server 2004 uses Active Directory by registering services and resources with the Active Directory schema. The benefits of using Active Directory include:

- Client configuration and resource location on the network is simplified.
- The limitation of 8,000 sponsor connections that existed in SNA Server 4.0 is eliminated.

Host Integration Server 2004 client computers must be configured to communicate to a Host Integration Server 2004 computer using either sponsor connections or Active Directory. A client computer cannot be set up to use both at the same time.

If a Host Integration Server 2004 computer is configured to use Active Directory, it must operate in an Organizational Unit (OU). If the Active Directory schema is new or otherwise does not have any OUs, Host Integration Server 2004 will create an OU for itself.

In addition, the following relationships between the SNA subdomain and the OU containing the Host Integration Server 2004 specific containers must be observed:

- Multiple Host Integration Server 2004 computers can exist within the same OU.
- Each OU containing a Host Integration Server 2004 must be a unique SNA subdomain.
- Two different SNA subdomains cannot exist within the same OU.
- An SNA subdomain cannot stretch across two OUs.
- If an OU contains multiple Host Integration Server 2004 computers, they must be part of the same SNA subdomain.
- The name of the OU and the name of the SNA subdomain within that OU can either be the same name or different names.

See Also

Active Directory Services

Configuring Active Directory During Host Integration Server 2004 Installation

Host Integration Server 2004 participation in Active Directory is accomplished by the SNA service and the SNA Windows Management Instrumentation (SNAWMI) Provider. The SNA service is an installable option that can be selected during Host Integration Server 2004 setup. The SNAWMI is always installed automatically when the SNA service is installed.

With Host Integration Server 2004, there are two mechanisms that will deliver SNA client resource location. One is sponsor connections, which is the existing mechanism present in SNA Server 4.0. The second uses Windows Server 2003 or Windows 2000 Active Directory. If you want to use Active Directory instead of SNA subdomains, you must add the Host Integration Server 2004 schema to the Windows Server 2003 or Windows 2000 domain schema before installing Host Integration Server 2004.

The Windows Server 2003 or Windows 2000 schema is extended by running a command-line utility found on the Host Integration Server 2004 CD-ROM. The following procedure adds the Host Integration Server 2004 schema to the Windows Server 2003 or Windows 2000 domain schema:

To extend the Active Directory schema

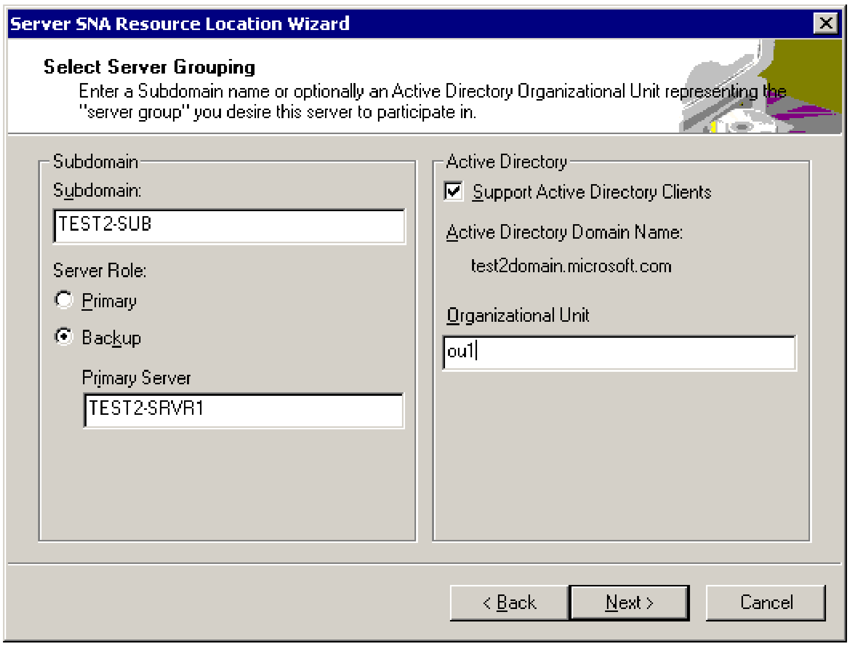
1. Make sure you are logged on to the server running Windows Server 2003 or Windows 2000 as **Administrator** or another user who is a member of both the Domain Admins and Schema Admins groups, and who has been delegated control to the domain. You can use the **Active Directory Users and Computers** administrative tool to verify user privileges and delegate control.
2. Click **Start**, point to **Programs**, point to **Administrative Tools**, and then click **Active Directory Users and Computers**.
3. Select **Users**, select **Domain Admins**, right-click, and then click **Properties**.
4. Select the **Members** tab and **add** members to this group.
5. Select **Users**, select **Schema Admins**, right-click, and then click **Properties**.
6. Select the **Members** tab and **add** members to this group.
7. Expand **Domain Controllers**, select the domain, right-click, and then click **Delegate Control…**.
8. Complete the wizard.
9. Insert the Host Integration Server 2004 CD-ROM into the CD-ROM drive of the computer running Windows Server 2003 or Windows 2000 Server .
10. Open a Command Prompt window.
11. Change drives to the CD-ROM drive.
12. Enter the following command.

    ```
    addschma HIserver.schema
    ```

13. The resulting display will indicate if the command was successful.

    Note If you do not successfully add the Host Integration Server 2004 schema, you will not be able to use Active Directory, but you can still configure a Host Integration Server 2004 client to use SNA subdomains and sponsor connections.

Configuring Host Integration Server 2004 to use Active Directory is performed during installation. The following figure shows the Setup screen where you can choose to install Active Directory support.



Select Server Grouping

Enter a Subdomain name or optionally an Active Directory Organizational Unit representing the "server group" you desire this server to participate in.

Subdomain: TEST2-SUB

Server Role:

○ Primary

● Backup

Primary Server: TEST2-SRVR1

☑ Support Active Directory Clients

Active Directory Domain Name:

test2domain.microsoft.com

Organizational Unit: ou1

Selecting Support Active Directory Clients, and then entering an Organizational Unit (OU) adds the following services to the ServerResources container for that OU:

- SNAServer Service
- SNAWMI Provider Service
- SNABase Service
- MngAgent Service

See Also

Active Directory Services

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Administration of Host Integration Server 2004 Active Directory

Administration of Host Integration Server 2004 Active Directory participation is done using the SNA Manager.

To access the Active Directory Server Configuration

1. In the SNA Manager tree, expand an SNA subdomain, select the server that you want to work with, right-click the server, and then click **Properties**.
2. In the **Properties** box, click **Change**. The **Server SNA Resource Location Wizard** appears.
3. Follow the on-screen prompts to install Active Directory support.

The **Server SNA Resource Location Wizard** is the same wizard that configures Host Integration Server 2004 following setup.

> **Note** Changes made to the **Server Properties** page require the SNABase Service to be restarted.

See Also

Active Directory Services

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host Configuration

For a connection to be established successfully between a host computer and a Host Integration Server 2004 computer, a number of software configuration settings (VTAM, NCP, or AS/400), and hardware characteristics must work together. These include the mainframe node ID settings, AS/400 name settings, addresses, BTU length, and link service settings.

The following table provides more details about important configuration items.

Element	Important items to consider
Host configuration settings (VTAM, NCP, or AS/400 settings) must match the **Connection and Server** settings on Host Integration Server 2004	**Mainframe Node ID settings:** For most mainframes, IDBLK and IDNUM in the PU definition must be matched by the two parts of the Remote Node ID on the Host Integration Server 2004 connection. **AS/400 name settings:** For the AS/400, local and remote Control Point Names (CP names) and network names must match corresponding Host Integration Server 2004 settings (local names configured on the server and remote names on the connection). **Addresses:** For several connection types (802.2, X.25, and channel), host settings must be matched with equivalent settings on the Host Integration Server 2004 connection. For details, see the section about the type of connection you are configuring. **BTU length:** For the mainframe, this is set through MAXDATA in the PU definition. For the AS/400, this is set through MAXFRAME. These should equal the Max BTU Length on the Host Integration Server 2004 connection. **Other settings:** For some connections, other settings are also important. For example, for Synchronous Data Link Control (SDLC), the NRZ/NRZI settings on the host must match those on the Host Integration Server 2004 connection. For details about these and other settings, see the section about the type of connection you are configuring.
For SDLC and X.25 **Communications hardware:** line, modem (if applicable), and adapter characteristics must match the **Link service and connection** settings on the Host Integration Server 2004	**Speed and duplexing:** For SDLC and X.25, note the speed and duplexing capabilities of the line, modem (or DCE), and adapter, and make sure that they will not be exceeded by the settings in the Host Integration Server 2004 link service and connection. Settings for fast transmission or for full duplexing cause greater demands on hardware. (Fast transmission plus full duplexing cause the greatest demands.) The hardware element with the smallest capacity will limit the capacity of the entire system. For example, with an SDLC adapter that lacks a coprocessor, you cannot use full-duplex transmissions at high speeds, even if the modem and line can handle them.

When configuring a new host connection or troubleshooting an existing connection, regardless of the connection type, the identifiers between the host and Host Integration Server 2004 must match. The following sections describe various configuration settings.

This section contains:

- Mainframe Connections Using Exchange Identifications (XIDs)
- Mainframe Connections Not Using (XIDs)
- AS/400 Connections
- Configuring VTAM for 3270 Access
- 802.2 Connection Parameters
- SDLC Connection Parameters
- X.25 Connection Parameters

Mainframe Connections Using Exchange Identifications (XIDs)

Node ID is the identifier used for exchange identifications (XIDs) with most mainframes. Check to make sure that the following items match; if they do not, Host Integration Server 2004 is not identifying itself in a way that the host can recognize.

Identifier used on mainframe	Identifier to configure on Host Integration Server 2004
IDBLK and **IDNUM** in the PU definition	The two parts of the **Local Node ID** (configured on the connection)

See Also

Host Configuration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Mainframe Connections Not Using (XIDs)

There are some situations in which the mainframe does not use Node ID in exchange identifications (XIDs), but instead uses Network Name and Control Point Name. These situations include mainframes communicating through LU 6.2 and mainframes that call up Host Integration Server 2004. (Host Integration Server 2004 accepts incoming calls on that mainframe connection.) In these situations, the following parameters must match.

> **Note** Use the following identifiers only when necessary. They are more complicated than needed for most mainframe connections and add the potential for error when used unnecessarily.

Identifier used on mainframe (in unusual cases only)	**Identifier to configure on Host Integration Server 2004**
NETID in the VTAM Start command for the local SSCP	**Local Network Name** (configured on the server)
CPNAME in the PU definition	**Local Control Point Name** (configured on the server)
NETID and **SSCPNAME** in the VTAM Start command for the remote SSCP (VTAM system)	**Remote Network Name** and **Remote Control Point Name** (configured on the connection)

See Also

Host Configuration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

AS/400 Connections

Network Name and Control Point Name (used together and called the fully qualified name) are the identifiers used when using exchange identification (XID) with AS/400 computers. Check to make sure that the following items match; if they do not, Host Integration Server 2004 is not identifying itself in a way that the AS/400 can recognize.

Identifier used on AS/400	**Identifier to configure on Host Integration Server 2004**
RMTNETID (usually; often set to APPN); **RMTCPNAME**	**Local Network Name** and **Local Control Point Name** (configured on the server)
RMTNETID (often set to APPN); **CP Name** (shown in the **Display network attributes** screen)	**Remote Network Name** and **Remote Control Point Name** (configured on the connection)

Event log entries can be very helpful in diagnosing and correcting mismatched identifiers between Host Integration Server 2004 and host computers.

See Also

Host Configuration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring VTAM for 3270 Access

When setting certain Host Integration Server 2004 parameters for a host connection, you must match values set on the host or on front-end processors for the host. Host values are configured in VTAM. Front-end processor values are configured in the Network Control Program (NCP).

The following table shows how parameters for Host Integration Server 2004 correspond to VTAM host parameters.

Host Integration Server 2004 parameter	**VTAM parameter**
Control Point Name (Local Node).	**CPNAME=** in the PU definition.
Network Name (Local Node) Note that the Network Name for the local and remote nodes is generally the same.	**NETID** parameter in the VTAM Start command for the local SSCP (the VTAM system to which Host Integration Server 2004 is attached). Note that this is generally the same as the NETID for the remote SSCP.

> **Note** The local Control Point Name and Network Name are needed only if the Host Integration Server 2004 will accept incoming calls, or will be used for LU 6.2 (APPC).

See Also

Host Configuration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

802.2 Connection Parameters

The following table shows how Host Integration Server 2004 parameters for 802.2 connections correspond to VTAM or Network Control Program (NCP) parameters. Asterisks (*) indicate required parameters.

Host Integration Server 2004 parameter	**VTAM or NCP parameter**
Local Node ID,* first three digits (block number).	**IDBLK=** parameter in the PU definition
Local Node ID,* last five digits (node number).	**IDNUM=** parameter in the PU definition
Network Name (Remote Node) Note that the Network Name for the local and remote nodes is generally the same.	**NETID** parameter in the VTAM Start command for the remote SSCP (VTAM system)
Control Point Name (Remote Node).	**SSCPNAME** parameter in the VTAM Start command for the remote SSCP (VTAM system)
Remote Network Address* when connecting to a 3720, 3725, or 3745 front-end processor.	**MACADDR=** parameter in the NCP Gen
Remote Network Address* when connecting to an IBM 9370 host.	**MACADDR**= parameter in the PORT definition
Remote SAP Address when connecting to an IBM 9370 host.	**SAPADDR**= parameter in the PU definition
Max BTU Length.	**MAXDATA**= parameter in the PU definition (set Max BTU Length &le; MAXDATA)

* Required parameter in Host Integration Server 2004

See Also

Host Configuration

SDLC Connection Parameters

The following table shows how Host Integration Server 2004 parameters for Synchronous Data Link Control (SDLC) connections correspond to VTAM or Network Control Program (NCP) parameters. Asterisks (*) indicate required parameters.

Host Integration Server 2004 parameter	**VTAM or NCP parameter**
Local Node ID,* first three digits (block number).	**IDBLK=** parameter in the PU definition
Local Node ID,* last five digits (node number).	**IDNUM=** parameter in the PU definition
Network Name (Remote Node) Note that the Network Name for the local and remote nodes is generally the same.	**NETID** parameter in the VTAM Start command for the remote SSCP (VTAM system)
Control Point Name (Remote Node).	**SSCPNAME** parameter in the VTAM Start command for the remote SSCP (VTAM system)
Max BTU Length.	**MAXDATA=** parameter in the PU definition (set Max BTU Length &le; MAXDATA)
Encoding (NRZ or NRZI).	**NRZI=** setting in the LINE/GROUP definition (defaults to YES on host)
Local Poll Address.	**ADDR**= parameter in the PU definition

* Required parameter in Host Integration Server 2004

See Also

Host Configuration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

X.25 Connection Parameters

The following table shows how Host Integration Server 2004 parameters for X.25 connections correspond to VTAM or Network Control Program (NCP) parameters. Asterisks (*) indicate required parameters.

Host Integration Server 2004 parameter	**VTAM or NCP parameter**
Local Node ID,* first three digits (block number).	**IDBLK=** parameter in the PU definition
Local Node ID,* last five digits (node number).	**IDNUM=** parameter in the PU definition
Network Name (Remote Node) Note that the Network Name for the local and remote nodes is generally the same.	**NETID** parameter in the VTAM Start command for the remote SSCP (VTAM system)
Control Point Name (Remote Node).	**SSCPNAME** parameter in the VTAM Start command for the remote SSCP (VTAM system)
Remote X.25 Address*.	**DIALNO=** parameter in the PORT definition
Max BTU Length.	**MAXDATA=** parameter in the PU definition (set Max BTU Length &le; MAXDATA)

* Required parameter in Host Integration Server 2004

See Also

Host Configuration

Sample VTAM Parameters

VTAM parameters on host connections need to correspond to settings in Host Integration Server 2004. Each connection needs its own specified values.

This section contains:

- Sample VTAM Parameters for a Token Ring Connection
- Sample VTAM Parameters Including CPNAME
- Configuring VTAM for APPC Access
- Sample VTAM Parameters for Independent APPC
- Sample CICS Configuration Screens for Use with APPC
- Configuring NCP for Independent APPC
- Configuring the AS/400 for 5250 Access
- Table of Parameters for AS/400 Communication

Sample VTAM Parameters for a Token Ring Connection

The following is a sample of VTAM parameters that might be used for a Token Ring connection to an IBM 9370 host. The underlined values correspond to values specified in Host Integration Server 2004 Manager.

```
R01100   PORT
CUADDR=100,MACADDR=400040004001,LANCON=(5,2),X

MAXDATA=2012,MAXSTN=52,SAPADDR=04

SERVER01 PU     ADDR=C1, IDBLK=05D, IDNUM=00001,X

ANS=CONTINUE,MAXDATA=0265,MAXOUT=7,MAXPATH=7,X

PACING=0,VPACING=0,SSCPFM=USSSCS,X

LANACK=(0,0),LANCON=(5,2),LANINACT=4.8,LANRESP=(5,2), X

LANSDWDW=(7,1),LANSW=YES,MACADDR=400040001111,X

USSTAB=MSUSSTAB,DLOGMOD=D4C32792,X

PUTYPE=2,DISCNT=(NO),ISTATUS=ACTIVE,SAPADDR=04

T0110002 LU   LOCADDR=002
T0110003 LU   LOCADDR=003
T0110004 LU   LOCADDR=004
T0110005 LU   LOCADDR=005
P0110006 LU   LOCADDR=006,DLOGMOD=LU33286S
T0110007 LU   LOCADDR=007
T0110008 LU   LOCADDR=008
```

The following table shows the Host Integration Server 2004 parameters and values that correspond to the sample VTAM parameters.

Host Integration Server 2004 parameter	Sample value	VTAM parameter
Remote Network Address	400040004001	MACADDR= parameter in the PORT definition
Local Node ID, first three digits (block number)	05D	IDBLK= parameter in the PU definition
Local Node ID, last five digits (node number)	00001	IDNUM= parameter in the PU definition
Max BTU Length	265	MAXDATA= parameter in the PU definition (set Max BTU Length &le; MAXDATA)
Remote SAP Address	04	SAPADDR= parameter in the PU definition
LU Numbers	2 through 8	LOCADDR= parameter in the LU definitions

See Also

Sample VTAM Parameters

Sample VTAM Parameters for an SDLC Connection

The following is a sample of VTAM parameters that might be used for a Synchronous Data Link Control (SDLC) connection to a host. The underlined values correspond to values specified in Host Integration Server 2004 Manager.

```
SERVER02 PU     ADDR=C1,IDBLK=017,IDNUM=B8001,DISCNT=NO,X
                VPACING=00,PACING=00,PUTYPE=2,MAXDATA=265,X
                DLOGMOD=D4C32792,USSTAB=MSUSSTAB
```

```
T01B8002 LU   LOCADDR=002
T01B8003 LU   LOCADDR=003
T01B8004 LU   LOCADDR=004
T01B8005 LU   LOCADDR=005
P01B8006 LU   LOCADDR=006,DLOGMOD=LU33286S
```

The following table shows the Host Integration Server 2004 parameters and values that correspond to the sample VTAM parameters.

Host Integration Server 2004 parameter	**Sample value**	**VTAM parameter**
Local Poll Address	C1	ADDR= parameter in the PU definition
Local Node ID, first three digits (block number)	017	IDBLK= parameter in the PU definition
Local Node ID, last five digits (node number)	B8001	IDNUM= parameter in the PU definition
Max BTU Length	265	MAXDATA= parameter in the PU definition (set Max BTU Length &le; MAXDATA)
The encoding scheme (NRZ versus NRZI)	Not specified; defaults to NRZI=YES on host	The NRZI= setting in the LINE/GROUP definition
LU Numbers	2 through 6	LOCADDR= parameter in the LU definitions

See Also

Sample VTAM Parameters

Sample VTAM Parameters for an X.25 Connection

The following is a sample of VTAM parameters that might be used for an X.25 connection to a host. The underlined values correspond to values specified in Host Integration Server 2004 Manager.

```
PORTA00  PORT
CUADDR=(A00,A08),NETTYPE=1,CHARGACC=YES,CHARGE=NO,X

VCALLS=(,,001,006,,),DIALNO=31370023061,MAXOUT=7,
NETLEVEL=80,PMOD=8,PLENGTH=256,PWINDOW=3,
REPLYT0=3,RETRIES=7

SERVER03 PU
ADDR=C1,IDBLK=05D,IDNUM=00025,ANS=CONTINUE,X
MAXDATA=265,MAXOUT=7,MAXPATH=0,PACING=0,VPACING=0,X

SSCPFM=USSSCS,IRETRY=YES,USSTAB=MSUSSTAB,PUTYPE=2,X

DISCNT=YES,ISTATUS=ACTIVE
```

The following table shows the Host Integration Server 2004 parameters and values that correspond to the sample VTAM parameters.

Host Integration Server 2004 parameter	**Sample value**	**VTAM parameter**
Remote X.25 Address	31370023061	DIALNO= parameter in the PORT definition
Local Node ID, first three digits (block number)	05D	IDBLK=parameter in the PU definition
Local Node ID, last five digits (node number)	00025	IDNUM=parameter in the PU definition
Max BTU Length	265	MAXDATA= parameter in the PU definition (set Max BTU Length &le; MAXDATA)

See Also

Sample VTAM Parameters

Sample VTAM Parameters Including CPNAME

The following is a sample of VTAM parameters that might be used for a Token Ring connection to an IBM 9370 host, when identification of the computer running Host Integration Server 2004 is based on Control Point Name (CPNAME). For this configuration, Format XIDs must be exchanged.

In the PU definition, IDBLK, IDNUM, MACADDR, and SAPADDR are not used. For this configuration to work on Host Integration Server 2004, the Remote Node ID, Remote Network Name, and Remote Control Point Name should all be left blank. Additionally, the Local Node ID can be left at the default value (because it is not used).

In this sample, the underlined values correspond to values specified in Host Integration Server 2004 Manager.

```
R01100   PORT CUADDR=100,MACADDR=400040004001,LANCON=(5,2),         X
              MAXDATA=2012,MAXSTN=52,SAPADDR=04

SERVER01 PU   ADDR=C1,CPNAME=SERVER01,ANS=CONTINUE,                 X
              MAXDATA=0265,MAXOUT=7,MAXPATH=7,                      X
              PACING=0,VPACING=0,SSCPFM=USSSCS,                     X
              LANACK=(0,0),LANCON=(5,2),LANINACT=4.8,               X
              LANRESP=(5,2),LANSDWDW=(7,1),LANSW=YES,               X
              USSTAB=MSUSSTAB,DLOGMOD=D4C32792,                     X
              PUTYPE=2,DISCNT=(NO),ISTATUS=ACTIVE

T0110002 LU   LOCADDR=002
T0110003 LU   LOCADDR=003
T0110004 LU   LOCADDR=004
T0110005 LU   LOCADDR=005
P0110006 LU   LOCADDR=006,DLOGMOD=LU33286S
T0110007 LU   LOCADDR=007
T0110008 LU   LOCADDR=008
```

The following table shows the Host Integration Server 2004 parameters and values that correspond to the sample VTAM parameters.

> **Note** For this example, it is assumed that the local Network Name configured for the Host Integration Server 2004 matches the NETID parameter in the VTAM Start command for the local SSCP. (The VTAM system to which Host Integration Server 2004 is attached.)

Host Integration Server 2004 parameter	Sample value	VTAM parameter
Remote Network Address	400040004001	MACADDR= parameter in the PORT definition
Local Control Point Name (for the server)	SERVER01	CPNAME= parameter in the PU definition
Max BTU Length	265	MAXDATA= parameter in the PU definition (set Max BTU Length less than or equal to MAXDATA)
LU Numbers	2 through 8	LOCADDR= parameter in the LU definitions

See Also

Sample VTAM Parameters

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring VTAM for APPC Access

Parameters on VTAM must match Advanced Program-to-Program Communications (APPC) parameters on Host Integration Server 2004. To configure the needed parameters, consult with the host administrator for the matching VTAM parameters.

The following tables show Host Integration Server 2004 parameters and values that correspond to VTAM and CICS parameters. Note that the values given are samples only and may not work for your configuration.

The following table shows Host Integration Server 2004 parameters and values that correspond to sample VTAM parameters.

Host Integration Server 2004 parameter	**Sample value**	**VTAM parameter**
Connection: Local Node ID, first three digits (block number)	05D	IDBLK= parameter in the PU definition
Connection: Local Node ID, last five digits (node number)	11111	IDNUM= parameter in the PU definition
Server: Control Point Name	SNASERV	CPNAME= parameter in the PU definition
Connection: Max BTU Length	521	MAXDATA= parameter in the PU definition (set Max BTU Length &le; MAXDATA)
Local APPC LU: LU Name	LOCLU1	Name in LU definition
LU 6.2 Partner LUs: Mode	APPCMODE	DLOGMOD= parameter in the LU definition

The mode named APPCMODE is an example of a mode configured for use with LU 6.2. The mode named SNASVCMG is included in Host Integration Server 2004, because it is required for parallel session support. It does not need to be configured.

The following table shows Host Integration Server 2004 parameters and values that correspond to sample CICS parameters.

Host Integration Server 2004 parameter	**Sample value**	**CICS parameter**
LU Name for Local APPC LU	LOCLU1	Sessions
Mode name	APPCMODE	Modename
Parallel Session Limit in the mode	250	Maximum
Partner Min Contention Winner Limit in the mode	125	Maximum
Max Receive RU Size in the mode	00521	SENDSize
Max Send RU Size in the mode	00521	RECEIVESize
LU Name for remote APPC LU	CICSLU	APPLID

The parameter called Maximum has two values, 250 and 125, separated by commas. The first value (250) is the parallel session limit. The second value (125) is the host minimum contention winner limit. On Host Integration Server 2004, this corresponds to Partner Min Contention Winner Limit in the mode. In addition, because the host is the contention winner on 125 sessions (out of a total of 250), Host Integration Server 2004 should be configured as the contention winner on the remaining 125 sessions. In this case, Host Integration Server 2004 mode would have the following values:

- Parallel Session Limit 250
- Minimum Contention Winner Limit 125
- Partner Min Contention Winner Limit 125
- Automatic Activation Limit 0

See Also

Sample VTAM Parameters

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Sample VTAM Parameters for Independent APPC

The lists in this section show sample VTAM parameters that might be used for communication using independent Advanced Program-to-Program Communications (APPC). The underlined values correspond to values specified in SNA Server Manager.

```
SERVER1  PU    ADDR=09,                                X
               IDBLK=05D,                              X
               IDNUM=11111,                            X
               CPNAME=SNASERV,                         X
               ISTATUS=ACTIVE                          X
               DLOGMOD=D4C32782,                       X
               MODETAB=ISTINCLM,                       X
               MAXDATA=521,                            X
               MAXPATH=1,                              X
               PUTYPE=2,                               X
               SSCPFN=USSSCS,                          X
               MAXOUT=7,                               X
               PASSLIM=4,                              X
               PACING=0,                               X
               DISCNT=NO,                              X
               USSTAB=USSTAB

TRPATH    PATH DIALNO=2223331234567890,                X
               GRPNM=AAA01,                            X
               GID=2

LOCLU1    LU   LOCADDR=0,                              X
               ISTATUS=ACTIVE,DLOGMOD=APPCMODE,        X
               RESSCB=25,USSTAB=USSTAB,PACING=0,       X
               VPACING=0
```

In the preceding example, the LOCADDR= value for the LOCLU1 is 0. This is the correct value to use with independent APPC LUs.

The following table shows Host Integration Server 2004 parameters and values that correspond to the preceding sample VTAM parameters.

Host Integration Server 2004 parameter	**Sample value**	**VTAM parameter**
Connection: Local Node ID, first three digits (block number)	05D	IDBLK= parameter in the PU definition
Connection: Local Node ID, last five digits (node number)	11111	IDNUM= parameter in the PU definition
Server: Control Point Name	SNASERV	CPNAME= parameter in the PU definition
Connection: Max BTU Length	521	MAXDATA= parameter in the PU definition (set Max BTU Length &le; MAXDATA)
Local APPC LU: LU Name	LOCLU1	Name in LU definition
APPC Partner LUs: Mode	APPCMODE	DLOGMOD= parameter in the LU definition

The following list shows mode table entries for use with independent APPC LUs.

```
*********************************************************
*           LOGMODE TABLE ENTRY FOR RESOURCES           *
*          CAPABLE OF ACTING AS LU 6.2 DEVICES          *
*********************************************************
SNASVCMG MODEENT LOGMODE=SNASVCMG,FMPROF=X'13',         X
               TSPROF=X'07',PRIPROT=X'B0',              X
               SECPROT=X'B0',COMPROT=X'D0B1',           X
               RUSIZES=X'8585',ENCR=B'0000',            X
               PSERVIC=X'060200000000000000000300'

APPCMODE MODEENT LOGMODE=APPCMODE,                      X
               TYPE=0,                                  X
               FMPROF=X'13',                            X
```

```
                  TSPROF=X'07',                           X
                  PRIPROT=X'B0',                          X
                  SECPROT=X'B0',                          X
                  COMPROT=X'50B1',                        X
                  PSNDPAC=X'03',                          X
                  SRCVPAC=X'03',                          X
                  RUSIZES=X'8585',                        X
                  PSERVIC=X'060200000000000000002F00'
```

In the preceding list, the mode named APPCMODE is an example of a mode configured for use with APPC. The mode named SNASVCMG is included in Host Integration Server 2004, because it is required for parallel session support; it does not need to be configured in SNA Server Manager.

See Also

Sample VTAM Parameters

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Sample CICS Configuration Screens for Use with APPC

The following series of screens show how CICS could be configured for independent Advanced Program-to-Program Communications (APPC) through VTAM. In the first screen, the underlined values correspond to values specified in SNA Server Manager.

```
OVERTYPE TO MODIFY                    CICS RELEASE = 0330
 CEDA  ALter
  Sessions       : LOCLU1
  Group          : VER3AAAA
  DEscription  ==> VERSION 3 LU 6.2 SESSION ENTRY
 SESSION IDENTIFIERS
  Connection   ==> CON1
  SESSName     ==>
  NETnameq     ==>
  MOdename     ==> APPCMODE
 SESSION PROPERTIES
  Protocol     ==> Appc                 Appc | Lu61
  MAximum      ==> 250 , 125            0-999
  RECEIVEPfx   ==>
  RECEIVECount ==>                      1-999
  SENDPfx      ==>
  SENDCount    ==>                      1-999
  SENDSize     ==> 00521                1-30720
  RECEIVESize  ==> 00521                1-30720

                                             APPLID=CICSLU
PF 1 HELP 2 COM 3 END   6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

The following table shows Host Integration Server 2004 parameters and values that correspond to the preceding sample CICS parameters.

Host Integration Server 2004 parameter	Sample value	CICS parameter
LU Name for local APPC LU	LOCLU1	Sessions
Mode name	APPCMODE	Modename
Parallel Session Limit in the mode	250	Maximum
Partner Min Contention Winner Limit in the mode	125	Maximum
Max Receive RU Size in the mode	00521	SENDSize
Max Send RU Size in the mode	00521	RECEIVESize
LU Name for remote APPC LU	CICSLU	APPLID

In the sample CICS screen, the parameter called Maximum has two values, 250 and 125, separated by commas. The first value (250) is the parallel session limit. The second value (125) is the host minimum contention winner limit. On Host Integration Server 2004, this corresponds to Partner Min Contention Winner Limit in the mode. In addition, because the host is the contention winner on 125 sessions (out of a total of 250), Host Integration Server 2004 should be configured as the contention winner on the remaining 125 sessions. In this case, Host Integration Server 2004 mode would have the following values:

- Parallel Session Limit 250
- Minimum Contention Winner Limit 125
- Partner Min Contention Winner Limit 125
- Automatic Activation Limit 0

The remaining screens in this section show more information about how CICS could be configured for independent APPC through VTAM.

```
OVERTYPE TO MODIFY                    CICS RELEASE = 0330
 CEDA  ALter
 SESSION PROPERTIES
  SESSPriority ==> 000                  0-255
  Transaction    :
 OPERATOR DEFAULTS
```

```
   OPERId         :
   OPERPriority   : 000                 0-255
   OPERRsl        : 0                             0-24,...
   OPERSecurity   : 1                             1-64,...
  PRESET SECURITY
   USERId       ==>
  OPERATIONAL PROPERTIES
   Autoconnect  ==> Yes                 No | Yes | All
   INservice      :                     No | Yes
   Buildchain   ==> Yes                 Yes | No
   USERArealen  ==> 000                 0-255
   IOarealen    ==> 00000 , 00000       0-32767
   RELreq       ==> No                  No | Yes
   DIscreq      ==> No                  No | Yes
   NEPclass     ==> 000                 0-255
  RECOVERY
   RECOVOption  ==> Sysdefault  Sysdefault | Clearconv
                                | Releasesess | Uncondrel
                                | None
   RECOVNotify  ==> None       None | Message | Transaction

                                                APPLID=CICSLU
 PF 1 HELP 2 COM 3 END   6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

In the following screen, the underlined value corresponds to the LU Name of the local APPC LU in Host Integration Server 2004.

```
 OVERTYPE TO MODIFY                   CICS RELEASE = 0330
  CEDA  ALter
   Connection     : CON1
   Group          : VER3AAAA
   DEscription  ==> VERSION 3  LU 6.2 DEFINITION
  CONNECTION IDENTIFIERS
   Netname      ==> LOCLU1
   INDsys       ==>
  REMOTE ATTRIBUTES
   REMOTESystem ==>
   REMOTEName   ==>
  CONNECTION PROPERTIES
   ACcessmethod ==> Vtam                Vtam | IRc
                                        |INdirect | Xm
   Protocol     ==> Appc                Appc | Lu61
   SIngleess    ==> No                  No | Yes
   DAtastream   ==> User                User | 3270 | SCs
                                        | STrfield | Lms
   RECordformat ==> U                   U | Vb
  OPERATIONAL PROPERTIES
   AUtoconnect  ==> Yes                 No | Yes | All
   INService    ==> Yes                 Yes | No
  SECURITY
   SEcurityname ==>
   ATtachsec    ==> Verify              Local | Identify
                                        | Verify | Persistent
                                        | Mixidpe
   BINDPassword ==>                     PASSWORD SPECIFIED
   BINDSecurity ==> No                  No | Yes

                                                APPLID=CICSLU
 PF 1 HELP 2 COM 3 END   6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

See Also

Sample VTAM Parameters

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to

http://go.microsoft.com/fwlink/?linkid=29507.

Configuring NCP for Independent APPC

Parameters on Network Control Program (NCP) must match Advanced Program-to-Program Communications (APPC) parameters on Host Integration Server 2004. To configure the needed parameters, consult with the host administrator for the matching NCP parameters.

This section provides information about NCP definitions used for supporting and defining independent LUs. The section is not intended to provide comprehensive information about NCP, which is described more thoroughly in IBM manuals such as:

- *Planning and Reference for NetView, NCP, VTAM* (CN4D1200)
- *NCP, SSP, and EP Resource Definition Guide* (CXDG7200)
- *NCP, SSP, and EP Resource Definition Reference* (CXDH1200)

You may need to study other IBM documentation as well. Some of the topics to study are:

- Independent LUs
- Type 2.1 node support
- Dynamic reconfiguration

Table of NCP Parameters That Affect Independent APPC

The following table shows basic recommendations for setting NCP parameters for independent APPC with Host Integration Server 2004. The next sections describe the parameters in more detail.

NCP definition	NCP parameter	Recommendations
BUILD	ADDSESS	Must support the number of sessions needed.
Not applicable	AUXADDR	Must support the number of additional addresses needed.
Not applicable	MAXSESS	Use for setting the maximum sessions allowed for any LU. Corresponds to the sum of all the parallel session limits for all the modes with which a particular LU is partnered.
PUDRPOOL	NUMBER	Must support the number of servers accessing NCP.
LUDRPOOL	NUMILU	Must support the number of dynamically configurable LUs needed.
PU	NETID	Corresponds to the Local Network Name on Host Integration Server 2004.
Not applicable	PUTYPE	For independent APPC, use PUTYPE=2.
Not applicable	XID	For independent APPC, use XID=YES.
LU	LOCADDR	For independent LUs with set definitions, use LOCADDR=0.
Not applicable	PACING	Use a value greater than or equal to the corresponding Host Integration Server 2004 parameter, the Pacing Receive Count in the mode.
Not applicable	VPACING	Use a value less than or equal to the corresponding Host Integration Server 2004 parameter, the Pacing Send Count in the mode.

BUILD Definition

The following parameters in the BUILD definition affect independent APPC:

ADDSESS=*value*

Is equivalent to the total number of sessions available to independent LUs. ADDSESS specifies the number of LU-LU session control blocks available for independent LUs. Note that session control blocks may be reserved for a particular LU by using RESSCB (reserved session control blocks) in the LU definition.

The sum of ADDSESS, AUXADDR, and NUMILU equals the total number of control blocks available for dynamic configuration of LUs. (For a description, see LUDRPOOL Definition, later in this topic.) This total should be high enough to support needed sessions, but low enough so that NCP does not exceed the storage capacity of the controller.

AUXADDR=*value*

Specifies the number of addresses that can be dynamically defined for both dependent and independent LUs. To allow for additional sessions between independent LUs, AUXADDR should be greater than ADDSESS. For more information about dynamic reconfiguration, see ADDSESS (the preceding description).

MAXSESS=*value*

Specifies the maximum number of LU-LU sessions that one independent LU can support. If you specify MAXSESS in an LU definition (as supported by NCP V6R2), the LU uses the value in the LU definition, not the BUILD definition. The limit set by MAXSESS prevents an independent LU from using too many unreserved session control blocks.

PUDRPOOL Definition

The following parameter in the PUDRPOOL definition affects independent APPC:

NUMBER=*value*

Specifies the number of physical units (PUs) that can be dynamically defined.

LUDRPOOL Definition

The following parameter in the LUDRPOOL definition affects independent APPC:

NUMILU=*value*

Specifies the number of independent LUs that can be added through dynamic reconfiguration. Find a value high enough to support needed sessions (including control-session overhead for parallel sessions), but low enough so that NCP does not exceed the storage capacity of the controller. Note that total LUs allowed by NUMILU plus NUMTYP1 plus NUMTYP2 is limited. The exact limit depends on your version of NCP.

PU Definition

The following parameters in the PU definition affect independent APPC:

NETID=*name*

Specifies the name of an adjacent network, and corresponds to the local Network Name on Host Integration Server 2004. NETID allows the network names to differ between the host and Host Integration Server 2004. This name is used in exchange identification (XID) negotiation.

PUTYPE=2

For independent APPC, use PUTYPE=2. When combined with XID=YES, this is equivalent to physical unit type 2.1.

XID=YES

For independent APPC, specify XID=YES, so that XIDs can be exchanged while in Normal Disconnected Mode (NDM).

LU Definition

The following parameters in the LU definition affect independent APPC:

LOCADDR=0

For independent LUs configured by an administrator (as contrasted with LUs dynamically configured by NCP), specify LOCADDR=0.

PACING=*value*

Specifies the number of frames for NCP to send to an independent LU before NCP waits for a pacing response. The value for PACING should generally be greater than or equal to the corresponding Host Integration Server 2004 mode parameter, Pacing Receive Count. This ensures a smooth flow of data from the host to the Host Integration Server 2004. (Host Integration Server 2004 does not support adaptive pacing.)

VPACING=*value*

Specifies the number of frames for NCP to receive from an independent LU before NCP sends a pacing response; sometimes called the receive window size. The value for VPACING should generally be less than or equal to the corresponding Host Integration Server 2004 mode parameter, Pacing Send Count. This prevents delays in sending from the Host Integration Server 2004 to the host. (Host Integration Server 2004 does not support adaptive pacing.)

See Also

Sample VTAM Parameters

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring the AS/400 for 5250 Access

When setting Host Integration Server 2004 parameters for an AS/400 connection, you must match values set on the host. Check with the host administrator to obtain required information for AS/400 access.

The administrator of the AS/400 may allow configurations to be created automatically in response to incoming requests. Alternatively, the administrator may disable this feature, to ensure a higher level of security. Work with the documentation for the AS/400 or with the administrator to determine the appropriate methods for configuring the AS/400.

> **Note** If the administrator of the AS/400 has allowed configurations to be created automatically in response to incoming requests, the parameters listed in this section need not be specified on the AS/400.

The following list shows command sequences on the AS/400 and the parameters to set after choosing those command sequences. You must be logged on with administrative privilege on the AS/400 to configure the listed parameters. For more detailed information, see the AS/400 documentation.

Communications —> Network configuration —> Configure communications and remote hardware —> Work with lines

Find out the name of the line from the AS/400 administrator. To enable automatic configuration for the line, for Autocreate controller, specify *YES, and for Autodelete controller (a time-out value), specify *NONE, or a large value such as 7000 (minutes). To prevent automatic configuration for the line, for Autocreate controller, specify *NO.

If the configuration is not automatic, specify the following:

- APPN-capable *YES
- A Control Point Name and network identifier that match corresponding parameters in Host Integration Server 2004
- APPN CP session support *YES

Communications —> Network configuration —> Configure communications and remote hardware —> Work with communications controllers

In this context, communications controller means the Host Integration Server 2004.

If the configuration is not automatic, specify the local address of the Host Integration Server 2004 computer.

Connection type	Address as specified in AS/400 configuration	Method for finding out address on Host Integration Server 2004
802.2	LAN remote adapter address	At the command prompt, type **net config server**; then view the line labeled "Server is active on."
SDLC	Station address (STNADR)	Start Host Integration Server 2004 Manager and view the Poll Address specified for the SDLC connection. (For SDLC, both ends use same address.)
X.25	Network address	Start SNA Manager, access the **IBM X.25 Link Service Setup** dialog box, and view the Local X.25 Address.

See Also

Sample VTAM Parameters

Guidelines for an AS/400 that Does Not Have PC Support

You can connect to an AS/400 for 5250 emulation even if the AS/400 does not have PC Support. However, to do this, you must create the mode QPCSUPP on the AS/400, along with other resources that would have been created by PC Support. A recommended way to do this is to create the QPCSUPP mode, create the QWCPCSUP class, and add the class QWCPCSUP to the subsystem QCMN. For details about how to create these resources, see the online OS/400 documentation for the related commands: **crtmodd**, **crtcls**, and **addrtge**.

Changing Session Limits with a Single Mode Name

If the AS/400 requires different session limits on each LU (while the mode name stays the same), you must change the device description attached to the controller to reflect the correct number of sessions allowed for the LUs. For example, with a 5250 emulator, the mode name must be QPCSUPP. If you change the Parallel Session Limit on QPCSUPP for one LU-LU pair, all other LU-LU pairs that use the QPCSUPP mode will also be affected. Therefore, to change the session limit on some LUs but not others, you must change it at the AS/400.

The simplest way to get the correct number of sessions for the LUs on the AS/400 is to autocreate the controllers and devices, and then change the device description attached to the controller, so that the session limit is decreased. This is done by using the Change Device Description (**chgdevappc**) command. It needs to be done for each device description that needs to have different session limits. The AS/400 device settings that should be modified are Maximum Sessions (**maxssn**) and Maximum Conversations (**maxcnv**).

For 5250 emulation in the AS/400 environment, you must configure the following elements:

- Each Host Integration Server 2004 computer that will access the AS/400
- Connections
- Local APPC LUs
- Remote APPC LUs
- LU-LU pairs

See Also

Sample VTAM Parameters

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Table of Parameters for AS/400 Communication

The following table summarizes details about configuring Host Integration Server 2004 for the AS/400 environment. In addition, for an X.25 connection using permanent virtual circuit (PVC), specify the PVC Alias.

SNA Server element	Parameter name in Host Integration Server 2004	Instructions for configuring for the AS/400 environment
Server	Network Name (Local Node)	This generally corresponds to the RMTNETID setting on the AS/400. (APPN is often used.)
Server	Control Point Name (Local Node)	Corresponds to RMTCPNAME on the AS/400.
Connection	Remote End	Select Peer System as the Remote End for the connection.
Connection	Activation	Coordinate with the switched disconnect (SWTDSC) setting on the AS/400. If SWTDSC is *YES, select On Demand. If SWTDSC is *NO, select On Server Startup.
Connection	Local Node ID	Specify the Local Node ID, a required parameter for all connections. This corresponds to EXCHID on the AS/400.
Connection	Control Point Name (Remote Node)	Specify the AS/400 Control Point Name (CP name) as the remote Control Point Name for the connection.
Connection	Network Name (Remote Node)	Corresponds to the RMTNETID on the AS/400. (APPN is often used.)
Connection	802.2: Remote Network Address SDLC: Poll Address X.25: Remote X.25 Address	Corresponds to ADPTADR in the Line Description on the AS/400. Corresponds to STNADR in the Line Description on the AS/400. Specify the address of the AS/400.
Connection	Max BTU Length	Corresponds to the MAXFRAME setting on the AS/400.
Remote APPC LU	LU Name	Specify the Control Point Name of the AS/400 as the remote LU name.
Mode	Mode name	Choose the QPCSUPP mode for all LU-LU pairs to be used for AS/400 connectivity.
User or group listing	Default local APPC LU	Assign a Default local APPC LU to the user or group. If the user or group does not specify a local LU name when opening a session to an AS/400, this default local LU name will be used.
User or group listing	Default remote APPC LU	Assign a Default remote APPC LU – which is the same as a default AS/400 – to the user or group. If the user or group does not specify a remote LU (that is, an AS/400) when opening a session, the assigned AS/400 will be used.

See Also

Sample VTAM Parameters

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Applications and Tools

Microsoft® Host Integration Server 2004 includes several applications and tools to assist you in managing your environment.

- Network Management Support describes various methods of managing network environments.
- Using the SNA Trace Utility and Trace Viewer describes how to set up tracing on a Host Integration Server 2004 computer and how to view trace files for information on the activity between components.

Network Management Support

The requirement to manage heterogeneous network environments containing mainframes, midrange systems, and personal computers is a big challenge. This section discusses two mainframe management tools, IBM's NetView and Response Time Monitor, which are supported by the Microsoft® Host Integration Server 2004 and can be used to manage your integrated network.

Host Integration Server 2004 can be managed either from the Host Integration Server 2004 computer (and other computers on the LAN) or from the mainframe using NetView. NetView is a centralized network management system that allows you to control SNA network resources, including Host Integration Server 2004.

Using the IBM Response Time Monitor (RTM) provides additional management of the Host Integration Server 2004. RTM measures the length of time it takes for a host to respond to an incoming 3270 end-user request. Working in conjunction with NetView on the mainframe, RTM gathers data from 3270 terminal emulators and sends the information to the host through the NetView connection.

This section contains:

- Using NetView to Manage the SNA Environment
- Monitoring Mainframe Response Times

Using NetView to Manage the SNA Environment

The IBM NetView program sends and receives alerts and other information between a host (mainframe or AS/400) and the computers that connect to it. Host Integration Server 2004 supports NetView, bringing centralized SNA-based network management into local area network (LAN) environments. Using NetView, you can control any Host Integration Server 2004 computer that represents a physical unit (PU) in the SNA environment.

NetView can forward Host Integration Server 2004 alerts to the host system. In addition, NetView can be extended with the Windows NVAlert and NVRunCmd services. NVAlert provides the ability for the host system console to receive and display alerts generated by Windows and applications running on the Windows computer. NVRunCmd provides the ability to command Host Integration Server 2004 from the host system console.

The NVAlert and NVRunCmd services are installed when you install Host Integration Server 2004. By default, the NVAlert configuration file, NVAlert.ini, is created and placed in the \Program Files\Host Integration Server\System folder. Also installed in the Windows Control Panel is the NVAlert service, and is configured with a startup setting of Manual.

If you plan to manage Host Integration Server 2004 most of the time using NetView from the mainframe, you should change the default startup configuration from Manual to Automatic. In Control Panel, click the **Services** icon, and then select the service you want to change. Click **Startup**, and then click **Automatic** as the Startup Type.

To configure NetView

1. In the Host Integration Server 2004 console tree, right-click the subdomain that you want to configure, and click **Properties**.
2. Click the **NetView** tab, and fill in the option.
3. Click **OK**, and save the configuration.

NVAlert runs as a background process, enabling alert messages generated by Windows or by Windows-based applications to be forwarded to a host system through NetView. To control the alert messages sent from the NVAlert service, modify the NVAlert.ini file to specify the Windows alerts that you want forwarded to the host system.

As events occur and are recorded in a log file, NVAlert compares each logged event to the list in the NVAlert.ini file. When an event matches one on the list, NVAlert forwards an alert as specified in NVAlert.ini to the host system.

If a problem occurs sending an alert, NVAlert follows a preset pattern of time-outs and retries. No additional alerts can be sent until the alert is successfully sent to the host.

See Also

The NVAlert.ini File

Sending Commands to Host Integration Server 2004 from the Mainframe

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

The NVAlert.ini File

The following sections describe the structure and the required and optional lines of data for NVAlert.ini. For information about standard code points and values used by NetView, see your IBM NetView documentation.

Required Data Lines

You must precede each section of data lines that you add to NVAlert.ini with the following heading, including the square brackets **[ ]** as shown:

```
[source.type.eventid]
```

Use the Windows Event Log service to view the intended alert, and supply values as described in the following list. For information about the Event Log service, see your Windows documentation.

- For *source*, substitute the name that appears beneath the Source heading in the Windows Event Log service.
- For *type*, find the type listing (in the event detail in the Windows Event Log service), and substitute one of the following values:

Success	0
Information	1
Warning	2
Error	3
Success audit	4
Failure audit	5

- For *eventid*, use the decimal number that appears under the EventID heading in the Windows Event Log service.

> **Note** Choose alerts that will not exceed the basic transmission unit (BTU) of the connection over which the alerts will flow because the host cannot handle alerts exceeding this size.

After the heading, type data lines using the following syntax:

```
AlertType=xx

AlertDescription=xxxx

ProbableCauses=xxxx[,...]
```

In these lines, each letter *x* represents a hexadecimal digit specifying NetView code points. For the appropriate values to provide, see your IBM NetView documentation. The element characters [**,**...] indicate that the argument can be repeated, with commas separating the repetitions. Do not type the brackets.

Adding Optional Data Lines

To help you monitor the SNA environment or diagnose a problem, you can add additional data to the alerts sent to the mainframe. The following optional data lines can be added to an alert:

```
UserCauses=xxxx[,...]

UserDetData=00,xx,string[;...]

UserRecAct=xxxx[,...]

UserRecActDetData=00,xx,string[;...]

FailureCauses=xxxx[,...]

FailureDetData=00,xx,string[;...]

FailureRecAct=xxxx[,...]
```

```
FailureRecActDetData=00,xx,string[;...]

InstallCauses=xxxx[,...]

InstallDetData=00,xx,string[;...]

InstallRecAct=xxxx[,...]

InstallRecActDetData=00,xx,string[;...]
```

Each letter *x* represents a hexadecimal digit specifying NetView code points. For the appropriate values, see your NetView documentation. The elements [**,**...] and [**;**...] indicate that the argument can be repeated, with commas or semicolons separating the repetitions. Do not type the brackets.

RecAct is an abbreviation for recommended action and *DetData* is an abbreviation for detailed data. You can use the DetData syntax to add blocks of detailed data to an alert.

- For *xx,* type the Data ID code point as described in the IBM *SNA Formats* manual (IBM document GA27-3136-12) or other NetView documentation.
- For *string*, provide a text string using the following variables:

%M	Module name.
%C	Computer name.
%I	Event ID.
%S*n*	String number *n* in the event log (*n* starts at zero).
%D*xxxx*, *yyyy*	Raw data of length *yyyy*, starting at buffer offset *xxxx*. Both *xxxx* and *yyyy* are hexadecimal values. Use this variable only if you do not specify any other variables.

Example of an Alert

The following is an example of a Windows-based alert and a description of each data line. The alert warns that a hard disk is nearly full and the description in the Windows Event Log service will read "The C: disk is at or near capacity. You may need to delete some files."

Sample alert and description

Data lines	Description
`[Srv.2.2013]`	Source is Srv, type is 2 (warning), and EventID is 2013
`AlertType=11`	Impending problem
`AlertDescription=5002`	Resource nearing capacity
`ProbableCauses=5001`	Media DASD device
`UserCauses=0102,F0A0`	Insufficient storage media space available
`UserDetData=00,95,%C`	Problem located on the indicated file server name (supplied through NetView value 95); event logged on indicated computer name (supplied through %C)

See Also

Using NetView to Manage the SNA Environment

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Sending Commands to Host Integration Server 2004 from the Mainframe

The NVRunCmd service enables you to launch processes on the Host Integration Server 2004 from the NetView console. Commands are sent to the Host Integration Server 2004 computer, carried out, and results are returned to the NetView console as long as the results contain only alphanumeric characters. The NVRunCmd service cannot send graphical information to the mainframe NetView console. For example, if you use NVRunCmd to run the **dir** command, a character-based display of the current folder is displayed in NetView. But if you use NVRunCmd to start a graphical application, no command output is sent to NetView.

NVRunCmd does not handle back-and-forth interactions, such as a confirmation generated by a Host Integration Server 2004 computer in response to a command. If a command forwarded by NVRunCmd requires confirmation before being carried out, the command process will not be completed, and will eventually time out.

NVRunCmd is configured during Host Integration Server 2004 setup and runs as a background process, waiting for a command to be sent from a NetView console. When NVRunCmd receives a command, it determines whether the command is one that it can process, and returns either the results (in 256-byte segments) or a message saying that the command failed. NVRunCmd attempts to send the results back to the NetView console only once, and if the NetView console does not receive the results, the link or some other part of the communications has failed.

The pipe symbol (|) cannot be used to combine commands. For example, NVRunCmd cannot process the following command string:

```
dir | more
```

The maximum amount of information that can be returned to the NetView console is 31,700 bytes. Any additional information returned by the command will be lost, with a message appended to the truncated data warning the user.

Configuring NVRundCmd Privileges

By default, the NVRunCmd service runs in the context of the local system's security. Therefore, some commands generate responses that are different from the responses generated by a user logged on the same Windows operating system. For example, the commands **net use** and **chdir**, typed without options, generate a response in the context of NVRunCmd, not the context for a logged-on user.

For better system security, use the Windows Control Panel to access the **Services** dialog box and configure **Startup** options for the NVRunCmd service. Associate the NVRunCmd service with a user account that has the privilege level that you want for NVRunCmd.

Sending a Command from the Host Console

To send a command to the intended Host Integration Server 2004 computer, you need to specify the corresponding PU in the **runcmd** command in the NetView console of the host system. Use the following syntax to launch a process on the Host Integration Server 2004 software. Commands are not case sensitive; commands entered in lower case are converted to upper case.

```
runcmd sp=servicepoint, appl=NVRunCmd  cmd commandname parameters
```

- For *servicepoint*, type the name of the VTAM PU of the Host Integration Server 2004 computer (node) in which you want the command to run. Note that on the server, this value is configured as the control point name for the server.
- For *commandname*, type the command you want to run. The command must be alphanumeric because NetView cannot return graphical output.
- For *parameters*, type the parameters needed for running the command on the server.

  Note NVRunCmd does not use or need a defined NetView connection. You can use NVRunCmd from the host to each Host Integration Server 2004 computer in the subdomain separately. The NetView connection is needed only for sending alerts to NetView.

See Also

Using NetView to Manage the SNA Environment

Monitoring Mainframe Response Times

The IBM response time monitor (RTM) measures the length of time it takes for a host to respond to an incoming 3270 end-user request. Responding to customer requests is a good indication of system performance. Monitoring the response time can be helpful diagnosing network and other system problems. RTM is a feature that works in conjunction with NetView on the mainframe. It gathers data from 3270 terminal emulators and sends the information to the host through the NetView connection for collection and analysis. Then you can view a graphical display of response times for a particular 3270 emulation session.

This section contains:

- Configuring RTM in Host Integration Server 2004
- Additional Information

Configuring RTM in Host Integration Server 2004

Use the SNA manager console to configure how response times are measured and classified. Response time monitor (RTM) statistics for a specific logical unit (LU) are sent to the host that owns the LU, rather than to the connection designated for NetView data.

You can specify the times that RTM should send data and the trigger that causes it to register the host response. The configuration settings are on the **Response Time Monitor** tab of the **Properties** page for the selected SNA subdomain and are listed in the following table:

> **Note** For these settings to be meaningful, each emulator for your 3270 users must support RTM. If the host RTM settings are different, they override the Host Integration Server 2004 settings.

RTM Settings

Setting		**Definition**
RTM Data Sent At		Specifies when RTM data is sent to the host. You can send the data during one or both of the following situations:
	Counter Overflow	Sends the RTM data to the host when the number of host responses in a given time period overflows the size of the available counter.
	End of Session	Sends the RTM data to the host at the end of each LU-to-LU session.
RTM Timers Run Until		Specifies when the RTM registers a host response - when RTM stops the timers. (The timers are started when the local system sends data.) Possible stopping points are as follows:
	First Data Reaches Screen	Stops timing when data reaches the local screen.
	Host Unlocks Keyboard	Stops timing when the host unlocks the local keyboard.
	Host Lets User Send	Stops timing when the host lets the local computer send more data.
RTM Thresholds		Specify the cutoff times, in tenths of a second that the RTM saves its count of host responses and restarts the count. The range is 1–1000 in tenths of a second (from 0.1 seconds to 100.0 seconds). The defaults are 5, 10, 20, and 50 (0.5 seconds, 1.0 seconds, 2.0 seconds, and 5.0 seconds).

Although you can configure the RTM boundaries and definition that you want to use on your server, the host can override these values, either for an individual 3270 LU or for all LUs the host controls. The host can also specify whether to permit local display of RTM data, and, when Host Integration Server 2004 sends RTM data, it can disable collection of RTM statistics completely.

To configure Response Time Monitor (RTM)

1. In the Host Integration Server 2004 console tree, right-click the subdomain that you want to configure, and click **Properties**.
2. Click the **Response Time Monitor (RTM)** tab, and complete the options.
3. Click **OK**, and **save** the configuration.

This section contains:

- Defining RTM Thresholds
- Specifying When RTM Data is Sent
- Indicating Lost RTM Data

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Defining RTM Thresholds

Response time monitor (RTM) data is collected by comparing host response times against a series of four boundary values. Each time a host transaction occurs, the response time is compared with the boundary values, and the appropriate counter is incremented. There is a counter for each of the four intervals defined by the boundary values, and an overflow counter for response times above the largest boundary value.

You can change the default boundaries — 0.5, 1, 2, and 5 seconds — using the SNA manager console. You also can select which of three response time definitions to set as default.

The response time is measured from the time the user presses ENTER until one of the following events occurs:

- The first character of host data reaches the 3270 display.
- The keyboard is unlocked.
- The user is enabled to send data.

A host can override the default boundaries and other host response time settings for any or all logical units (LUs) it controls.

See Also

Specifying When RTM Data is Sent

Indicating Lost RTM Data

Specifying When RTM Data is Sent

Response times are recorded for a specific logical unit (LU) rather than for a specific 3270 session. If a 3270 session ends and another session of the same or a different 3270 user starts using the same LU, the response time counters include responses from both sessions. To prevent the counters from collecting information from more than one 3270 session, you can reset the RTM counters on the LU before a new session begins. The counters are reset when the host requests the reset or when response time monitor (RTM) data is sent unsolicited by Host Integration Server 2004. Usually when a host requests RTM data the counters are reset at the same time.

To ensure that RTM data relates only to the current 3270 session, you should select the **End-of-Session** checkbox when configuring RTM parameters for Host Integration Server 2004. Note that the host can override this setting.

See Also

Defining RTM Thresholds

Indicating Lost RTM Data

Indicating Lost RTM Data

When Host Integration Server 2004 sends response time monitor (RTM) data to the host, it can indicate to the host that RTM data may have been lost, that is, some host response times were not included in the RTM data sent to the host. This indication is sent when:

- One of the RTM counters reaches its maximum value, and Host Integration Server 2004 is not configured to send RTM data unsolicited at counter overflow. When this occurs, Host Integration Server 2004 stops recording response times until the host requests the data or until end-of-session, if unsolicited sending at end-of-session is configured. The data is sent with an indication that data may have been lost due to counter overflow.
- Connection to the host for either Host Integration Server 2004 or the Windows servers ends abnormally. The first RTM data sent to the host after the connection is re-established includes the lost-data indicator to indicate that data may have been lost due to failure of the server.
- Host Integration Server 2004 is configured to send RTM data at the end-of-session, and a new 3270 session is started before the RTM data for the previous 3270 session on the same LU can be sent. Response times for the new session are discarded until the RTM data from the previous session is sent and the counters are reset. When RTM data is sent on the new session, it includes the lost data indicator.

See Also

Defining RTM Thresholds

Specifying When RTM Data is Sent

Additional Information

For additional information about NetView and RTM see Network Management The following topics are discussed:

- Connections used for the IBM NetView program and RTM facilities
- Link alerts
- Link statistics
- Application-generated alerts, and alerts generated through the NVAlert and NVRunCmd services
- Local logging of network management data

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Using the SNA Trace Utility and Trace Viewer

This following information guides you through configuring and using the Microsoft® Host Integration Server 2004 SNA Trace Utility and Trace Viewer applications.

The SNA Trace Utility is used to control trace files, and Trace Viewer is used to display trace files.

This section contains:

- Using the SNA Trace Utility
- Running the SNA Trace Utility
- Using Trace Viewer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Using the SNA Trace Utility

This section includes an overview of the Host Integration Server 2004 SNA Trace Utility and details the names and locations of the files generated by the trace application. This section contains:

- About the SNA Trace Utility
- System Troubleshooting
- Trace and Diagnostic File Location
- Trace File Names
- Choosing a Trace Type
- Trace Types
- Message Traces
- Interpreting Traces
- Using Trace to Diagnose Problems

About the SNA Trace Utility

The Host Integration Server 2004 SNA Trace Utility (snatrace.exe) is a graphical tool that allows you to enable or disable tracing options and set the SNA Trace Utility parameters.

After deciding the software components and types of tracing that can provide useful information, start the Host Integration Server 2004 SNA Trace Utility application and configure trace options for Host Integration Server 2004 computers.

If you are working to improve system performance or solve a difficulty with Host Integration Server 2004 components, reviewing trace files can assist in determining the source of the problem.

The SNA Trace Utility records activity between or within components of Host Integration Server 2004. The files created provide detailed information about the exact sequence of events occurring within Host Integration Server 2004 components or between Host Integration Server 2004 computers and Host systems on the network.

> **Note** You must be an administrator on the local account to run the SNA Trace Utility.

See Also

Using the SNA Trace Utility

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

System Troubleshooting

When gathering information about system difficulties, it is best to start with information provided by the Windows Event Log and System Monitor.

Event log information is generally more straightforward to interpret than trace information; use trace information only if event logs do not provide enough details.

When you report system problems to Microsoft Product Support (PSS), a technician may ask you for trace files and other system information:

- Trace files
- Windows Event Logs
- The current configuration file (Com.cfg)
- Dump files, which may be created by Host Integration Server 2004 when a system trap (exception error) occurs
- Datascope traces of protocol exchanges

See Also

Using the SNA Trace Utility

Trace and Diagnostic File Location

The following table lists the default location of files containing trace and diagnostic information:

File type	**Default location**	**File name or file name extensions**
Trace files created by the Host Integration Server 2004 Trace application	...\Host Integration Server\Traces	*.atf
Log files	\WINNT\System32\Config	*.evt
Configuration file	...\Host Integration Server\System\Config	com.cfg
Dr. Watson file	\WINNT	drwtsn32.log
Dump files	...\Host Integration Server\Traces	snadump.log

See Also

Using the SNA Trace Utility

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Trace File Names

Each trace file has two names associated with it, <*Filename*1>.atf and <*Filename*2>.atf.

Traces are written to the first file until it reaches the specified size, then to the second until it reaches that size, and so on alternating between the two files.

By default, the trace files are stored in the \Program Files\Host Integration Server\Traces folder, with an .atf file extension.

The following table lists the file names used by Trace:

Service	Type of tracing	File names used	File names used
SnaBase	Internal	Napint1.atf	Napint2.atf
	Message	Napmsg1.atf	Napmsg2.atf
SnaServer (PU 2.1 node)	Internal	Nodeint1.atf	Nodeint2.atf
	Message	Nodemsg1.atf	Nodemsg2.atf
Link service	Internal	Linkint1.atf	Linkint2.atf
	Message	Linkmsg1.atf	Linkmsg2.atf
NetView Alert	Internal	Nvaint1.atf	Nvaint2.atf
	Message	Nvamsg1.atf	Nvamsg2.atf
	API	Nvaapi1.atf	Nvaapi2.atf
NetView command	Internal	Nvcint1.atf	Nvcint2.atf
	Message	Nvcmsg1.atf	Nvcmsg2.atf
	API	Nvcapi1.atf	Nvcapi2.atf
SNA applications	Internal	Cliint1.atf	Cliint2.atf
	Message	Cliimsg1.atf	Cliimsg2.atf
	API	Cliiapi1.atf	Cliapi2.atf
Manage Agent	Internal	Mgaint1.atf	Mgaint2.atf
	Message	Mgamsg1.atf	Mgamsg2.atf
Manage Client	Internal	Mgcint1.atf	Mgcint2.atf
	Message	Mgcmsg1.atf	Mgcmsg2.atf
SNA Manager	Internal	Expint1.atf	Expint2.atf
	Message	Expmsg1.atf	Expmsg2.atf
	API	Expapi1.atf	Expapi2.atf
TN3270	Internal	tn3int1.atf	tn3int2.atf
	Message	tn3msg1.atf	tn3msg2.atf
	API	tn3api1.atf	tn3api2.atf
TN5250	Internal	tn5int1.atf	tn5int2.atf
	Message	tn5msg1.atf	tn5msg2.atf
	API	tn5api1.atf	tn5api2.atf
Host Print Service	Internal	sprtint1.aft	sprtint2.aft
	Message	sprtmsg1.atf	sprtmsg2.atf
	API	sprtapi1.atf	sprtapi2.atf
NetView	Internal	mnvtint1.atf	mnvtint2.atf
DDM	Internal	ddmint1.atf	ddmint2.atf
	Message	ddmmsg1.atf	ddmmsg2.atf
	API	ddmapi1.atf	ddmapi2.atf
DB2 Network Library	Internal	db2int1.atf	db2int2.atf
	Message	db2msg1.atf	db2msg2.atf
	API	db2api1.atf	db2api2.atf

See Also

Using the SNA Trace Utility

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Choosing a Trace Type

After selecting one or more Host Integration Server 2004 components to be traced, decide the type of tracing to apply.

The following table describes the types of tracing available:

Type of tracing	Activity traced	Applies to installed components
Internal*	Activity within a software component of Host Integration Server 2004.	SnaBase, SnaServer (PU 2.1 node), SNA applications, link services and more.
Message	Messages passed into and out of a software component of Host Integration Server 2004, including messages sent to and received from the network.	SnaBase, SnaServer (PU 2.1 node), SNA applications, link services and more.
API	Information passed into and out of a Host Integration Server 2004 DLL, as the DLL communicates with an application, such as the APPC DLL.	SNA applications and more.

* Internal tracing is intended for use by product support technicians. Interpreting internal traces and certain types of message traces requires a specialized knowledge base.

See Also

Using the SNA Trace Utility

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Trace Types

Before setting up tracing, decide the software components you want to trace, and which types of tracing information will be useful.

Each type of tracing is enabled using the Host Integration Server 2004 Trace application.

Internal Trace types:

- Fatal Conditions
- Error Conditions
- Debug Conditions
- Function Entry/Exit
- State Transition
- Custom Conditions

Message Trace types:

- Internal Messages
- 3270 Messages
- LU 6.2 Messages

API Trace types:

- APPC API
- CPI-C API
- LUA API
- CSV API

TN3270 Internal Trace types:

- TN3270 Internal Trace

See Also

About the SNA Trace Utility

Message Traces

The following table details Message traces.

Trace option	**Activity traced for Host Integration Server 2004 Applications on Host Integration Server 2004 client computers**
Internal Messages	Messages between the SNA Manager (considered an application), and SnaBase and SnaServer (PU 2.1 node)
3270 Messages	Messages between 3270 applications (3270 emulators and/or LUA programs) on the local system and the PU 2.1 node
LU 6.2 Messages	Messages between the APPC DLL on the local system and the PU 2.1 node

See Also

Trace Types

Interpreting Traces

The Host Integration Server 2004 Trace feature provides message, client API, SnaBase, Transaction Integrator, PU 2.1 node, and link service tracing.

The following table shows the information needed for interpreting each type.

Type of tracing	**Software component traced**	**Area of expertise needed**
APPC API	SNA applications	APPC programming
CPI-C API	SNA applications	CPI-C programming
LUA API	SNA applications	LUA programming
SNA Formats	SnaServer (PU 2.1 Node)	SNA formats
Data Link Control (messages)	SnaServer (PU 2.1 node) or link service	DLC interface
Level 2 Messages	Link service	Link service interface
3270 Messages	SNA Applications, SnaServer (PU 2.1 Node), or SnaBase	3270 emulator interface
Internal Messages	All software components for Host Integration Server 2004	Intended for product support personnel
APPC Messages	SNA Applications, SnaServer (PU 2.1 Node), or SnaBase	Intended for product support personnel
Internal	All software components for Host Integration Server 2004	Intended for product support personnel

See Also

Trace Types

Using Trace to Diagnose Problems

The following table shows examples of possible difficulties and the types of tracing that may be useful.

Difficulty	What to trace
Host Integration Server 2004 can't connect to host	For the SnaServer (PU 2.1 node), trace Data Link Control and 3270 Messages
SNA Manager does not reflect changes in network services	For the SnaServer (PU 2.1 node), trace Internal Messages; for Manage Agent, enable internal tracing
Windows-based client computer cannot connect to a Host Integration Server 2004 resource	For any client computer, enable internal tracing For a 3270 or LUA client computer, trace 3270 messages For an APPC or CPI-C client computer, trace LU 6.2 messages

See Also

Using the SNA Trace Utility

Running the SNA Trace Utility

You can run the SNA Trace Utility from either the SNA Manager or from a command prompt.

This section contains:

- Starting the SNA Trace Utility
- Tracing Servers Components

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Starting the SNA Trace Utility

The following topics explain how to start the SNA Trace Utility from the SNA Manager, from the Windows Start menu, or from a command prompt.

This section contains:

- Starting from the SNA Manager
- Starting from Windows Start Menu
- Starting from a Command Prompt

Starting from the SNA Manager

The following procedure details how to start the SNA Trace Utility from the SNA Manager

To start the SNA Trace Utility from the SNA Manager

1. Click **Start**, and point to **Programs**.
2. Point to **Host Integration Server**, and then click **SNA Manager**.
3. Click **Tools**, and then click **SNA Trace Utility**.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Starting from Windows Start Menu

The following procedure details how to start the SNA Trace Utility from the Windows Start menu.

To start the SNA Trace Utility from the Start menu

1. Click **Start**, and point to **Programs**.
2. Point to **Host Integration Server**, and then point to **Application and Tools**.
3. Click **SNA Trace Utility**.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Starting from a Command Prompt

The following procedure details how to start the SNA Trace Utility from a command prompt.

To start the SNA Trace Utility from a command prompt

1. From **Start**, click **Run**.
2. Type in **command**, and click **OK**.
3. Type in:

```
cd c:\Program Files\Host Integration Server\System
snatrace
```

-or-

To run the SNA Trace Utility on a specific server

1. From **Start**, click **Run**.
2. Type in **command**, and click **OK**.
3. Type in:

```
cd c:\Program Files\Host Integration Server\System
snatrace \\servername
```

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Tracing Servers Components

The Host Integration Server 2004 Trace application can be started locally or remotely for a Host Integration Server 2004 computer. For a client computer, the Host Integration Server 2004 Trace application can only be started locally.

> **Important** All procedures listed in this section assume that Trace is running on a computer that has Host Integration Server 2004 installed and configured.

This section contains:

- Selecting Components to Trace
- Tracing SNA APIs
- Tracing SnaBase
- Tracing PU 2.1 Node
- Tracing Link Services
- Tracing for TN3270
- Tracing for TN5250

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Selecting Components to Trace

Before you can begin tracing files, you need to decide on the Host Integration Server 2004 components to trace.

The Trace application enables you to record internal or external activity for the following components:

- Enterprise Single Sign-On
- NVAlert
- NVRuncmd
- SNA applications
- SNA Manager Client
- SNA Manager Agent (MngAgent)
- SnaBase
- Installed link services
- SNANetMn
- SNAPrint
- SNAServer
- SNA Management
- DB2 Network Library
- SNADDM
- TN3270
- TN5250

See Also

Tracing SNA APIs

Tracing SnaBase

Tracing PU 2.1 Node

Tracing Link Services

Tracing for TN3270

Tracing for TN5250

Tracing SNA APIs

The following table details SNA API Trace Options.

Trace option	Activity traced for SNA Applications
APPC API	Activity between APPC applications and the Host Integration Server 2004
CPI-C API	Activity between CPI-C applications and the Host Integration Server 2004
LUA API	Activity between LUA applications and the Host Integration Server 2004
CSV API	Activity between CSV applications and the CSV DLL on Host Integration Server 2004

See Also

Tracing SnaBase

Tracing PU 2.1 Node

Tracing Link Services

Tracing for TN3270

Tracing for TN5250

Tracing SnaBase

The following table details SnaBase Trace Options.

Trace option	**Activity traced for SnaBase**
Internal Messages	Messages between the SnaBase software, which maintains lists of service names and statuses, the SNA Manager and Client/Server messages
3270 Messages	Messages between the SnaBase software, which maintains lists of service names and statuses, and 3270 applications (3270 emulators and/or LUA programs)
LU 6.2 Messages	Messages between the SnaBase software, which maintains lists of service names and statuses, and the APPC DLL

See Also

Tracing SNA APIs

Tracing PU 2.1 Node

Tracing Link Services

Tracing for TN3270

Tracing for TN5250

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Tracing PU 2.1 Node

The following table details PU 2.1 Node traces.

Trace option	Activity traced for the SnaServer (PU 2.1 node)
Internal Messages	Messages between the SnaServer (PU 2.1 node) and the SNA Manager
3270 Messages	Messages between the PU 2.1 node and all 3270 client computers (3270 emulators and/or LUA programs)
Data Link Control	Messages between the PU 2.1 node and link services
SNA Formats	Data link control messages that are in Host Integration Server 2004 formats. Understanding such messages requires knowledge of Host Integration Server 2004 formats and protocols.
LU 6.2 Messages	Messages between the PU 2.1 node and the APPC DLL

See Also

Tracing SNA APIs

Tracing SnaBase

Tracing Link Services

Tracing for TN3270

Tracing for TN5250

Tracing Link Services

The following table details link service traces.

Trace option	Activity traced for the link service
Internal Messages	Messages between the link service and the SNA Manager
Data Link Control	Activity between the link service and PU 2.1 node
Level 2 Messages	Information related to Level 2 in the international standards organization (ISO) model

See Also

Tracing SNA APIs

Tracing SnaBase

Tracing PU 2.1 Node

Tracing for TN3270

Tracing for TN5250

Tracing for TN3270

You can enable or disable tracing for TN3270 using the Host Integration Server 2004 Trace application. Host Integration Server 2004 Trace provides API, internal, and message tracing.

Host Integration Server 2004 SNA Trace Utility places trace files for TN3270 in the \Host Integration Server\Traces folder by default.

The following table illustrates the TN3270 file names used by Host Integration Server 2004 Trace:

Service	Type of tracing	File names used	File names used
TN3270	API	Tn3api1.atf	Tn3api2.atf
	Internal	Tn3int1.atf	Tn3int2.atf
	Message	Tn3msg1.atf	Tn3imsg2.atf
	TN3270 internal trace	Tn_00.atf – Tn0a.atf	

> **Note** The TN3270 internal trace contains up to 1024 bytes of information and creates up to ten files. The names are Tn_00.atf to Tn_0a.atf.

> **Note** SNA Trace event monitoring will not stop the TN3270 internal trace.

See Also

Tracing SNA APIs

Tracing SnaBase

Tracing PU 2.1 Node

Tracing Link Services

Tracing for TN5250

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Tracing for TN5250

You can enable or disable tracing for TN5250 using the Host Integration Server 2004 Trace application. Host Integration Server 2004 Trace provides API, internal, and message tracing.

The Host Integration Server 2004 Trace application places trace files for TN5250 in the \Host Integration Server\Traces folder by default.

The following table illustrates the TN5250 file names used by Host Integration Server 2004 Trace:

Service	Type of tracing	File names used	File names used
TN5250	API	Tn5api1.atf	Tn5api2.atf
	Message	Tn5msG1.atf	Tn5msg2.atf
	Internal	Tn5int1.atf	Tn5int2.atf

See Also

Tracing SNA APIs

Tracing SnaBase

Tracing PU 2.1 Node

Tracing Link Services

Tracing for TN3270

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Using Trace Viewer

You can view the files created by the SNA Trace Utility using Trace Viewer (tracevwr.exe).

This section contains:

- About Trace Viewer
- Starting Trace Viewer
- Trace Viewer Properties
- Viewing Partial Details of Traces
- Filtering the Traces

About Trace Viewer

The Trace Viewer application is used to view Host Integration Server 2004 trace files.

With Trace Viewer, you can view all traces for a particular Host Integration Server 2004 component, view partial details for traces, and filter traces based on various criteria.

The Trace Viewer can be run from the SNA Manager, **Start** menu or from a command prompt.

See Also

Using Trace Viewer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Starting Trace Viewer

The following information details how to start the Trace Viewer. This section contains:

- Starting Trace Viewer from the SNA Manager
- Starting Trace Viewer from the Windows Start Menu
- Starting Trace Viewer from a Command Prompt

Starting Trace Viewer from the SNA Manager

The following procedure details how to start Trace Viewer from the SNA Manager.

To start Trace Viewer from the SNA Manager

1. Click **Start**, and point to **Programs**.
2. Point to **Host Integration Server**, and then click **SNA Manager**.
3. Click **Tools**, and then click **Trace Viewer**.
4. On the **File** menu, click **Open**.
5. Open a valid trace file (*.atf).

See Also

Starting Trace Viewer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Starting Trace Viewer from the Windows Start Menu

The following procedure details how to start Trace Viewer from the Windows Start Menu.

To start Trace Viewer from Start menu

1. Click **Start**, and point to **Programs**.
2. Point to **Host Integration Server**, and then point to **Application and Tools**.
3. Click **Trace Viewer**.
4. On the **File** menu, click **Open**.
5. Open a valid trace file (*.atf).

See Also

Starting Trace Viewer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Starting Trace Viewer from a Command Prompt

The following procedure details how to start Trace Viewer from a command prompt.

To start Trace Viewer from a command prompt

1. Click **Start**, and then click **Run**.
2. Type in **command**, and click **OK**.
3. Type in:

```
cd c:\Program Files\Host Integration Server\System
tracevwr
```

4. On the **File** menu, click **Open**.
5. Open a valid trace file (*.atf).

See Also

Starting Trace Viewer

Trace Viewer Properties

The following procedure details how to view Trace properties.

To view Trace properties

1. On the **Tools** menu, click **Trace Viewer**.
2. On the **File** menu, click **Open**.
3. Open a valid trace file (*.atf).
4. Click a line.
5. On the **View** menu, click **Properties**.

See Also

Viewing Partial Details of Traces

Filtering the Traces

Viewing Partial Details of Traces

The following procedure details how to view partial details of Traces.

To view partial details of Trace files

1. On the **Tools** menu, click **Trace Viewer**.
2. Open a valid trace file.
3. Click on a line.
4. On the **View** menu, click **Partial details**.
5. Select the columns you want to make visible.
6. Click **OK**.

See Also

Trace Viewer Properties

Filtering the Traces

Filtering the Traces

You can filter traces based on criteria you specify.

To filter traces

1. On the **Tools** menu, click **Trace Viewer**.
2. On the **View** menu, click **Filter Traces**.
3. Select the options you want to filter.
4. Click **OK**.

See Also

Trace Viewer Properties

Viewing Partial Details of Traces

Messaging User's Guide

Microsoft® MSMQ-MQSeries Bridge is an adaptable system that can be customized. You can set up MSMQ-MQSeries Bridge to operate on almost any Message Queuing (also known as MSMQ) or IBM MQSeries network configuration.

This section contains:

- Using MSMQ-MQSeries Bridge
- How MSMQ-MQSeries Bridge Works
- MSMQ-MQSeries Bridge Setup and Configuration
- MSMQ-MQSeries Bridge Manager
- Controlling MSMQ-MQSeries Bridge

Using MSMQ-MQSeries Bridge

The topics in this section describe the procedures for using MSMQ-MQSeries Bridge. In addition, Help buttons located on the MSMQ-MQSeries Bridge user interface are linked to help topics specific to their context.

This section contains:

- About MSMQ-MQSeries Bridge
- MSMQ-MQSeries Bridge Operation
- MSMQ-MQSeries Bridge Benefits
- Features of Message Queuing and MQSeries
- Reference Material

About MSMQ-MQSeries Bridge

MSMQ-MQSeries Bridge is an external gateway between two otherwise incompatible message queuing systems. MSMQ-MQSeries Bridge provides a seamless interface between Message Queuing (also known as MSMQ) on computers running Microsoft® Windows Server™ 2003 or Windows® 2000 Server and IBM MQSeries running on mainframes and other systems.

See Also

Using MSMQ-MQSeries Bridge

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MSMQ-MQSeries Bridge Operation

MSMQ-MQSeries Bridge is an interface between Message Queuing and MQSeries, so that you can send messages between Message Queuing applications and MQSeries queues.

MSMQ-MQSeries Bridge operates entirely in the background. In the MSMQ to MQSeries direction, an Message Queuing application can send a message to an MQSeries queue by a standard MQSendMessage() application programming interface (API) call or ActiveX® control.

An MQSeries application can receive the message from the MQSeries queue by a standard MQGET() API call. In the MQSeries to MSMQ direction, the opposite relations apply. Neither application needs to be aware that the message has crossed between environments.

The MSMQ-MQSeries Bridge interface extends the features of Message Queuing and MQSeries across the combined environment. MSMQ-MQSeries Bridge fully supports connectionless, asynchronous messaging.

Using MSMQ-MQSeries Bridge, you can route messages to each messaging system even if the two systems are not connected to the network at the same time.

See Also

Using MSMQ-MQSeries Bridge

MSMQ-MQSeries Bridge Benefits

Using MSMQ-MQSeries Bridge, your applications can send messages between IBM MQSeries and Message Queuing easily and efficiently. MSMQ-MQSeries Bridge extends connectionless, store-and-forward messaging across messaging systems and computing platforms throughout your network.

MSMQ-MQSeries Bridge offers:

Compatibility

Each messaging system sends and receives data in its native format. MSMQ-MQSeries Bridge converts the message formats automatically between the systems.

Adaptability

Your applications can send messages using standard Message Queuing or MQSeries API calls. You do not need to recode existing applications to use MSMQ-MQSeries Bridge.

Reliability

MSMQ-MQSeries Bridge supports transactions and deliver-once features, ensuring that messages are properly delivered following recovery from a system failure.

Performance

You can customize MSMQ-MQSeries Bridge for optimal performance in your network environment.

Management

Using MSMQ-MQSeries Bridge Manager, you can configure and manage all MSMQ-MQSeries Bridge computers in your enterprise network from a central location.

See Also

Using MSMQ-MQSeries Bridge

Features of Message Queuing and MQSeries

The Message Queuing and MQSeries message queuing systems offer the following features:

Connectionless, asynchronous messaging
The communicating applications do not need to log on to the remote system or establish a session with each other. The computers on which the applications run do not need to be connected at the instant when messages are written or read. Applications can continue running without waiting for transmission to be completed.

Guaranteed delivery and deliver once
Message Queuing and MQSeries provide mechanisms by which an application can guarantee and confirm that messages are delivered, and prevent duplicate delivery.

Message prioritization
A sending application can specify the order in which the receiving application will get the messages.

User-defined message structure
The message body may contain a single byte (or no message contents at all), a text string, or a long and complex data structure. The message body may be structured or encrypted in any syntax that the communicating applications understand.

Transaction support
Send-message or receive-message operations can participate in a transaction, and can be coordinated with other operations such as database updates. The entire transaction is canceled and rolled back if any of the operations fail.

Application programming interface (API)
MSMQ and MQSeries operate on the Application Layer of the ISO Reference Model for Open System Interconnection. They act as a simple interface between an application program and the network, freeing the application programmer from concern about network or communication details.

See Also

Using MSMQ-MQSeries Bridge

Reference Material

Before installing or programming MSMQ-MQSeries Bridge, you should be familiar with the principles of message queuing and with at least one message queuing environment (Message Queuing or MQSeries).

For background information, refer to the *Host Integration Server 2004 Programmer's Guide*, Message Queuing documentation, and the IBM MQSeries documentation.

See Also

Using MSMQ-MQSeries Bridge

How MSMQ-MQSeries Bridge Works

The following topics detail how MSMQ-MQSeries Bridge works.

This section contains:

- MSMQ-MQSeries Bridge Concepts
- Message Queuing Concepts
- Message Fields or Properties
- Sending and Receiving Messages
- System Components
- Message Conversion
- Network Architecture
- Multiple Connections
- Sending Messages From Message Queuing to MQSeries
- Sending Messages From MQSeries to Message Queuing
- Transactional and Nontransactional Message Pipes

MSMQ-MQSeries Bridge Concepts

With MSMQ-MQSeries Bridge, Message Queuing (also known as MSMQ) and MQSeries applications can send messages to each other, between the message queuing systems.

MSMQ-MQSeries Bridge achieves this by mapping the messages and the data fields of the sending system and the values associated with those fields, to the fields and values of the receiving environment.

After the mapping and conversion, MSMQ-MQSeries Bridge completes the process by routing the message across the combined Message Queuing and MQSeries networks.

See Also

How MSMQ-MQSeries Bridge Works

Message Queuing Concepts

Message queuing enables programs to share data across a network without necessarily having a synchronized connection linking the sending and receiving applications at the same instant. The programs do this by putting the data, or message, on a message queue, which is then retrieved by the receiving application.

Two basic concepts of both Message Queuing and MQSeries are message and message queue:

Message
A message is a set of data that needs to be transmitted from one application to another application, on the same or a different computer in a network.

Message queue
A message queue is the location where messages are stored, which can be written and read by applications.

See Also

How MSMQ-MQSeries Bridge Works

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Message Fields or Properties

A message may contain one or more fields, such as the message buffer or body, label, priority, or sender ID. The following applies to fields or properties:

- In MQSeries, the fields are members of a fixed data structure.
- In Message Queuing, the fields are known as properties. A message can contain any number of properties (even zero). In practice, an application assembles a message from one or more properties in a dynamic data structure.

See Also

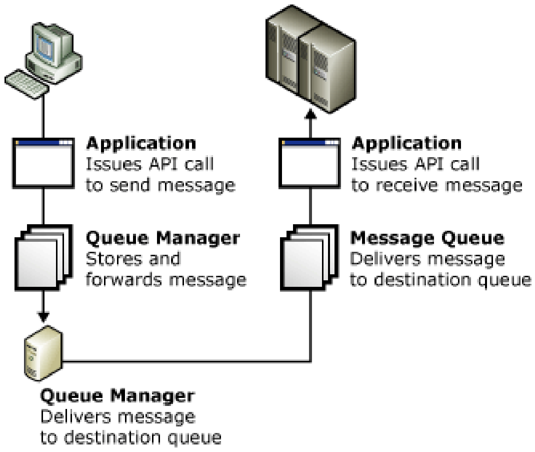
How MSMQ-MQSeries Bridge Works

Sending and Receiving Messages

To create a message, an application specifies the message fields or properties and supplies the field values. The application then issues a Message Queuing or MQSeries API call to send the message.

The Message Queuing or MQSeries Queue Manager (server) transmits the message to the destination message queue. If the destination location is not connected to the network when the message is sent, the message queuing system stores the message at an interim location. The system forwards the message automatically when a connection is established.

To receive a message, an application issues an API call that reads the message from the queue.


Application
Issues API call
to send message
Queue Manager
Stores and
forwards message
Queue Manager
Delivers message
to destination queue
Application
Issues API call
to receive message
Message Queue
Delivers message
to destination queue

See Also

How MSMQ-MQSeries Bridge Works

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

System Components

The MSMQ-MQSeries Bridge system can contain two main components:

MSMQ-MQSeries Bridge
Converts and transmits messages between the Message Queuing and MQSeries environments.

MSMQ-MQSeries Bridge Manager
Configures, monitors, and controls the messaging traffic through MSMQ-MQSeries Bridge.

See Also

How MSMQ-MQSeries Bridge Works

Message Conversion

MSMQ-MQSeries Bridge maps the fields or properties of a message to the corresponding fields or properties of the destination message queuing system. For example, if you send a message from MQSeries to Message Queuing, MSMQ-MQSeries Bridge analyzes the fields of the MQSeries message and maps each value to its Message Queuing counterpart. In cases where one system needs an additional field that does not exist in the other, MSMQ-MQSeries Bridge provides the field during the conversion process.

For example, if a Message Queuing message includes the PROPID_M_TIME_TO_BE_RECEIVED property with a specific value, MSMQ-MQSeries Bridge maps this property to the MQSeries MQMD.Expiry property and multiplies the value by 10 to change the units from seconds to tenths of seconds.

MSMQ-MQSeries Bridge does not restrict the content of a message. The message body may contain its own internal structure, which is recognized only by the sending and receiving applications and is not interpreted in any way by MSMQ-MQSeries Bridge.

For detailed information about how MSMQ-MQSeries Bridge maps and converts properties from Message Queuing to MQSeries and from MQSeries to Message Queuing, see the *Host Integration Server Programmer's Guide*.

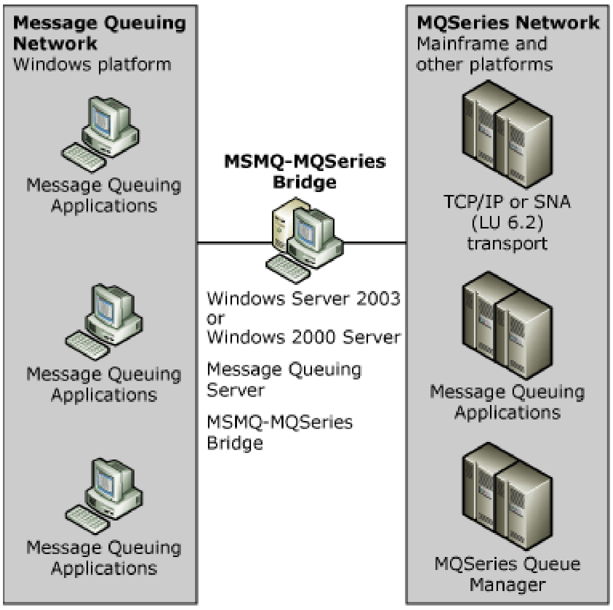
See Also

How MSMQ-MQSeries Bridge Works

Network Architecture

MSMQ-MQSeries Bridge is used in conjunction with Message Queuing and MQSeries networks. MSMQ-MQSeries Bridge is a Message Queuing Connector application.

MSMQ-MQSeries Bridge is installed on a Microsoft® Windows Server™ 2003, Enterprise Edition or Windows® 2000 Server Enterprise Edition system that serves as a connection point between the networks. A Message Queuing routing server must be installed on the same computer as MSMQ-MQSeries Bridge, and the computer must be connected by a TCP/IP or LU 6.2 link to an MQSeries Queue Manager.


Message Queuing Network
Windows platform
Message Queuing Applications
Message Queuing Applications
Message Queuing Applications
MSMQ-MQSeries Bridge
Windows Server 2003 or Windows 2000 Server
Message Queuing Server
MSMQ-MQSeries Bridge
MQSeries Network
Mainframe and other platforms
TCP/IP or SNA (LU 6.2) transport
Message Queuing Applications
MQSeries Queue Manager

See Also

How MSMQ-MQSeries Bridge Works

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Multiple Connections

You can connect any number of Message Queuing or MQSeries systems or networks using MSMQ-MQSeries Bridge. For example, you can connect:

- A single MSMQ-MQSeries Bridge to several MQSeries Queue Managers
- A single MQSeries Queue Manager to several MSMQ-MQSeries Bridges
- Several MSMQ-MQSeries Bridges to several MQSeries Queue Managers

See Also

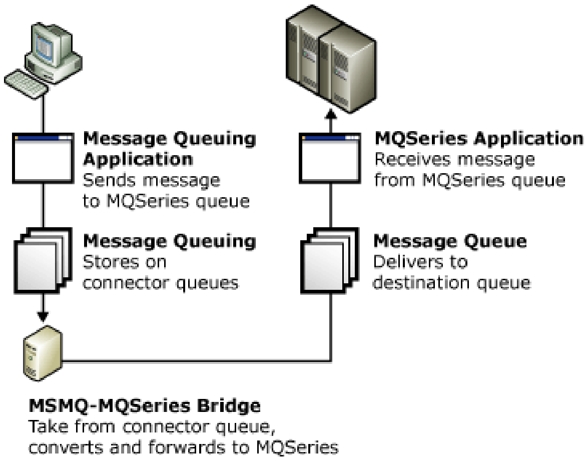
How MSMQ-MQSeries Bridge Works

Sending Messages From Message Queuing to MQSeries

To send a message from Message Queuing to MQSeries, you must define a Message Queuing foreign computer representing the MQSeries Queue Manager, and the MQSeries destination queue must already exist. If this is not the case, see Installing and Configuring MSMQ-MQSeries Bridge.

The messaging process is as follows:

- A Message Queuing application issues a Message Queuing MQCreateQueue() API call to create a foreign queue, located on the foreign computer and representing the MQSeries destination queue. Alternatively, you can create the foreign queue using Message Queuing, and in Windows Server 2003 or Windows 2000 the foreign queue is a part of Users and Computers.
- The application calls MQOpenQueue() to open the foreign queue.
- The application calls MQSendMessage() to send a message to the foreign queue. Message Queuing routes the message and stores it temporarily on a Message Queuing connector queue.


Message Queuing Application
Sends message to MQSeries queue
Message Queuing
Stores on connector queues
MSMQ-MQSeries Bridge
Take from connector queue, converts and forwards to MQSeries
Message Queue
Delivers to destination queue
MQSeries Application
Receives message from MQSeries queue

- MSMQ-MQSeries Bridge takes the message from the connector queue and converts the message properties to the MQSeries message structure. MSMQ-MQSeries Bridge routes the message to the MQSeries destination queue.
- An MQSeries application issues an MQSeries MQGET() API call to receive the message from the MQSeries queue.

Message Queuing processes the message from the initial MQSendMessage() call until it is placed on the connector queue. MSMQ-MQSeries Bridge converts and transmits the message to MQSeries, which handles the transmission from that point on.

See Also

How MSMQ-MQSeries Bridge Works

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

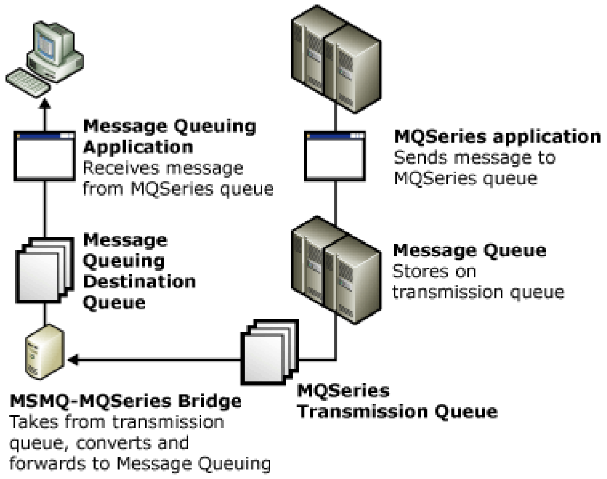
Sending Messages From MQSeries to Message Queuing

The path for sending a message from MQSeries to Message Queuing is essentially the inverse of Message Queuing to MQSeries, with a few differences. You must define appropriate MQSeries aliases, transmission queues, and channels for the Message Queuing destination queue or the Message Queuing server, and the Message Queuing destination queue must already exist.

For additional information, see Typical Configuration.

The messaging steps are as follows:

- An MQSeries application issues an MQOPEN() API call for a remote queue representing the Message Queuing destination queue.
- The MQSeries application calls MQPUT() to send a message to the remote queue. MQSeries transmits the message and stores it temporarily on an MQSeries transmission queue located at the MQSeries Queue Manager.
- MSMQ-MQSeries Bridge takes the message from the transmission queue and converts the message structure to Message Queuing message properties. MSMQ-MQSeries Bridge transmits the message to the Message Queuing destination queue.
- A Message Queuing application issues a Message Queuing MQReceiveMessage() API call to receive the message from the Message Queuing queue.


Message Queuing Application
Receives message from MQSeries queue
MQSeries application
Sends message to MQSeries queue
Message Queuing Destination Queue
Message Queue
Stores on transmission queue
MSMQ-MQSeries Bridge
Takes from transmission queue, converts and forwards to Message Queuing
MQSeries Transmission Queue

See Also

How MSMQ-MQSeries Bridge Works

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Transactional and Nontransactional Message Pipes

Using MSMQ-MQSeries Bridge, you can send messages through transactional or nontransactional message pipes.

If you send a message by a transactional message pipe, MSMQ-MQSeries Bridge supports the deliver-once feature of Message Queuing and MQSeries. This feature ensures that each message is delivered exactly once to the receiving application, but entails some overhead.

Choosing a nontransactional message pipe may improve performance, but a message may be delivered more than once in the event of a system failure during transmission.

Message Queuing messages in the foreign transactional queue will go through transactional message pipes, while Message Queuing messages in the foreign nontransactional queue will go through the nontransactional message pipes.

In the MQSeries to Message Queuing direction, you can send a message by transactional or nontransactional message pipe by specifying the appropriate remote queue manager alias as follows:

"**BRIDGEQMNAME**" refers to transactional message pipe.

"**BRIDGEQMNAME%**" refers to nontransactional message pipe.

In the Message Queuing to MQSeries direction, MSMQ-MQSeries Bridge sends transacted messages by normal service and untransacted messages by high service. In the MQSeries to Message Queuing direction, you can send a message by normal or high service by specifying an appropriate alias as the remote queue manager address.

See Also

How MSMQ-MQSeries Bridge Works

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MSMQ-MQSeries Bridge Setup and Configuration

The following sections detail the setup and configuration of MSMQ-MQSeries Bridge.

After installing, you must configure the Message Queuing (also known as MSMQ), MQSeries, and MSMQ-MQSeries Bridge systems.

The configuration process is equivalent to building a bridge, enabling MSMQ-MQSeries Bridge to transfer messages.

This section contains:

- MSMQ-MQSeries Bridge Setup Requirements
- MSMQ-MQSeries Bridge Prerequisites
- MSMQ-MQSeries Bridge Properties
- Choose Names for Message Queuing and MQSeries Entities
- Installing and Configuring MSMQ-MQSeries Bridge
- Test the Installation
- Typical Configuration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MSMQ-MQSeries Bridge Setup Requirements

The following information details the steps required to set up MSMQ-MQSeries Bridge. The installation process is straightforward, but rolling out a full installation may take some time in a complex network configuration.

This section helps you get started quickly and presents a step-by-step procedure for an initial MSMQ-MQSeries Bridge configuration.

This section contains:

- Minimal Configuration
- Where You Should Work
- Gather Required Information

Minimal Configuration

The minimal configuration enables MSMQ and MQSeries applications to communicate with one another, so the benefits of MSMQ-MQSeries Bridge are immediate. The minimal configuration requirements are:

- One installation of MSMQ-MQSeries Bridge on a computer running Windows Server 2003 or Windows 2000 Server.
- One installation of Message Queuing on the same computer as MSMQ-MQSeries Bridge. (Message Queuing with routing in Windows Server 2003 or Windows 2000 Server.)
- One installation of MQSeries Queue Manager on any supported platform.

See Also

MSMQ-MQSeries Bridge Setup Requirements

Where You Should Work

To install MSMQ-MQSeries Bridge, you must work on two computers:

- The Message Queuing and MSMQ-MQSeries Bridge computer.
- The MQSeries computer, where the MQSeries Queue Manager is installed.

There are several steps and data transfers that must be performed on each computer.

See Also

MSMQ-MQSeries Bridge Setup Requirements

Gather Required Information

Before you proceed, write down the following information. You will need this information later in the configuration process.

The following worksheet should be used to record needed installation information.

Required information	Your value
Computer name (example: `MSBRIDGE1`).	
Directory in which the MQSeries Client for Windows Server 2003, Windows 2000, or Windows NT® is installed (example: `c:\MQCLIENT`).	

Information about the MQSeries computer

Required information	Your value
Connection information • For TCP/IP, the computer name or IP address (example: `IBMNT`) and the port number (example: `1414`). • For SNA, the LU 6.2 Side Information Record (CPI-C Symbolic Destination Name).	
Name of the MQSeries Queue Manager (example: `IBMNT`).	

Note Write all MQSeries names in uppercase (for example, MSBRIDGE1, and not Msbridge1`)`.

See Also

MSMQ-MQSeries Bridge Setup Requirements

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MSMQ-MQSeries Bridge Prerequisites

For information about MSMQ-MQSeries Bridge prerequisites, see the following topics.

This section contains:

- MSMQ-MQSeries Bridge Platforms
- Prerequisites for Computers Running Windows Server 2003 or Windows 2000
- Prerequisites for MQSeries Computers

MSMQ-MQSeries Bridge Platforms

The Server can be installed on any computer running Windows Server 2003 or Windows 2000 Server.

The Administrator Client can be installed on the following platforms: Windows Server 2003, Windows 2000 Professional, or Windows 2000 Server with Terminal Services installed.

See Also

MSMQ-MQSeries Bridge Prerequisites

Prerequisites for Computers Running Windows Server 2003 or Windows 2000

The following software should already be installed on the computer where you will install MSMQ-MQSeries Bridge Server or Administrator Client:

Server Prerequisites

- Windows Server 2003 or Windows 2000 Server
- Message Queuing server (not in a workgroup) with routing enabled
- IBM MQSeries Client for Windows NT or IBM MQSeries for Windows NT (with server and client installed)
- TCP/IP or SNA (LU 6.2) link to an MQSeries Queue Manager (QM)

Administrator Client Prerequisites

- Windows Server 2003, Windows 2000 Professional, or Windows 2000 Server with Terminal Services
- Message Queuing set up (not in a workgroup)

See Also

MSMQ-MQSeries Bridge Prerequisites

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Prerequisites for MQSeries Computers

The following applies to MQSeries computers:

- For OS/390 systems, be sure that your MQSeries Queue Manager is configured with the Client Attachment feature. For additional information, refer to the IBM MQSeries documentation.

See Also

MSMQ-MQSeries Bridge Prerequisites

MSMQ-MQSeries Bridge Properties

For information about MSMQ-MQSeries Bridge properties, see the following topics. This section contains:

- Before Adding a Connected Network
- Adding a Connected Network
- Deleting a Connected Network
- Setting Connected Network Properties
- Setting Message Pipe Properties

See Also

General Tab

Advanced Tab

MQI Channels Tab

General Tab - CN

General Tab - Message Pipe

Batch Tab

Cache Tab

Retry Tab

Before Adding a Connected Network

Before you can add a connected network (CN) to an MSMQ-MQSeries Bridge, you should:

- Define the CN in Message Queuing and associate the MSMQ-MQSeries Bridge computer with the CN.
- Open MSMQ-MQSeries Bridge Manager.

See Also

MSMQ-MQSeries Bridge Properties

Adding a Connected Network

To add a connected network (CN), right-click the MSMQ-MQSeries Bridge computer to which the CN is connected. Select **New CN** from the pop-up menu, and select the CN name from the list.

Along with the new CN, the following four message pipes are added to the console tree.

Message pipe	**Description**
MSMQ->MQS Transactional	Message Queuing to MQSeries transactional message.
MSMQ->MQS Nontransactional	Message Queuing to MQSeries nontransactional message.
MQS->MSMQ Transactional	MQSeries to Message Queuing transactional message.
MQS->MSMQ Nontransactional	MQSeries to Message Queuing nontransactional message.

Right-click the new CN and each message pipe to set their properties.

See Also

MSMQ-MQSeries Bridge Properties

Deleting a Connected Network

To delete a connected network (CN), right-click the CN and select **Delete** from the pop-up menu.

See Also

MSMQ-MQSeries Bridge Properties

Setting Connected Network Properties

To set the properties of a connected network (CN), right-click the CN icon in **MSMQ-MQSeries Bridge Manager**, and choose the **Properties** option.

Icon	Description
🖧	Icon for a CN

See Also

MSMQ-MQSeries Bridge Properties

Setting Message Pipe Properties

To set the properties of a message pipe, right-click its icon in MSMQ-MQSeries Bridge Manager, and choose the **Properties** option.

The following are icons for message pipes.

Icon	Description
⏹	Stopped
⏸	Paused
⌛	Pending
🕒	Recovering
▶	Running
✖	Error

See Also

MSMQ-MQSeries Bridge Properties

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Choose Names for Message Queuing and MQSeries Entities

You need to choose names for certain Message Queuing and MQSeries entities that you will define during the configuration process. For reference as you proceed with the configuration process, write the names on the worksheets.

> **Note** The names are identical to or derived from other names that you already recorded. This naming system is recommended because it helps you maintain your system easily.
>
> For additional information about naming for Message Queuing and MQSeries Entities, see the following topics. This section contains:

- Message Queuing Names
- MQSeries Names

Message Queuing Names

Use this worksheet for Message Queuing names.

Required information	Your value
Name of a connected network or foreign site (example: `IBMNT_CN`).	
Name of the Queue Manager on the foreign computer (example: `IBMQM`).	
Name of a foreign queue (example: `IBM.NT.QUEUE`).	
Name of a Message Queuing queue to which you will send test messages (example: `MSBRDIGE1.QUEUE`).	

See Also

MQSeries Names

MQSeries Names

Use this worksheet for MQSeries names.

Required information	Your value
MQI channel name (example: `IBMNT_CN`).	
Transmission queue name for normal service (example: `MSBRIDGE1.XMITQ`).	
Transmission queue name for high service (example: `MSBRIDGE1.XMITQ.HIGH`).	
Name of an MQSeries queue to which you will send test messages (example: `IBM.NT.QUEUE`).	

See Also

Message Queuing Names

Installing and Configuring MSMQ-MQSeries Bridge

The following topics detail how to configure MSMQ-MQSeries Bridge components:

Installing the software

- Install the MSMQ-MQSeries Bridge Software
- Transport Considerations

Configuring MSMQ-MQSeries Bridge on Windows Server 2003 or Windows 2000

- Configuring MSMQ-MQSeries Bridge on Windows Server 2003 or Windows 2000

Configuring Message Queuing 2.0 on Windows Server 2003 or Windows 2000

- Define a Foreign Site in Windows Server 2003 or Windows 2000
- Add a Foreign Computer Representing MQSeries in Windows Server 2003 or Windows 2000
- Set the Foreign Site Permission in Windows Server 2003 or Windows 2000
- Create a Foreign Queue in Windows Server 2003 or Windows 2000

Configuring MSMQ-MQSeries Bridge Manager

- Add the Connected Network
- Disable the Message Pipes
- Export an MQSeries Server Definition File
- Export an MQSeries Client Definition File

Configuring MQSeries

- Run the MQSeries Server Definition File
- Run the MQSeries Client Definition File
- Configure the MQSeries Client

Install the MSMQ-MQSeries Bridge Software

The procedure for installing the MSMQ-MQSeries Bridge software is the same whether you are installing the Server or the Administrator Client.

Choosing Server installs MSMQ-MQSeries Bridge and MSMQ-MQSeries Bridge Manager. Choosing Administrator Client installs only MSMQ-MQSeries Bridge Manager.

To install MSMQ-MQSeries Bridge

1. Insert the Host Integration Server 2004 CD-ROM.
2. From the Host Integration Server 2004 startup page, click **Install Server** or **Install Administrator Client** and follow the directions on the screen.
3. When the setup is complete, you can optionally view the **Readme** file and launch MSMQ-MQSeries Bridge Manager. Click **Finish** to complete the installation.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

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Transport Considerations

When the TCP/IP protocol is used between the MQSeries Client and MQSeries Queue Manager, check the **Keep Alive** and **Keep Alive Time** settings in the MQSeries Queue Manager initialization file (Qm.ini). **Keep Alive** should be set to **YES** and the **Keep Alive Time** should be no more than half the message pipes retry delay. This enables the MQSeries Listener to release the resources of a broken connection before MSMQ-MQSeries Bridge retries the connection.

The message pipes retry delay can be found by right-clicking a message pipe in MSMQ-MQSeries Bridge Manager. Select **Properties**, and then select the **Cache** tab.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

Configuring MSMQ-MQSeries Bridge on Windows Server 2003 or Windows 2000

Configuring MSMQ-MQSeries Bridge on Windows Server 2003 or Windows 2000 is a three-stage process requiring Message Queuing 2.0 or later, MSMQ-MQSeries Bridge, and MQSeries to be configured in that order. Configuring Message Queuing on Windows Server 2003 (Message Queuing 3.0) or Windows 2000 (Message Queuing 2.0) is the only stage that is different from that described for configuring MSMQ-MQSeries Bridge on Windows NT 4.0.

Message Queuing and MSMQ-MQSeries Bridge

Message Queuing is built into Windows Server 2003 and Windows 2000 and offers the following additional functionality:

- Integration with the Microsoft Active Directory® directory service, removing the need to use a separate SQL Server™ computer to maintain the MQIS.
- Mixed-mode operation, enabling Message Queuing 1.0 and Message Queuing 2.0 (or later) environments to coexist together.
- Performance improvements, particularly in the area of transactions.
- Workgroup Mode, enabling computers running Windows Server 2003 or Windows 2000 to use Message Queuing without the need for Active Directory.

MSMQ-MQSeries Bridge is capable of running on Windows Server 2003 or Windows 2000. MSMQ-MQSeries Bridge can be installed on any of the computers running Windows Server 2003 or Windows 2000.

To use MSMQ-MQSeries Bridge on Windows Server 2003 or Windows 2000, install:

- Windows Server 2003 or Windows 2000 Server.
- Message Queuing server (not in a workgroup) with routing enabled.
- IBM MQSeries (now WebSphere MQ) Client for Windows NT, Version 5.3, or IBM MQSeries (now WebSphere MQ) for Windows NT, version 5.3 (both Server and Client).
- MSMQ-MQSeries Bridge (from Host Integration Server 2004).

There are some changes in Message Queuing 2.0 and above that are relevant to MSMQ-MQSeries Bridge. These are:

- Foreign Connected Network has been replaced with the term Foreign Site. This is in keeping with Active Directory terminology. Therefore, in Windows Server 2003 or Windows 2000 a CN refers to a foreign site.
- The Message Queuing COM API has changed. Many more of the Message Queuing message properties are now exposed through the Message Queuing COM API. In particular, the extension property (PROPID_M_EXTENSION) is now accessible from Visual Basic®, making it easier to override MSMQ-MQSeries Bridge conversions.
- Creating foreign sites and foreign computers is achieved using Active Directory Sites and Services.

Configuring Message Queuing on Windows Server 2003 or Windows 2000

This section assumes that Message Queuing has been installed (with routing enabled) on a computer running Windows Server 2003 or Windows 2000 on which you plan to install MSMQ-MQSeries Bridge. Using Active Directory Users and Computers, it should be possible to see the Message Queuing object:

Domain Controllers

Computer Name (Your computer name)

Message Queuing

If this is not the case, check that the view is set to Advanced Features. If the Message Queuing object still does not appear, Message Queuing is not installed. Check the Windows Server 2003 or Windows 2000 Message Queuing Help to ensure the Message Queuing prerequisites are met before installing Message Queuing.

From **Control Panel**, select **Add Remove Components** and install the **Message Queuing Services**. During the installation of Message Queuing, ensure that you select **Enable Routing**. This will enable you to define a foreign site (foreign connected network) and define routing links to the foreign site, which are required to set up an MSMQ-MQSeries Bridge.

Active Directory is used to configure Message Queuing for use with MSMQ-MQSeries Bridge. This requires permissions to make changes to Active Directory. For example, when creating a routing link, the default is that only users of the Enterprise

Administrators group can make these changes. Check to ensure you have the appropriate permissions to make the required Active Directory changes before commencing Message Queuing configuration.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

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Define a Foreign Site in Windows Server 2003 or Windows 2000

Use the following procedure to define a foreign site in Windows Server 2003 or Windows 2000.

1. From **Active Directory Sites and Services**, select **View**, and then select **Show Services Node**.
2. Under **Services**, right-click **MsmqServices** and select **New Foreign Site**.
3. Enter the name for the foreign site. This is the name of the Foreign Connected Network in Message Queuing 1.0. The same naming conventions apply to the foreign site name as to the Foreign Connected Network name for Message Queuing 1.0.
4. Click **OK**.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

Add a Foreign Computer Representing MQSeries in Windows Server 2003 or Windows 2000

Use the following procedure to add a foreign computer representing MQSeries in Windows 2003 Server or Windows 2000.

1. From **Active Directory Sites and Services**, select **View**, and then select **Show Services Node**.
2. Under **Services**, right-click **MsmqServices** and select **New Foreign Computer**.
3. Enter the **Name** for the Foreign Computer. This name must be the same as that of the MQSeries Queue Manager.

   Note Windows Server 2003 and Windows 2000 do not allow the dot (.) character in computer names. If your MQSeries Queue Manager name contains a dot, you can replace it with a dash (-) and MSMQ-MQSeries Bridge will map the dash back to a dot when routing the message to its MQSeries destination.

4. Select the name for the **Site**, and click **OK**. This is the name of the foreign site that was just created.
5. Click **OK**.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

Set the Foreign Site Permission in Windows Server 2003 or Windows 2000

Use the following procedure to modify the permissions for the foreign site.

1. From **Active Directory Sites and Services**, expand the **Sites** folder, and select the foreign site created earlier.
2. Right-click the foreign site, and then select **Properties**.
3. Select the **Security** tab, and select **Everyone**. If MSMQ-MQSeries Bridge was installed using a local account, enable **Open Connector Queue**. Otherwise, select the account name used during setup.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

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Create a Foreign Queue in Windows Server 2003 or Windows 2000

Use the following four procedures to create a foreign queue.

Define the MQSeries Queues

Use the following procedure to define the MQSeries queues.

1. From **Active Directory Users and Computers**, select **View**, select **Advanced Features**, select **View**, and then select **Users, Groups and Computers As Containers**.
2. Expand the **Computers** folder and select the foreign computer that was previously created.
3. Right-click the Message Queuing object, select **New**, and then select **MSMQ Queue**.
4. Type the name for the queue and click **OK**. The name must be the same as that of the MQSeries Queue.
5. Or, if you want to create a queue to accept transactional messages, type a name, select the **Transactional** check box, and then click **OK**.

Create a Routing Link

A routing link is required to enable Message Queuing 2.0 to route messages between the current Windows Server 2003 or Windows 2000 site and the newly created Foreign Site that is used for MQSeries. Use the following procedure to create a routing link.

1. From **Active Directory Sites and Services**, select **View**, and then select **Show Services Node** (if not already selected).
2. Under **Services**, right-click **MsmqServices**, select **New**, and then select **MSMQ Routing Link**.
3. Set Site 1 to the name of the foreign site that was previously created. Set Site 2 to the name of the current Windows Server 2003 or Windows 2000 site.
4. Set the **Routing link cost** at 1 and then click **OK**. Using a value greater than 1 is only relevant when multiple routing links are defined between sites, and you want to enforce one route over another. Do not set this value to zero, because it will cause routing of Message Queuing messages to the foreign site to fail.

Define a Site Gate

A site gate is an Message Queuing server that is configured to route messages between sites on behalf of other clients. The Message Queuing server that will be defined as the site gate is the computer that will run MSMQ-MQSeries Bridge. This site gate will use the routing link that was just created. Use the following procedure to define a site gate.

1. From **Active Directory Sites and Services**, select **View**, and then select **Show Services Node** (if not already selected).
2. Under **Services**, right-click **MsmqServices**. The routing link that was previously created should appear in the right pane window.
3. **Right-click** the routing link, and select **Properties**.
4. Select the **Site Gates** tab. In **Site Servers**, select the name of the computer that will run MSMQ-MQSeries Bridge, and then click **Add**.
5. Click **OK**.

Add the Message Queuing Server to the Foreign Site

The Message Queuing server, which is the same computer running Windows Server 2003 or Windows 2000 as MSMQ-MQSeries Bridge, needs to be added to the foreign site created earlier.

1. From **Active Directory Users and Computers**, select **View**, select **Advanced Features**, select **View**, and then select **Users, Groups and Computers as containers**.
2. Expand the Domain Controllers or Computers/<*Your server name*>/MSMQ folder.
3. Right-click the **Message Queuing** object, and select **Properties**.
4. Select the **Sites** tab.
5. Select the foreign site created earlier, and then click **Add** to add this server to the foreign site.
6. Click **OK**.

On the computer running Windows Server 2003 or Windows 2000, open MSMQ-MQSeries Bridge Manager. In MSMQ-MQSeries Bridge Manager, perform the following steps.

1. Expand the **Enterprise** icon.
2. Right-click the **Microsoft MSMQ-MQSeries Bridge Service** icon, click **Stop**, and then click **OK**.
3. Right-click the **Microsoft MSMQ-MQSeries Bridge Service** icon and click **Properties**.
4. On the **MQI Channels** tab, click **Add**.
5. Enter the **Channel Name**.
6. Enter the **Queue Manager** name.
7. For **Transport Type**, select **TCP/IP** or **SNA LU6.2**
8. On the **Address** tab, if you connect by TCP/IP, specify the IP address or computer name for **Address** and the port number for **Port**. For SNA LU 6.2, specify the LU 6.2 Side Information Record.
9. Click **OK** twice. A message appears warning you about changing the MQI Channel configuration. Click **OK** to bypass this message. Click the topics that follow for more information about configuration.

    - Export an MQSeries Server Definition File
    - Export an MQSeries Client Definition File
    - Run the MQSeries Server Definition File
    - Run the MQSeries Client Definition File

See Also

Installing and Configuring MSMQ-MQSeries Bridge

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Add the Connected Network

To add the connection network (CN), right-click the **Microsoft MSMQ-MQSeries Bridge Service** icon in MSMQ-MQSeries Bridge Manager. Point to **New**, and click **CN**.

1. Select **CN** from the drop-down list box.
2. Click **OK**. The **CN Properties** window (**General** tab) appears.
3. Select the **MQSeries QM Name**.
4. For the **Reply to QM Name**, enter the name of the computer running Windows.
5. For **Startup**, select **Enabled** and click **OK**.
6. MSMQ-MQSeries Bridge Manager displays four message pipes (`MSMQ->MQS Transactional, MSMQ->MQS`, and so on).

The message pipes are auto-started by default. You can disable the auto-start option in the appropriate **Properties** page.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Disable the Message Pipes

Use the following procedure to disable the message pipes.

1. In MSMQ-MQSeries Bridge Manager, right-click the first message pipe icon, `MSMQ->MQS Transactional`, and click **Properties**.
2. On the **General** tab, select **Disabled** and click **OK**.
3. Repeat steps 1 and 2 for the second message pipe, `MSMQ->MQS`.
4. Right-click the third message pipe icon, `MQS->MSMQ Transactional`, and click **Properties**.
5. On the **General** tab, select **Disabled** and click **OK**.
6. Repeat steps 4 and 5 for the MQS->Message Queuing message pipe.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Export an MQSeries Server Definition File

Use the following procedure to export an MQSeries Server definition file.

1. Right-click the **Microsoft MSMQ-MQSeries Bridge Service** icon in MSMQ-MQSeries Bridge Manager, and click **Export Server Definitions**.
2. Enter a directory name to save the definition file (by default, C:\Program Files\Host Integration Server\MQBridge), and click **OK**. MSMQ-MQSeries Bridge Manager saves the file with an extension of .txt. If you define more than one **CN**, a definition file for each MQSeries Queue Manager is created in the directory.
3. Transfer the files to the MQSeries computer. If you use FTP to transfer the file, be sure to specify the ASCII transfer option.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

Export an MQSeries Client Definition File

Use the following procedure to export an MQSeries Client definition file.

1. Right-click the **Microsoft MSMQ-MQSeries Bridge Service** icon and click **Export Client Definitions**.
2. Enter the directory name to save the definition file (the default is C:\Program Files\Host Integration Server\MQBridge), and click **OK**.
3. MSMQ-MQSeries Bridge Manager saves the file with the name ClientDf.txt.
4. Transfer the file to the MQSeries computer. If you transfer by FTP, be sure to specify the ASCII transfer option.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

Run the MQSeries Server Definition File

On the MQSeries computer, run the MQSeries Server definition file that you transferred from MSMQ-MQSeries Bridge Manager.

1. At the command prompt, run the `MQSC` command, for example:

   ```
   >RUNMQSC IBMNT < IBMNT.TXT > SERVREPORT.OUT
   ```

   Note Substitute the MQSeries Queue Manager name for `IBMNT`.

2. The MQSeries Queue Manager is now configured. Review the Servreport.out file to be sure that the definitions ran successfully.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Run the MQSeries Client Definition File

On the MQSeries Queue Manager computer, run the MQSeries Client definition file that you transferred from MSMQ-MQSeries Bridge Manager.

1. At the command prompt, run the MQSC command, for example:

   ```
   >RUNMQSC IBMNT < ClientDf.txt > CLIENTREPORT.OUT
   ```

2. The MQSC command creates a channel file called Amqclchl.tab, located in the directory MQMDirectory/QMGRS/<QueueManagerName>/@IPCC (the exact location may differ on various platforms).
3. Review the Clientreport.out file to be sure that the definitions ran successfully.
4. Transfer the Amqclchl.tab file to the MQSeries Client directory on the Windows computer. If you transfer by FTP, be sure to specify the Binary transfer option.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure the MQSeries Client

To complete the MQSeries configuration, return to the computer running Windows where MSMQ-MQSeries Bridge is installed.

1. On the computer running Windows Server 2003 or Windows 2000, right-click the **My Computer** icon from your desktop, click **Properties**, select the **Advanced** tab, and then click **Environment Variable**.
2. Verify the following variables are in the **System Variables**. If not, set them correctly.

   MQCHLLIB should be the directory path of the channel file (by default, the MQSeries Client directory).

   MQCHLTAB should be the file name of the channel file (by default, Amqclchl.tab).

3. Check that the environment variable MQSERVER is not defined.
4. Click **OK**.

See Also

Installing and Configuring MSMQ-MQSeries Bridge

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Test the Installation

You can use the test programs provided in the server installation to test the MSMQ-MQSeries Bridge operation. By default, the test programs are installed to C:\Program Files\Host Integration Server\system.

For additional information about testing the MSMQ-MQSeries Bridge configuration, see the following topics. This section contains:

- Create the Test Queues
- Test the MQSeries Client Definitions
- Start MSMQ-MQSeries Bridge
- Send Test Messages from Message Queuing to MQSeries
- Send Test Messages from MQSeries to Message Queuing

Create the Test Queues

Create a Message Queuing and an MQSeries queue to receive the test messages. Alternatively, you can use queues that already exist on the computers running Windows and MQSeries.

To create a new Message Queuing queue on Windows Server 2003 or Windows 2000, see
Create a Foreign Queue in Windows Server 2003 or Windows 2000.

> **Note** Use `IBMNT` for your MQSeries Queue Manager name. Use `IBM.NT.QUEUE` for the MQSeries queue name.

See Also

Test the Installation

Test the MQSeries Client Definitions

Use the following procedure to start the MQSRRECV program.

1. To start the program, open the command prompt and go to the MSMQ-MQSeries Bridge `samples` directory (by default, C:\Program Files\Host Integration Server\system).
2. Start the program by typing the following command:

   ```
   >MQSRRECV IBMNT IBM.NT.QUEUE
   ```

   Note For `IBMNT`, use the MQSeries Queue Manager name. For `IBM.NT.QUEUE`, use the MQSeries queue name.

3. If the program starts successfully, it displays the message:

   ```
   Use <CTRL-C> to stop!
   ```

If you do not receive this message, confirm the channel file steps. You can view the channel file in Windows Notepad. If the file does not exist or it contains no entries, delete the Amqclchl.tab file from the MQSeries Server and execute the channel file steps again.

If the program still fails to start, override the channel file settings by issuing the following command:

```
>SET MQSERVER=<channel name>/<transport type>/<connection name>[(<port number>)]
```

An example for TCP/IP is:

```
>SET MQSERVER=IBMNT_CN/TCP/10.10.10.5(1414)
```

An SNA example is:

```
>SET MQSERVER=IBMNT_CN/LU62/MQSCPIC
```

Where `MQSCPIC` is the side information record name (CPI-C Symbolic Destination Name).

Then try `MQSRRECV` again. If the program now starts, either the channel file was not found, or it does not contain a correct MQI channel definition. If `MQSRRECV` still does not start, check that the listener on the MQSeries computer is started for the correct port. If not, start the listener and try again.

Press CTRL+C to stop the `MQSRRECV` program.

See Also

Test the Installation

Start MSMQ-MQSeries Bridge

Open MSMQ-MQSeries Bridge Manager and then use the following procedure.

1. Right-click the **Microsoft MSMQ-MQSeries Bridge Service** icon and click **Start**.
2. In the Manager display, all four message pipes should start (the icons should have a green arrow).

If the message pipes do not start, check the event log.

The `MQS->MSMQ` message pipes may fail in the following situations:

- Another MSMQ-MQSeries Bridge computer is currently using the same transmission queue.
- Microsoft MSMQ-MQSeries Bridge is terminated abnormally, causing the MQSeries server to behave as if MSMQ-MQSeries Bridge is still using the corresponding XMIT queue. If this happens, you must restart MQSeries Queue Manager, or configure the **Keep Alive** option in your MQSeries server. (For further information, see your MQSeries documentation.)

See Also

Test the Installation

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Send Test Messages from Message Queuing to MQSeries

On the computer running Windows, perform the following procedure to send test messages.

1. Open two MS-DOS windows. Change both windows to the server installation directory (by default, C:\Program Files\Host Integration Server\System).
2. Start the MQSeries receiver program in the first window.

   ```
   >MQSRRECV IBMNT IBM.NT.QUEUE
   ```

   Note Use `IBMNT` for your MQSeries Queue Manager name. Use `IBMNT` for the MQSeries queue name.

3. In the second window, send 10 messages from Message Queuing to MQSeries:

   ```
   >MSMQSEND IBMNT\IBM.NT.QUEUE
   ```

   Note Use `IBMNT` for your foreign computer name. Use `IBMNT.QUEUE` for the MQSeries queue name.

4. If the test succeeds, the first window displays the 10 messages that it receives.
5. Stop the `MQSRRECV` program by pressing CTRL+C in the first window.

See Also

Test the Installation

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Send Test Messages from MQSeries to Message Queuing

On the computer running Windows, perform the following procedure to send test messages.

1. Open two MS-DOS windows. Go to the default installation directory (default is C:\Program Files\Host Integration Server\System).
2. In the first window, start the Message Queuing receiver program.
3. Send from MQSeries with the following command:

   ```
   >MQSRSend IBMNT MSBRIDGE1 MSBRIDGE1.QUEUE
   ```

4. Receive in Message Queuing with the following command:

   ```
   >MSMQRecv MSBRIDGE1\MSBRIDGE1.QUEUE
   ```

See Also

Test the Installation

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Typical Configuration

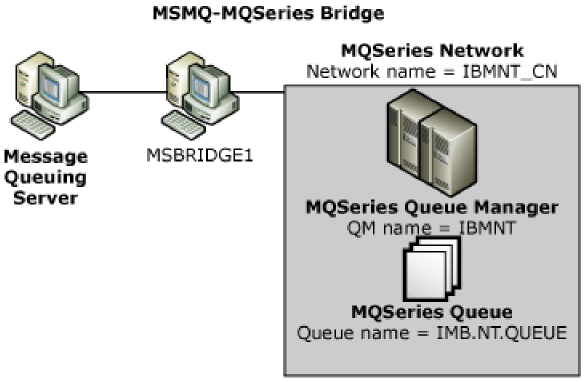
The following topics detail the configuration of MSMQ-MQSeries Bridge. This section contains:

- Diagram of a Typical Configuration
- Settings for a Typical Configuration

Diagram of a Typical Configuration

Examine the diagram for an overview of a typical configuration. The names in the diagram (such as MSBRIDGE1, IBMNT_CN, and IBMNT) are arbitrary, but you must use the same name for the same entity at different locations in the configuration.

For example, if the MSMQ-MQSeries Bridge computer is called MSBRIDGE1, you must reference this same name in MSMQ-MQSeries Bridge Manager and in MQSeries.


MSMQ-MQSeries Bridge
MQSeries Network
Network name = IBMNT_CN
Message Queuing Server
MSBRIDGE1
MQSeries Queue Manager
QM name = IBMNT
MQSeries Queue
Queue name = IMB.NT.QUEUE

See Also

Settings for a Typical Configuration

Settings for a Typical Configuration

The following tables show settings for a typical configuration.

Define in Message Queuing		
	Foreign Connected Network or Foreign Site	IBMNT_CN
	Foreign computer	IBMNT
	Foreign queue	IBM.NT.QUEUE

Define in MSMQ-MQSeries Bridge		
MSMQ-MQSeries Bridge properties	MQI channel	IBMNT_CN
	Transport type	TCP/IP or LU6.2
Foreign Connected Network or Foreign Site properties	CN name	IBMNT_CN
	MQSeries QM	IBMNT
	Reply to QM	MSBRIDGE1
Message pipe properties	MQSeries Message Queuing	Normal
	MQSeries Message Queuing	High
Transmission queue	IBM.NT_CN.XMITQ	IBMNT_CN.XMITQ.HIGH

Import or define in MQSeries		
	Transactional Service	Nontransactional Service
Transmission queue	IBMNT_CN.XMITQ	IBMNT_CN.XMITQ.HIGH
Queue manager alias	MSBRIDGE1	MSBRIDGE1%
	Model queue	Q2Q_SYNC_Q
	MQI channel	MQS_CN
	Transport type	TCP/IP or LU6.2

See Also

Diagram of a Typical Configuration

MSMQ-MQSeries Bridge Manager

For information about MSMQ-MQSeries Bridge Manager, see the following topics. This section contains:

- About MSMQ-MQSeries Bridge Manager
- MSMQ-MQSeries Bridge Manager Display
- MSMQ-MQSeries Bridge Manager Properties
- Icons for MSMQ-MQSeries Bridge Manager Objects
- Column Display Options for MSMQ-MQSeries Bridge Manager
- MSMQ-MQSeries Bridge Display
- Connected Network Display
- Message Pipe Display
- Customizing the Column Display
- Shortcut Menu of MSMQ-MQSeries Bridge Manager
- Status Bar

About MSMQ-MQSeries Bridge Manager

Using MSMQ-MQSeries Bridge Manager, you can control and monitor MSMQ-MQSeries Bridge operations. For example, you can use MSMQ-MQSeries Bridge Manager to:

- Start, stop, or pause the operation of an MSMQ-MQSeries Bridge, a CN, or a message pipe.
- Observe the quantity and type of traffic between Message Queuing and MQSeries.
- Determine how many messages are on MQSeries transmission queues or Message Queuing connector queues waiting to be transmitted.

This topic explains how to use and customize MSMQ-MQSeries Bridge Manager for these purposes.

> **Note** You can also use MSMQ-MQSeries Bridge Manager to configure your MSMQ-MQSeries Bridge system. This is an essential step in the MSMQ-MQSeries Bridge installation. For complete information, see MSMQ-MQSeries Bridge configuration.

See Also

MSMQ-MQSeries Bridge Manager

MSMQ-MQSeries Bridge Manager Display

Open MSMQ-MQSeries Bridge Manager. The MSMQ-MQSeries Bridge Manager window is divided into two panes. On the left, in the console tree, a Manager tree displays the MSMQ-MQSeries Bridge installations in your network, and message pipes. The details pane, on the right, lists detailed information about the status of an object that is selected in the tree.

See Also

MSMQ-MQSeries Bridge Manager

MSMQ-MQSeries Bridge Manager Properties

To set the properties of MSMQ-MQSeries Bridge components, right-click the **Microsoft MSMQ-MQSeries Bridge Service** icon from the left pane in MSMQ-MQSeries Bridge Manager, and select the **Properties** option.

The Properties window displays several tabs. You should set the properties on the **MQI Channels** tab before you add a connected network.

See Also

MSMQ-MQSeries Bridge Manager

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Icons for MSMQ-MQSeries Bridge Manager Objects

Within MSMQ-MQSeries Bridge Manager, different icons are used to designate items such as MSMQ-MQSeries Bridge installations, connected networks (CNs), and message pipes.

Icon	Description
	Enterprise network
	Computer (on which one or more MSMQ-MQSeries Bridge products are installed)
	MSMQ-MQSeries Bridge (running)
	MSMQ-MQSeries Bridge (stopped)
	Connected Network
	Message pipe (running)
	Message pipe (paused)
	Message pipe (pending)
	Message pipe (recovering)
	Message pipe (stopped)
	Message pipe (error)

See Also

MSMQ-MQSeries Bridge Manager

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Column Display Options for MSMQ-MQSeries Bridge Manager

The columns displayed in the details pane of MSMQ-MQSeries Bridge Manager change according to the object you have selected in the console tree. You can customize the columns that MSMQ-MQSeries Bridge Manager displays for each type of object.

> **Note** The Object Name column is always displayed.

See Also

MSMQ-MQSeries Bridge Manager

MSMQ-MQSeries Bridge Display

The following table shows the MSMQ-MQSeries Bridge Manager column name and description.

Column name	Description
MQS H Threads	Number of MQSeries to Message Queuing threads at nontransactional message pipe
MQS N Threads	Number of MQSeries to Message Queuing threads at transactional message pipe
Message Queuing H Threads	Number of Message Queuing to MQSeries threads at nontransactional message pipe
Message Queuing N Threads	Number of Message Queuing to MQSeries threads at transactional message pipe
Lifetime	Time since MSMQ-MQSeries Bridge started
Path	Computer name
Status	MSMQ-MQSeries Bridge status (running, paused, or stopped)
DLQ Depth	Number of messages on the MSMQ-MQSeries Bridge non-transacted dead letter queue
XDLQ Depth	Number of messages on the MSMQ-MQSeries Bridge transacted dead letter queue

See Also

MSMQ-MQSeries Bridge Manager

Connected Network Display

The following table shows the connected network (CN) column name and description.

Column name	Description
QM Name	Name of MQSeries Queue Manager to which the CN is connected
Startup	CN is enabled or disabled at MSMQ-MQSeries Bridge startup
Status	CN status (running, paused or stopped)

See Also

MSMQ-MQSeries Bridge Manager

Message Pipe Display

The following table shows the message pipe column name and description.

Column name	**Description**
Acc Size	Accumulated size (in bytes) of all messages transmitted since the message pipe started
Lifetime	Time since the message pipe started
Messages Sent	Total number of messages that have been sent since the message pipe started
Msgs/Sec	Messages per second (the current throughput of the pipe)
Q Depth	Queue depth (number of messages in the queue) waiting to be transmitted
Q Name	Name of the MQSeries transmission queue or Message Queuing connector queue associated with the message pipe
Retries	Number of times that MSMQ-MQSeries Bridge has tried to activate the message pipe
Startup	Whether the message pipe is enabled or disabled at MSMQ-MQSeries Bridge startup
Status	Message pipe status (running, paused, pending, recovering, stopped, or error)

See Also

MSMQ-MQSeries Bridge Manager

Customizing the Column Display

Use the following procedure to add or remove a column in the details pane of MSMQ-MQSeries Bridge Manager.

1. From the **View** menu, select **Columns**.
2. Select the tab for the type of object (**MSMQ-MQSeries Bridge**, **CN**, or **Message Pipe**).
3. To add a column to the display, select its name in the **Available Columns** list, and click **Add**.
4. To remove a column, select its name in the **Show the following** list, and click **Remove**.
5. To change the sequence of the column display, select columns in the **Show the following** list, and click the UP ARROW key or the DOWN ARROW key.
6. Click **OK**.

See Also

MSMQ-MQSeries Bridge Manager

Shortcut Menu of MSMQ-MQSeries Bridge Manager

MSMQ-MQSeries Bridge Manager offers the standard Windows Explorer menu and toolbar. In addition, you can display a shortcut menu by right-clicking:

New

Start

Stop

Refresh Cache

Pause

Resume

Delete

Export Server Definitions

Export Client Definitions

Properties

The options on the menu depend on the object and its current status.

See Also

MSMQ-MQSeries Bridge Manager

Status Bar

The status bar at the bottom of the MSMQ-MQSeries Bridge Manager window displays status and error messages. For example, the status bar displays an access denied message if an unauthorized user tries to start or stop Microsoft MSMQ-MQSeries Bridge.

See Also

MSMQ-MQSeries Bridge Manager

Controlling MSMQ-MQSeries Bridge

To control the operation of an object, right-click the object in MSMQ-MQSeries Bridge Manager, and choose the appropriate command.

Some of the commands are also available on the main Manager menu.

For additional information, see the following topics. This section contains:

- Starting, Stopping, or Pausing an Object
- Refreshing the Cache
- Configuration Backup
- Additional Information About MSMQ-MQSeries Bridge

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Starting, Stopping, or Pausing an Object

At MSMQ-MQSeries Bridge startup, the connected network (CN) and message pipes start automatically if you selected the **Startup Enabled** option in the object properties.

To change the status of an object, right-click that object in MSMQ-MQSeries Bridge Manager. Select one of the following options.

Option	Description
Stop	Stops the operation and resets the object's counters (lifetime, messages sent, and accumulated size).
Start	Starts a stopped object.
Pause	Pauses an operation, retaining the object's counters.
Resume	Resumes operation after **Pause**.

The command affects the selected object and all objects below it on the tree. For example, starting a CN starts all its **Enabled** message pipes.

See Also

Controlling MSMQ-MQSeries Bridge

Refreshing the Cache

Occasionally, you may want to refresh the MSMQ-MQSeries Bridge cache memory. For example, you can do this to close queues needed by other applications.

In MSMQ-MQSeries Bridge Manager, right-click a Microsoft MSMQ-MQSeries Bridge service or message pipe, and choose the **Refresh Cache** option.

See Also

Controlling MSMQ-MQSeries Bridge

Configuration Backup

MSMQ-MQSeries Bridge stores the MQSeries configuration and the MSMQ-MQSeries Bridge configuration in the registry. You can back up those configurations by using Regedit.exe provided in your Windows Server 2003, Windows 2000, or Windows NT system.

The registry location depends on whether you are running Windows NT in a cluster or non-cluster environment, as follows.

MSMQ-MQ Series configuration	**Registry key to backup**
Non-cluster environment	HKLM\Software\Microsoft\MQBridge\Server
Cluster environment	HKLM\Cluster\Software\Microsoft\MQBridge\Server

See Also

Controlling MSMQ-MQSeries Bridge

Additional Information About MSMQ-MQSeries Bridge

The following topics provide additional information about MSMQ-MQSeries Bridge. This section contains:

- Use of the Dash (-) in Message Queuing Computer Names
- Use of the Dot (.) in a Remote MQSeries Queue Manager Name on Windows Server 2003 or Windows 2000
- MSMQ-MQSeries Bridge Dead Letter Queue
- Notes on the Current Release of MSMQ-MQSeries Bridge
- Terminology Used in MSMQ-MQSeries Bridge

Use of the Dash (-) in Message Queuing Computer Names

If a Message Queuing computer name contains the dash (-) character, IBM MQSeries will not be able to address it as a remote queue manager because IBM MQSeries does not support queue manager names with dashes.

MSMQ-MQSeries Bridge provides a feature to resolve this problem through name replacement. In IBM MQSeries, you can refer to the remote queue manager name with a dot (.) instead of a dash, and when the message arrives, MSMQ-MQSeries Bridge changes the dot back to a dash.

To enable this option, see the Advanced Tab.

See Also

Additional Information About MSMQ-MQSeries Bridge

Use of the Dot (.) in a Remote MQSeries Queue Manager Name on Windows Server 2003 or Windows 2000

Windows Server 2003 or Windows 2000 does not support computer names containing the dot (.) character. As a result, dots cannot be used when naming a remote IBM MQSeries QM.

MSMQ-MQSeries Bridge provides a feature to resolve this problem through name replacement. In Windows Server 2003 or Windows 2000, you can refer to the remote IBM MQSeries QM name with a dash (-) instead of a dot, and when the message arrives, MSMQ-MQSeries Bridge changes the dash back to a dot.

This feature is enabled by default. To disable the feature, set the following registry value:

Key: HKLM\Software\Microsoft\MQBridge\Server

Value: DisableDash2DotTranslation(REG_DWORD) = 1

See Also

Additional Information About MSMQ-MQSeries Bridge

MSMQ-MQSeries Bridge Dead Letter Queue

MSMQ-MQSeries Bridge creates two dead letter queues for storing messages that are not deliverable. **MQBridge Dead Letter Queue** is for messages through the nontransactional message pipe, and **MQBridge Xact Dead Letter Queue** is for messages through the transactional message pipe.

In Windows Server 2003 or Windows 2000, these two queues are located in **Active Directory Users and Computers** under **Domain Controllers** or **Computers\<MSMQ-MQSeries Bridge Computer>\msmq**.

See Also

Additional Information About MSMQ-MQSeries Bridge

Notes on the Current Release of MSMQ-MQSeries Bridge

The following are additional notes to support the current release of MSMQ-MQSeries Bridge in Host Integration Server 2004.

MSMQ-MQSeries Bridge Manager Supports Queue Names in Uppercase Characters

MSMQ-MQSeries Bridge does not differentiate uppercase vs. lowercase foreign queue names and foreign queue manager names. It converts them all to uppercase. MSMQ-MQSeries Bridge can only send messages to MQSeries queue managers and queues that have uppercase names.

MSMQ-MQSeries Bridge Encryption Delays on Windows Server 2003 or Windows 2000

There is a noticeable delay for changes to take place when enabling or disabling MSMQ-MQSeries Bridge encryption. It is recommended that you wait 5-15 minutes after changing the **Enable/Disable** option for encryption, before expecting MSMQ-MQSeries Bridge to function correctly.

Converting an MSMQ-MQSeries Bridge Resource Into a Cluster Resource

In Windows Server 2003 or Windows 2000, clusters are Active-Active. You must perform the following steps after installation to convert an MSMQ-MQSeries Bridge resource into a cluster resource:

1. In the Program Files\Host Integration Server\System directory by default, at the command line, type:

   ```
   BCLUSTER
   ```

2. When the dialog box appears, click **Add Bridge Resource**.
3. In MSMQ-MQSeries Bridge Manager, right-click the **Microsoft MSMQ-MQSeries Bridge Service** cluster resource and select **Bring online**.

In Windows Server 2003 or Windows 2000, you can also run the cluster on the local node only. To do this, run BCLUSTER as described in the preceding procedure, and click **Remove Resource**.

When moving from local node to cluster node, it is necessary to stop Microsoft MSMQ-MQSeries Bridge on all local nodes before you can bring the Microsoft MSMQ-MQSeries Bridge cluster resource online. This restriction only applies when running on Windows Server 2003 or Windows 2000.

Granting Access for Users Created During Install

When installing MSMQ-MQSeries Bridge on a computer running Windows Server 2003 or Windows 2000, if you choose to automatically create a user, that user will be denied access when attempting to start MSMQ-MQSeries Bridge.

You may also receive the following error in the event log: "Access to MSMQ connector queue is denied." While you should have sufficient rights for the operation of Microsoft MSMQ-MQSeries Bridge, it may be necessary to manually configure the Domain Administrator's group security for the foreign site or sites to have full control.

To grant user access

1. In **Active Directory**, go to **Active Directory Sites and Services**.
2. Right-click the foreign site.
3. Click the **Security** tab, and click **Domain Admins**.
4. In the **Permissions** box, select the **Full Control Allow** box.
5. Click **OK**.

MSMQ-MQSeries Bridge Quick Setup for Windows Server 2003 or Windows 2000

Use the following steps to set up a foreign site in Windows Server 2003 or Windows 2000 (previously known as a foreign connected network in Windows NT 4.0).

1. Install Message Queuing with routing.
2. Use **Active Directory Sites and Service** to create a new foreign site and new foreign computer. It is located in the Services\MsmqServices folder (right-click).

3. Create a routing link between the foreign site and the default first site name by right-clicking the Services\MsmqServices folder. Click **New**, and then click **MSMQ Routing Link**.
4. In **Routing link cost**, enter a number between 1-999, where 1 has the highest priority. Do not enter 0; it means no link.
5. Select **Property**, choose the **Site Gates** tab, and then add the MSMQ-MQSeries Bridge computer to be a member of the routing link site gates.
6. In **Active Directory Users and Computers**, under **Domain Controllers** or **Computers\<MSMQ-MQSeries Bridge Computer>\msmq**, select **Property** and then select the **Sites** tab. Add the computer to the foreign site created earlier.
7. Recycle Message Queuing on all domain controllers.

Testing the MQSeries Client/Server Connection Before Using Message Queuing Applications

The connection between the MQSeries Client and the MQSeries Server should be tested using the AMQSPUTC and AMQSGETC tools from IBM. To perform this test, use the following procedure.

1. Configure the MQSeries Server by using the server and client definition files generated by MSMQ-MQSeries Bridge.
2. Place the .tab file (by default, Amqclchl.tab) in the client location.
3. Use AMQSPUTC and AMQSGETC to test the connection.

Enabling MSMQ-MQSeries Bridge Encryption

Before you can enable encryption, you must first run the Add Schema program.

1. Log on as Schema Administrator. (This is usually the same as a Domain Administrator.)
2. In the Program Files\Host Integration Server\System directory (by default), type the following at the command line:

   ```
   addschma hiserver.schema
   ```

3. In MSMQ-MQSeries Bridge Manager, expand **Enterprise**, expand **Computers**, and expand the computer name.
4. Right-click **Microsoft MSMQ-MQSeries Bridge Service**, click **Properties**, and then click the **Advanced** tab.
5. Select the **Support MSMQ to Bridge Encryption** box.
6. Click **OK**, click **Yes**, and then click **OK**.
7. Restart the Microsoft MSMQ-MQSeries Bridge.

To disable encryption, return to the **Advanced** tab and clear the **Support MSMQ to Bridge Encryption** box, and then recycle Microsoft MSMQ-MQSeries Bridge.

MSMQ-MQSeries Bridge Rejects MSMQ Messages with MQMSG_AUTH_LEVEL_MSMQ20 Authentication.

Windows Server 2003 or Windows 2000 Server Message Queuing 2.0 introduces a new authentication signature, MQMSG_AUTH_LEVEL_MSMQ20, and is not supported for a connector queue. The result is that messages are rejected without being processed.

See Also

Additional Information About MSMQ-MQSeries Bridge

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Terminology Used in MSMQ-MQSeries Bridge

The following terms are used in MSMQ-MQSeries Bridge.

Term	Definition
CN	Foreign Connected Network in Windows NT 4.0, and Foreign Site in Windows Server 2003 or Windows 2000.
DLQ and **XDLQ**	MQBridge Dead Letter Queue and MQBridge Xact Dead Letter Queue. (For more information, see MSMQ-MQSeries Bridge Dead Letter Queue.)
MCA	Message Channel Agent. (For details, see IBM MQSeries documentation.)
MQI	Message Queue Interface (For details, see IBM MQSeries documentation.)
MQS	IBM MQSeries.
Message Queuing	Also known as MSMQ. Formerly known as Microsoft Message Queuing, Message Queuing Services, or Message Queue Server.
Nontransactional Message Pipe	Option allowing possible duplicate delivery of a message.
QM	Queue Manager.
Transactional Message Pipe	Option guaranteeing delivery of a message once and only once.

See Also

Additional Information About MSMQ-MQSeries Bridge

Security User's Guide

Enterprise Single Sign-On (SSO) provides services to enable single sign-on to end users for enterprise application integration (EAI) solutions. The SSO system maps Microsoft® Windows® accounts to back-end credentials. SSO simplifies the management of user IDs and passwords, both for users and administrators. It enables users to access back-end systems and applications by logging on only once to the Windows network.

This section contains:

- Understanding Enterprise Single Sign-On
- Installing Enterprise Single Sign-On
- Using Enterprise Single Sign-On
- Secure Deployment of Enterprise Single Sign-On
- Password Synchronization

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Understanding Enterprise Single Sign-On

To understand Enterprise Single Sign-On, it is useful to look at the three types of Single Sign-On services available today: Windows integrated, extranet, and intranet. These are described below, with Enterprise Single Sign-On falling into the third category.

Windows Integrated Single Sign-On

These services enable you to connect to multiple applications within your network that use a common authentication mechanism. These services request and verify your credentials after you log into the network, and use your credentials to determine the actions that you can perform based on your user rights. For example, if applications integrate using Kerberos, after the system authenticates your user credentials you can access any resource in the network that is integrated with Kerberos.

Extranet Single Sign-On

These services enable you to access resources over the Internet by using a single set of user credentials. The user provides a set of credentials to log on to different Web sites that belong to different organizations. An example of this type of Single Sign-On is Microsoft .NET Passport.

Intranet Single Sign-On

These services enable you to integrate multiple heterogeneous applications and systems within the enterprise environment. These applications and systems may not use common authentication. Each application has its own user directory store. For example, in an organization, Windows uses Active Directory® directory service to authenticate users, and mainframes use IBM's Resource Access Control Facility (RACF) to authenticate the same users. Within the enterprise, middleware applications integrate the front-end and back-end applications. Enterprise Single Sign-On enables users in the enterprise to connect to both the front-end (**Host Initiated Single Sign-On**) and back-end (**Windows Initiated Single Sign-On**) while using only one set of credentials.

In addition, **Password Synchronization** simplifies administration of the SSO credential database, and keeps passwords in sync across user directories. This is done through the use of password synchronization adapters, which you can configure and manage using the Password Synchronization command line utility.

The Enterprise Single Sign-On System

Enterprise Single Sign-On (SSO) provides services to store and transmit encrypted user credentials across local and network boundaries, including domain boundaries. SSO stores the credentials in the Credential database. Because SSO provides a generic single sign-on solution, middleware applications and custom adapters can leverage SSO to securely store and transmit user credentials across the environment. End users do not have to remember different credentials for different applications.

The Single Sign-On system consists of a Credential database, a master secret server, and one or more Single Sign-On servers.

The SSO system contains affiliate applications that an administrator defines. An affiliate application is a logical entity that represents a system or sub-system such as a host, back-end system, or line of business application to which you are connecting using Enterprise Single Sign-On. Each affiliate application has multiple user mappings; for example, it has the mappings between the credentials for a user in Active Directory and their corresponding RACF credentials.

The Credential database is the SQL Server database that stores the information about the affiliate applications, as well as all the encrypted user credentials to all the affiliate applications.

The master secret server is the Enterprise Single Sign-On server that stores the master secret. All other Single Sign-On servers in the system get the master secret from the master secret server.

The SSO system also contains one or more SSO Servers. These servers do the mapping between the Windows and back-end credentials, look up the credentials in the Credential database, and administrators use them to maintain the SSO system.

> **Note** You can have only one master secret server and only one Credential database in your SSO system. The Credential database can be remote to the master secret server.

This section contains:

- Enterprise Single Sign-On User Groups
- SSO Components
- SSO Server
- Master Secret Server

- SSO Affiliate Applications
- SSO Mappings
- SSO Tickets
- Configuring Enterprise Single Sign-On
- Best Practices for Enterprise Single Sign-On Security

Enterprise Single Sign-On User Groups

To configure and manage the Enterprise Single Sign-On (SSO) system, you must create certain Windows groups, and accounts within each of these groups. This section describes each of these groups.

> **Important** It is strongly recommended that you use domain groups when configuring SSO.

> **Note** For security purposes, the SSO system does not allow built-in accounts.

Single Sign-On Administrators

SSO administrators have the highest level user rights in the SSO system. They can:

- Create and manage the Credential database
- Create and manage the master secret
- Enable and disable the SSO system
- Create password synchronization adapters
- Enable and disable password synchronization in the SSO system
- Enable and disable host initiated SSO
- Perform all administration tasks

The SSO administrators account can be either a Windows group account or an individual account. The SSO administrators account can also be either a domain or local group or individual account. When using an individual account, you cannot change this account to another individual account. Therefore, it is recommended that you do not use an individual account. You can change this account to a group account as long as the original account is a member of the new group.

> **Important** The service account running the Enterprise Single Sign-On service must be a member of this group. To secure your environment, ensure that no other service is using the same service account.

Single Sign-On Affiliate Administrators

The SSO affiliate administrator defines the affiliate applications that the SSO system contains. Affiliate applications are a logical entity that represents the back-end system to which you are connecting using SSO. SSO affiliate administrators can:

- Create and manage affiliate applications
- Specify the application administrators account for each affiliate application
- Perform all the administration tasks that the application administrators and application users can

The SSO Affiliate Administrator account can be either a Windows group account or an individual account. The SSO Affiliate Administrator account can also be either a domain or local group or account.

Application Administrators

There is one application administrators group per affiliate application.

Members of this group can:

- Change the application users group account
- Create, delete, and manage credential mappings for all users of the specific affiliate application
- Set credentials for any user in that specific affiliate application users group account
- Perform all the administration tasks that the application users can

Application Users

There is one application users group account for each affiliate application. This group contains the list of end users in an ESSO environment. Members of this group can:

- Look up their credentials in the affiliate application
- Manage their credential mappings in the affiliate application

> **Note** Remember to be vigilant when assigning groups. It is possible, for example, to use an HIS security user group for the SSO application users group. Before you do this, be certain that all users need all access that will then be

available to them.

See Also

Updating the Properties of an Affiliate Application

Updating the Credential Database

Managing User Mappings

Understanding Enterprise Single Sign-On

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SSO Components

The sub services of the Enterprise Single Sign-On (SSO) service are:

- **Mapping.** This component maps the user account in the Windows system to the user accounts in the back-end systems (affiliate applications).
- **Lookup.** This component looks up the user credentials in the Credential database in the back-end system. This is the SSO runtime component.
- **Administration.** This component manages the affiliate applications and the mappings for each affiliate application.
- **Secret.** This component generates the master secret and distributes it to the other SSO servers in the system. It is only active on the Single Sign-On server that is acting as the master secret server.
- **Password Synchronization.** This component simplifies administration of the SSO credential database, and keeps passwords in sync across user directories.

See Also

SSO Server

Installing Enterprise Single Sign-On

SSO Server

The Enterprise Single Sign-On (SSO) server can perform any of the following tasks:

- **Functions as the master secret server.** The master secret server holds the master secret, or encryption key, used to encrypt all the credentials in the SSO system. Though the master secret server can act as a server for lookups and administration, it is recommended to use this server to act only as a master secret server for security reasons. For more information about the functions the master secret server performs, see Master Secret Server.
- **Performs administrative operations.** SSO administrators can use any of the Single Sign-On Servers to perform administrative tasks such as managing affiliate applications, setting user credentials, and managing user mappings.
- **Performs lookup operations.** The SSO server uses the runtime component to look up the user credentials.
- **Issues and Redeems Tickets.** The SSO server also issues and redeems SSO tickets.
- **Password Synchronization.** You can create and manage password synchronization adapters on the SSO Server.

See Also

Using Enterprise Single Sign-On

Installing Enterprise Single Sign-On

Master Secret Server

The master secret server is the Enterprise Single Sign-On (SSO) server that stores the master secret (encryption key). The master secret server generates the master secret when an SSO administrator requests it. The master secret server stores the encrypted master secret in the registry. Only Single Sign-On administrators can access the master secret.

The other Single Sign-On servers check every 30 seconds to see whether the master secret has changed. If it has changed, they read it securely; otherwise, they continue to use the master secret they already have cached in memory. The SSO service uses the master secret to encrypt and decrypt the user credentials.

You cannot use the SSO system until an SSO administrator configures the master secret server and generates the master secret. The master secret server generates the master secret during configuration. Only SSO administrators can generate the master secret. An SSO administrator must configure the master secret server and the Credential database before an application can use the SSO service.

> **Important** After you generate the master secret, it is strongly recommended that you back it up and store it in a secure location.

When an SSO administrator needs to regenerate the master secret, for example, if the SSO administrator wants to change the master secret periodically, the master secret server stores both the old and new master secret. The master secret server then goes through all the mappings, decrypts them using the old master secret, and encrypts them again using the new master secret.

If the master secret server fails, all runtime operations already running will continue to run, but SSO servers will not be able to encrypt new credentials.

> **Important** There can be only one master secret server in your SSO system. Therefore, it is strongly recommended you cluster the master secret server. For more information, see Clustering the Master Secret Server.

See Also

Using Enterprise Single Sign-On

SSO Affiliate Applications

The Enterprise Single Sign-On (SSO) Affiliate applications are logical entities that represent a system or sub-system such as a host, back-end system, or line of business application to which you are connecting using SSO. An affiliate application can represent a back-end system such as a mainframe or UNIX computer. It can also represent an application such as SAP, or a subdivision of the system, such as the "Benefits" or "Pay stub" sub-systems.

When the SSO administrator or the SSO Affiliate administrator defines an affiliate application, they must also determine who will administer the affiliate application (the application administrator), who the users of the affiliate application are (the application users), and what parameters the SSO system will use to authenticate the users of this affiliate application (the user ID, passwords, PIN numbers, and so on). For more information about application administrators and application users, see Enterprise Single Sign-On User Groups.

Affiliate Application Types

Enterprise SSO defines several different application types. The different application types support different types of mappings between the Windows account and the account on the non-Windows system.

The application types are:

Individual Individual applications support one-to-one mappings between the Windows account and the non-Windows account. In an Individual type application, one Windows account is mapped to one, and only one, non-Windows account. The mapping can be used in either direction, from Windows to non-Windows, or from non-Windows to Windows, or both, depending on the flags that have been set for this application. Thus, Individual applications may be used for Windows initiated SSO, Host initiated SSO, or both.

Group Group applications support mappings between one Windows group to one single non-Windows account. The Application Users account is used to define the Windows group that will be used for this Group application. Only one mapping can be defined for a Group application, and that mapping must be between the Windows group and the single non-Windows account that will be used by all members of this Windows group to access the non-Windows system. Group applications may only be used for Windows initiated SSO.

Host Group Host Group applications are conceptually the reverse of Group applications. They support mappings between a defined group of non-Windows accounts to a single Windows account. The single Windows account that will be used by the non-Windows accounts is defined by the Application Users account for the application. The group of non-Windows accounts that is allowed to access this application is defined by creating a mapping for each non-Windows account. Host Group applications may only be used for Host initiated SSO.

Designing an Affiliate Application

Before creating an affiliate application, the SSO affiliate administrator or the SSO administrator has to make the following decisions:

1. **What will this affiliate application represent?** You need to know the non-Windows application that the affiliate application will represent in the SSO system. For example,

Application name: APP1

Description: Application for Pay stub department

Contact: administrator@companyname.com

1. **Who will administer this affiliate application?** You need to determine the administrators for this affiliate application. These form the Windows administrators group for this affiliate application. For example, Domain\APP1AdminGroup
2. **Who will use this affiliate application?** You need to determine who the end-users are for this affiliate application. These users represent the Windows users group for this affiliate application; for example, Domain\DomainUsers. In the case of the application for Pay stubs, you might want all users to access their pay stub information, so you can specify the domain users group as the user group for this application.
3. **What credentials does the affiliate application use to authenticate its users?** Different applications user different credentials to authenticate users. For example, some applications may use user IDs, passwords, PINs, or a combination of these. You must also determine whether the system needs to mask these credentials as the user provides them.
4. **Will you use individual mappings or a group mapping for this affiliate application?** Does each Windows user have an account in the back-end system, or does the back-end system have one account for all Windows users? In the case of the pay stub system, each user has their own account to access their pay stub information, and you would need to use

individual mappings.

After you create an affiliate application, you cannot modify the following properties:

- Name of the affiliate application
- Fields associated with the affiliate application
- Affiliate application type (host group, individual, or configuration store)
- Administration account same as affiliate administrators group. (If you select this property, then the affiliate administrators group is used as the application administrator's account for this affiliate application.)

Affiliate Application Properties

The following table lists the properties you need to define for each affiliate application you create.

Property	Description
`Application name`	Name of the affiliate application. You cannot change this property after you create the affiliate application
`Description`	Brief description of the affiliate application
`Contact`	The main contact for this affiliate application that users can use. (Can be an e-mail address.)
`appUserAccount`	The Windows group that contains the user accounts of end-users that will be using this affiliate application
`appAdminAccount`	The Windows group that contains the administrator accounts that will manage this affiliate application. **Note** You do not need to define this property if you set the adminAccountSame to Yes.

Application Flag	Description
`enableApp`	The status of this affiliate application.
`groupApp`	Determines whether this application uses a group mapping (yes) or individual mappings (No.) You cannot change this property after you create the application.
`configStoreApp`	Determines whether this affiliate application is a Configuration Store type application (yes). You cannot change this property after you create the application.
`hostInitiatedSSO`	Enable this if it is a host initiated SSO type application. Default is No.
`windowsInitiatedSSO`	Enable this if it is a Windows initiated SSO type application. Default is Yes.

`validatePassword`	This applies only to host initiated SSO applications. When the application attempts to retrieve credentials, it must provide the password in the credential database which is used for validation by SSO services. Default is Yes.
`disableCredCache`	The SSO Server stores credentials in a cache to expedite access. Default is No.
`allowTickets`	Determines whether the SSO system uses tickets for this affiliate application. **Security** You must be an SSO administrator to set this flag.
`validateTickets`	Determines whether the SSO system validates tickets when the user redeems them. **Security** You must be an SSO administrator to set this flag.
`timeoutTickets`	Determines whether tickets have an expiration time. Default is No. **Security** Unless it is required, do not disable ticket timeouts (No.). **Security** You must be an SSO administrator to set this flag.
`allowLocalAccounts`	Determines whether you allow the use of local groups and accounts in the SSO system. You can only configure this flag to Yes in single-computer scenarios.
`adminAccountSame`	Determines whether to use the SSO affiliate administrator group as the application administrator group. You cannot change this property after you create the application. **Security** You must be an SSO administrator or SSO affiliate administrator to set this flag.

Application fields	**Description**	
Field [0]	<*credential*>: Masked/Unmasked	Determines the type of credential (user ID, password, smartcard) that end users must provide to connect to the affiliate application, and whether this credential is masked (that is, whether the characters that the user types are displayed on the screen) or not. You can enter as many fields as there are credentials for the affiliate application, but the first field must be the user ID. You cannot change this property after you create the application.

See Also

Managing Affiliate Applications

SSO Mappings

Managing User Mappings

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SSO Mappings

When an Enterprise Single Sign-On (SSO) administrator or an SSO affiliate administrator defines an affiliate application, the administrator can define it either as an application with individual mappings, or as an application with a group mapping.

Individual Mappings

SSO individual mappings enable administrators and users to create a one-to-one mapping between Windows users and their corresponding non-Windows credentials. When using individual mappings, users can manage their own mappings. The SSO system maintains the one-to-one relation for the user's Windows account and the user's non-Windows account.

Windows End-users can create and manage their own mappings for individual type applications. The same affiliate application can act as a Windows Initiated SSO and a Host Initiated SSO type application.

> **Note** Only individual users can obtain the credentials to their individual accounts when using individual mappings.

Group Mapping

SSO group mapping consists of mapping a Windows group, which contains multiple Windows users, to a single account in the affiliate application.

Only an application administrator, SSO affiliate administrator, or SSO administrator can create a group mapping.

You cannot specify the same group application for Windows initiated SSO and Host Initiated SSO.

> **Important** When you use group mappings, the members of the group can obtain the credential information for the group mapping.

See Also

Managing User Mappings

SSO Affiliate Applications

SSO Tickets

In an enterprise environment, where a user interacts with various systems and applications, it is very likely that the environment does not maintain the user context through multiple processes, products, and computers. This user context is crucial to provide single sign-on capabilities, as it is necessary to verify who initiated the original request. To overcome this problem Enterprise Single Sign-On (SSO) provides an SSO ticket (not a Kerberos ticket) that applications can use to get the credentials that correspond to the user who made the original request. SSO tickets are not enabled by default. For more information about enabling tickets, see Configuring the Enterprise Single Sign-On Tickets.

The SSO system issues a ticket when requested by an authenticated Windows user. The SSO system can only issue a ticket for the user making the request (you cannot request a ticket for other users). A ticket contains the encrypted domain and username of the current user, and the ticket expiration time. After the SSO system issues a ticket, it expires in two minutes by default. SSO administrators can modify the expiration time for tickets. For more information, see Configuring the Enterprise Single Sign-On Tickets.

After an application verifies the identity of the original requestor, the application redeems the ticket to obtain the credentials of the user who initiated the request affiliate application. An application can redeem tickets from the SSO system in one of three ways:

- **Redeem only.** When an application initiates a request to redeem a ticket, the request must contain the name of the affiliate application to connect to, and the ticket itself. Only application administrators for the specific affiliate application, SSO affiliate administrators, or SSO administrators can redeem a ticket. You should use **Redeem only** when there is a trusted sub-system between the application that issued the ticket and the application redeeming the ticket. Only an application administrator for the specified affiliate application can redeem the ticket for a user.
- **Validate and redeem.** Tickets contain information about the user for whom the SSO system is performing the credential look-up. In this case, the SSO service verifies that the sender of the original message and the user of the ticket are the same before the system redeems the ticket.

An SSO administrator can disable ticket timeouts on a per affiliate application basis. However, this is not recommended, as the ticket would never expire for this application. In scenarios that require that you disable ticket timeouts, ensure that there is a secure end-to-end trusted sub-system maintained between the front-end where the SSO system issues the ticket to the adapter where the SSO ticket redeems the ticket.

An SSO affiliate administrator can specify that tickets are allowed and that validation of the ticket is required on a per affiliate application basis. However, if the SSO administrator specifies at the SSO system level that the validation of tickets is required, the SSO affiliate administrator cannot turn off this option at the affiliate application level.

> **Important** When using SSO ticketing, you must ensure that the ticket timeout value is long enough to last between the time when the ticket is issued to the time that it is redeemed.

See Also

Managing User Mappings

Configuring Enterprise Single Sign-On

You can configure Enterprise Single Sign-On using command line utilities, or by using COM or Microsoft .NET interfaces.

SSO command line utilities

You use three different command line utilities to perform Enterprise Single Sign-On tasks:

SSOConfig. Enables an SSO administrator to configure the Credential database and to manage the master secret.

> **Note** The Configuration Wizard creates the Credential database and the master secret server.

SSOManage. Enables SSO administrators, SSO affiliate administrators, and application administrators to update the Credential database to add, delete and manage applications, administer user mappings, and to set credentials for the affiliate application users. Some operations can be performed only by the SSO administrators, or, only by the SSO administrators and SSO affiliate administrators.

SSOClient. Enables Single Sign-On users to manage their own user mappings and set their credentials.

For more information about the SSO accounts, see Enterprise Single Sign-On User Groups.

SSO COM and .NET interfaces

Enterprise Single Sign-On provides COM and .NET programmatic interfaces that enable you to create custom components, and to create scripts to facilitate the administration of the SSO system.

See Also

SSO Components

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Best Practices for Enterprise Single Sign-On Security

This section contains recommendations for securing your Enterprise Single Sign-On (SSO) system.

Perimeter network

When running Internet Information Services (IIS) and Enterprise Single Sign-On, follow these recommendations:

- If IIS is in a perimeter network (also known as demilitarized zone, DMZ, and screened subnet), provide another IIS server behind the firewall to connect to the SSO system.
- Do not open the remote procedure calls (RPC) port on IIS.

SQL Server access

All SSO servers access the SQL Server Credential database. For more information about how to secure SQL Server databases, see http://go.microsoft.com/fwlink/?LinkId=33174 and http://go.microsoft.com/fwlink/?LinkId=33175.

It is recommended that you use Secure Sockets Layer (SSL) and/or Internet Protocol security (IPSec) to secure the transmission of data between the SSO servers and the Credential database. For more information about using SSL, see http://go.microsoft.com/fwlink/?LinkId=33176.

To enable SSL for only the connection between the SSO server and the Credential database, you can set SSL support on every SSO server using the ssoconfig utility. This option enables SSO to always use SSL when accessing the Credential database. For more information, see Enabling SSL for Enterprise Single Sign-On.

Strong passwords

It is very important that you use strong passwords for all accounts, especially the accounts that are members of the SSO Administrators group, because these users have control over the entire SSO system.

SSO Administrator accounts

It is recommended that you use different service accounts for the SSO services running on different computers. You should not use the SSO administrator account that performs administration operations such as generating and backing up the secret for the SSO service. While the SSO service accounts should not be local administrators on that computer, the SSO administrator that is performing administration operations must be a local administrator on the computer for some operations.

Master secret server

It is highly recommended that you secure and lock down the master secret server. You should not use this server as a processing server. The only purpose of this server should be to hold the master secret. You should ensure the physical security of this computer and only SSO Administrators should have access to this computer.

Kerberos

SSO supports Kerberos, and it is recommended that you set up Kerberos for SSO. To set up Kerberos with SSO, you must register a Secure Principal Name (SPN) for the SSO service. By default, when you setup Kerberos, SSO uses that SPN to authenticate the components using the SSO Service. It is recommended you setup Kerberos authentication between the SSO administrative sub services and the SSO server. You can also user Kerberos authentication between the SSO servers and between the SSO servers and the SQL Server where the Credential database is.

To set up and verify Kerberos, you use the utilities setspn and kerbtray. For more information about these utilities, see http://go.microsoft.com/fwlink/?LinkId=33178 and http://go.microsoft.com/fwlink/?LinkId=33179.

Delegation

When using Windows Server 2003, it is possible to use constrained delegation, but it is recommended that you do not use delegation to perform the tasks of the Single Sign-On Administrator. Similarly, it is recommended that you do not delegate additional tasks or user rights to the Single Sign-On administrator.

Auditing

Auditing is a critical mechanism for tracking information in your environment. Enterprise Single Sign-On (SSO) audits all operations performed in the Credential database. SSO uses event logs and audit logs of the database itself. SSO provides two audit levels for the Single Sign-On servers:

- Positive auditing levels audit successful operations
- Negative auditing levels audit operations that fail.

SSO administrators can set the positive and negative audit levels that suit their corporate policies.

You can set positive and negative audits to one of the following levels:

0 = None. This level issues no audit messages.

1 = Low

2 = Medium

3 = High. This level issues as many audit messages as possible.

The default value for positive auditing is 0 (none), and the default value for negative auditing is 1(low). You may want to change these values depending on the level of auditing you want for your SSO system.

> **Important** Enterprise Single Sign-On auditing issues messages generated by the Single Sign-On service. This is not a security audit, and the SSO system does not save the information in the security log of the Event Log. The SSO system saves the SSO audit messages directly to the Application Event Log.

Database Level Auditing

> For database level auditing, the SSO system tracks the operations performed on the Credential database in the audit tables in the database. The size of these audit tables are defined at the SSO system level. You can audit for affiliate applications that are deleted, for mappings that are deleted, and for credential look-ups that are performed. By default, the audit size is set to 1000 entries. SSO administrators can change this size to meet their corporate policies.

Using Enterprise Single Sign-On Accounts

This section contains best practices when using domain and local groups and individual accounts in the Enterprise Single Sign-On (SSO) system.

Domain Windows Groups and Accounts

When working with domain Windows groups, the following recommendations apply:

- Use domain groups and domain accounts.
- Use a domain group for SSO administrators. You should not specify an individual domain account as the SSO administrator, because you cannot change this account from one individual account to another individual account.
- Although you can specify an individual domain account as the SSO affiliate administrator, you should use a domain group.
- Although you can specify an individual domain account as the application administrator, you should use a domain group.
- You must use domain groups for the application users account. The SSO applications users account does not support an individual account.

See Also

Auditing Enterprise Single Sign-On

Updating the Credential Database

Installing Enterprise Single Sign-On

The following sections contain information regarding installation of the Enterprise Single Sign-On feature. Because of this feature's complex relationships to other features and systems, and because of its importance to system security, you should read this section carefully before installing Enterprise Single Sign-On.

- **Important** To avoid total loss of your existing host security credential database, you must perform the migration procedure in Upgrading from Host Integration Server 2000 or SNA Server 4.0. Running the migration utility before installation is the only way to safely import host security domains and user mappings from your existing HIS or SNA Server primary domain controller. Installing Single Sign-On without performing this migration will permanently destroy all existing host security data.

This section contains:

- Upgrading from Host Integration Server 2000 or SNA Server 4.0
- Upgrading from a Previous Version of SSO
- Standard Installation Options
- High-Availability Installation Options
- Removing Enterprise Single Sign-On

Upgrading from Host Integration Server 2000 or SNA Server 4.0

Previous versions of Host Integration Server, such as HIS 2000 and SNA Server 4.0, provided both single sign-on and password synchronization through their host security feature. This feature was based around the host security domain, which contained user mappings to map credentials between Windows and host systems.

In Host Integration Server 2004, the Enterprise Single Sign-On feature replaces host security as the source of single sign-on and password synchronization. While some concepts are shared between the old and new features, there are important differences. In addition to the increased functionality, there are two primary conceptual differences in the new features:

- Host security domains are replaced by affiliate applications
- Security credential data is now stored in a secure SQL Server database

To migrate your existing host security data into the new SSO environment, use the Migration Utility. This is a command-line tool (hissomig.exe) which migrates all necessary data from the old version to the new, enabling you to continue using Single Sign-On without modifying your applications.

The topics in this section walk you through the migration process. It is important to follow these steps in the order given.

This section contains:

- Back up the Existing Security Data
- Export the Encryption Key
- Install Enterprise Single Sign-On
- Copy the Migration Utility to the Master Secret Server
- Run the Migration Utility

Back up the Existing Security Data

For safety purposes, you should back up your existing security data before migrating to Enterprise Single Sign-On.

For information about how to do this, see your Host Integration Server 2000 or SNA Server 4.0 documentation.

Export the Encryption Key

If you are migrating from Host Integration Server 2000, you must export the encryption key. The encryption key is a security device which HIS 2000 uses to encrypt user passwords. It must be backed up because the migration utility will need it as part of the migration process.

To export the encryption key

1. On the **Start** menu, click **Run**, and then type **cmd**.
2. Navigate to the Host Integration Server 2000 installation directory.
3. Type **udbkey /showkey >hostseckey.bak** to back up the key into a file.
4. Protect the file securely.

See Also

- Upgrading from Host Integration Server 2000 or SNA Server 4.0

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Install Enterprise Single Sign-On

At this point in the upgrade process, it is time to install Enterprise Single Sign-On. There are a number of installation options. For more information on installing, see Installing Enterprise Single Sign-On.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Copy the Migration Utility to the Master Secret Server

The Migration Utility is not installed with the rest of Host Integration Server 2004, and must be manually copied to the Master Secret Server.

To copy the Migration Utility

1. On the **Start** menu, click **Run**, and then type **cmd** and press **Enter**.
2. Type **copy hisssomig.exe from <cddrive>\support\utilities\ to c:\hostsec\** and press **Enter**.

See Also

- Upgrading from Host Integration Server 2000 or SNA Server 4.0

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Run the Migration Utility

Migration, which is performed with the hissomig.exe command-line utility, is essentially a two-step process:

First, the tool **exports** data from the host security domain into an XML file. This file also contains validation data for the migration process. Should mappings or file names conflict, an administrator can resolve them before the next step.

Second, the tool **imports** data into the SSO environment, and updates the HIS 2004 credential database appropriately.

The Migration Utility has the following restrictions:

- You must be an SSO Administrator and have at least read privileges to the SNAUDB database to perform migration.
- Both importing and exporting must be done on the Master Secret Server.

  Note The XML file generated during migration is not deleted. Since this file contains security data, it is important to manually delete the file as soon as migration is complete.

To export from HIS 2000

1. Stop the **Host Account Cache service**.
2. On the **Start** menu, click **Run**, and then type **cmd** and press **Enter**.
3. Type **hissomig –export –servername <server> -output <XML file>**

   where <server> is the fully qualified name, netbios name, or IP address of the HIS 2000 primary domain controller, and <XML file> is the full path of the XML file to which the data will be exported.

   For example:

   ```
   hissomig –export –servername SERVER1 -output c:\hostsecdb.xml
   ```

4. Press **Enter**.
5. Restart the **Host Account Cache service**.

To export from SNA Server 4.0

1. Stop the Host Account Cache service.
2. On the **Start** menu, click **Run**, and then type **cmd** and press **Enter**.
3. Type **hisssomig –export –dbfile <database file> -output <XML file>**

   where <database file> is the full path of the SNA 4.0 Host Security database file, and <XML file> is the full path of the XML file to which the data will be exported.

   For example:

   ```
   hisssomig –export –dbfile Y:\Program Files\SNA Server\hostsec\dbfile.dbs -output c:\hostsecdb.xml
   ```

4. Press **Enter**.
5. Restart the Host Account Cache service.

To import into HIS 2004

1. On the **Start** menu, click **Run**, and then type **cmd** and press **Enter**.
2. Type **hisssomig –import –key <key> -input <XML file>**

   where <key> is the full path of the file containing the encryption key, and <XML file> is the full path of the XML file from which the data will be imported.

   For example:

   ```
   hisssomig –import –key Z:\hostseckey.bak -input c:\hostsecdb.xml
   ```

3. Press **Enter**.

Other commands for Migration Utility

The following is a list of commands for the Migration Utility. These commands are also displayed during migration if you attempt to run the utility with incorrect data.

Command	Comment
-servername	Name of server that holds the HIS 2000 Host Security primary host account cache database.
-dbfile	Full path of the SNA 4.0 Host Security database file.
-key	Full path of the file containing the encryption key.
-username	User name used for encryption.
-password	Password for the username used for encryption.
-output	Full path of the XML file to which the data will be exported.
-input	Full path of the XML file from which the data will be imported.
-log	Creates migration log in the directory specified. For example: -log c:SSO\log

See Also

- Upgrading from Host Integration Server 2000 or SNA Server 4.0

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Upgrading from a Previous Version of SSO

If you are installing the Enterprise Single Sign-on feature and you already have a previous version deployed on your computer (for example, from Host Integration Server 2004 Beta, or Microsoft BizTalk® Server 2004), you must complete the steps below.

- Back up the SSODB to a secure location
- Back up the master secret key on the master secret server
- Update the master secret server by running Host Integration Server 2004 setup, choosing **Custom Installation**, and then selecting **Enterprise Single Sign-On**. Select **Reuse** when the Configuration Wizard prompts you with the question: Do you want to reuse the existing configuration?

It is not necessary to update the other SSO Servers (non-master secret servers) from your BizTalk Server 2004 installation. However, if you want the new Enterprise Single Sign-On features to be available on those servers, you must update them by using the same procedures outlined above.

If you have a Beta version of Enterprise SSO installed as part of a Host Integration Server 2004 Beta release, you can use the same mechanism to upgrade those servers.

> **Note** These considerations also apply if you are installing Microsoft BizTalk Server 2004 on a computer with an existing installation of Host Integration Server 2004 Enterprise Single Sign-On, and wish to update the servers.

See Also

- Upgrading from Host Integration Server 2000 or SNA Server 4.0

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Using Host Initiated SSO functionality in Enterprise Single Sign-On

Host Initiated Single Sign-On uses the protocol transition feature of Windows Server 2003 to perform Single Sign-On for the non-Windows user. This feature requires Windows Server 2003 and must be in a domain that has its **Domain Functional Level** set to **Windows Server 2003**.

See Also

- Upgrading from Host Integration Server 2000 or SNA Server 4.0

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Processing Servers for Enterprise Single Sign-On

In a multi-box environment, after the master secret server and Credential database have been created, you can install Enterprise Single Sign-On on subsequent computers. These are typically the computers on which Host Integration Server 2004 is installed as well.

The initial installation process is the same as on the first computer. Configuration, however, becomes slightly different. Since the master secret server and the SSO credential database are already in place, select **Join** when the Configuration Wizard asks, Do you want to create a new SSO system or join an existing SSO system?

See Also

- Upgrading from Host Integration Server 2000 or SNA Server 4.0

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Standard Installation Options

Host Integration Server 2004 leverages the Enterprise Single Sign-On (SSO) capabilities for securely storing critical information.

By default, Enterprise Single Sign-On is not installed with the rest of Host Integration Server 2004. You can install it by following the procedure below.

> **Note** When Enterprise Single Sign-on (Server component) is installed, configuration needs to performed. The first step to set up an SSO System is to configure the master secret server. It is recommended to set up a stand-alone master secret server. This can be done by only selecting Enterprise Single Sign-on from the custom feature tree in Host Integration Server 2004 setup.

To install Enterprise Single Sign-On

- Insert your Host Integration Server 2004 CD and re-run the setup program. Select **Custom Installation**, and then select the appropriate option from the list below:

When running the HIS Server package, you have the following options:

- **Enterprise Single Sign-On Server** A credential database to store mappings of Windows user identities to credentials for line of business applications. Also provides services to enable components to securely access this data to enable Single Sign-On.
- **Enterprise Single Sign-On Server with Password Synchronization** A credential database to store mappings of Windows user identities to credentials for line of business applications. Also provides services to enable components to securely access this data to enable Single Sign-On, as well as the Password Synchronization feature.
- **Enterprise Single Sign-On Administration** Administration and client tools for mapping and connecting to Enterprise Single Sign-On Services.

When running the HIS Client package, you have the following options:

- **Enterprise Single Sign-On Administration** Administration and client tools for managing and connecting to Enterprise Single Sign-On Services.
- **Enterprise Single Sign-On Client** Client tools for end users to manage their mappings.

See Also

Installing the Enterprise Single Sign-On Administration Component

Installing the Enterprise Single Sign-On Client Utility

High-Availability Installation Options

Removing Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Installing the Enterprise Single Sign-On Administration Component

It is possible to install the Enterprise Single Sign-On Administration component as a stand-alone feature. This is useful if you need to administer the SSO system remotely. The hardware and software requirements are the same as for a typical ESSO installation.

After installing the administration component, you will need to use ssomanage.exe to specify the SSO Server to be used for management. Both processes are included in the procedure below.

> **Note** While the SSO Administration feature in Host Integration Server 2004 is compatible with the server version of SSO in BizTalk Server 2004, the administrative components of Enterprise SSO in BizTalk Server 2004 are not compatible with the server version of Enterprise SSO in Host Integration Server 2004.

Installing the SSO administrative utility (ssomanage.exe) does not create shortcuts on the Start menu to access the command line utilities. To run the SSO administrative utilities after installation, you must open a command prompt and navigate to the SSO directory located at Program Files\Common Files\Enterprise Single Sign-On.

To install the Enterprise Single Sign-On administrative component

1. Perform a custom installation of Host Integration Server 2004, selecting only the Enterprise Single Sign-On administration component.
2. When the install program finishes, go to the **Start** menu, click **run**, and then type **cmd**.
3. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage –server** to specify the SSO Server you want to connect to when performing administration operations.

   OR

5. Type **ssomanage -serverall** to specify the SSO Server all users of this computer will connect to when performing administration operations.

See Also

Installing the Enterprise Single Sign-On Client Utility

Configuring Enterprise Single Sign-On

Installing Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Installing the Enterprise Single Sign-On Client Utility

The stand-alone SSO client utility (ssoclient.exe) allows end users to configure their client mappings in the credential database. You can install the client utility from a self-extracting file (SSOClientInstall.exe) which is installed with the SSO administration feature. Administrators can also make the installer package available to client users by placing a copy of the installer package on a network share.

To install the SSO client utility, you must be running one of the following operating systems on the client computer:

- Windows Server 2003
- Windows 2000 Server with Service Pack 4, or Windows XP Professional with Service Pack 1
- .NET Framework 1.1 (only necessary for the managed interoperability component of the SSO client utility)

Installing the SSO client utility does not create shortcuts on the Start menu to access the command line utilities. To run the SSO client utility after installation, you must open a command prompt and navigate to the SSO directory located at Program Files\Common Files\Enterprise Single Sign-On.

To install the SSO client utility

1. Double-click the installer package SSOClientInstall.

   > **Note** Ask your Enterprise Single Sign-On Administrator for the location of this file in your enterprise.

   The **WinZip Self-Extractor** program appears.

2. Select the folder where you want to unzip the files, and click **Unzip**.

   It is recommended to unzip the files in a temporary folder.

   The **Enterprise Single Sign-On Client Setup** program appears.

3. On **the Welcome to the Enterprise Single Sign-On Client** page, click **Next**.
4. On the License Agreement page, click **I accept the terms of this license agreement**, and then click **Next**.
5. On the **User Information** page, type your user name, organization name, and then click **Next**.
6. On the **Start Installation** page, click **Install**.
7. On the **Completing the Enterprise Single Sign-On Client Wizard** page, click **Finish**.

See Also

Installing the Enterprise Single Sign-On Administration Component

Configuring Enterprise Single Sign-On

Installing Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

High-Availability Installation Options

Topics in this section describe installation focused on high availability of Enterprise Single Sign-On, such as multi-computer deployment.

This section contains:

Clustering the Master Secret Server

Clustering the SQL Server

Configuring Enterprise Single Sign-On in a Multi-Computer Scenario

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Clustering the Master Secret Server

It is strongly recommended that you follow the instructions in this section to cluster the Enterprise Single Sign-On (SSO) service on the master secret server successfully.

Before you start configuring SSO in a cluster environment, it is recommended that you understand how clustering works. For more information, see http://go.microsoft.com/fwlink/?LinkId=33180.

When you cluster the master secret server, the Single Sign-On Servers communicate to the active clustered instance of the master secret server. Similarly, the active clustered instance communicates with the Credential database.

You must be an SSO administrator to perform this procedure.

> **Caution** You cannot install the master secret server on a Network Load Balancing (NLB) cluster.

To cluster the master secret server

1. Perform a custom installation to install the master secret server on the first node of the cluster (for example, ClusterNode1).
2. In the **Configuration Wizard**, on the **Configuration Questions** page, in the **Is this the master secret server?** drop down list, select **Yes**, and then click **Next**.
3. Specify the service account credentials for SSO service. This must be a member of the SSO Administrators group account.
4. Specify the location of the SQL Server and SSO Credential database (SSODB).
5. Back up the master secret on the active node.
6. Perform a custom installation to install the master secret server on the second node of the cluster (ClusterNode2).
7. Use the **Configuration Wizard** to configure an Enterprise SSO Server on the second node of the cluster. This time, however, select **No** when you reach the question in Step 2. However, as this is not the initial installation of the master secret server. Click **Next**, and then complete the **Configuration Wizard**.
8. Stop the SSO service by typing **net stop entsso** at the command line.
9. Change the master secret server name in the SSO credential database to the cluster name. For example, if the cluster is named MSS_CLUSTER, change the name from ClusterNode1 to MSS_CLUSTER.
10. Use a text editor to copy and paste the following code into an .xml file (for example: MSS CLUSTER.xml) and save the file:

```
<sso>
  <globalInfo>
     <secretServer>MSS_CLUSTER</secretServer>
</globalInfo>
   </sso>
```

11. At the command line, navigate to the Enterprise Single Sign-On installation directory. The default is Program Files\Common Files\Enterprise Single Sign-On.
12. Type **ssomanage -updatedb <filename>** where filename is the name of the .xml file in the previous step. This updates the master secret server name in the database.

    Ignore any runtime errors. The Microsoft Distributed Transaction Coordinator (DTC) was not configured to run on a cluster, and may be unable to start.

13. Open a command line on master secret server 1 and type **comclust -a**.
14. From the **Services** console, right-click **Distributed Transaction Coordinator**, and then click **Restart**.
15. Open a command line on master secret server 2 and type **comclust -a**.
16. From the **Services** console, right-click **Distributed Transaction Coordinator**, and then click **Restart**.
17. Open **Cluster Administrator**, and then click the cluster group that has the master secret server cluster.
18. On the **File** menu, point to **New**, and then click **Resource**.

    The New Resource window opens.

    Under **Name**, type the name of the SSO resource (for example, **ENTSSO**).

    Under **Resource Type**, select **Generic Service**.

19. On the **Possible Owners** window, include each cluster node as a possible owner of the ENTSSO resource.
20. After you create the **ENTSSO** resource, right-click **ENTSSO**, and click **Properties**.

21. In the **Cluster Properties** dialog box, click the **Security** tab, and verify that the user under which the application is running has sufficient user rights (not a local administrator) to access the cluster.
22. Open **Cluster Administrator**, right-click the cluster group that has the master secret server cluster, and then click **Move group**. This moves the master secret server resources from the first node to the second node.
23. On the **Start** menu, click **run**, and then type **cmd**.
24. At the command line prompt, navigate to the Enterprise Single Sign-On installation directory. The default is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
25. Type **ssoconfig -restoresecret <*restore file*>**, where <*restore file*> is the path and name of the back-up file that contains the master secret.

See Also

Master Secret Server

Installing Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Clustering the SQL Server

For information on clustering the SQL Server, see your SQL Server documentation.

Configuring Enterprise Single Sign-On in a Multi-Computer Scenario

This section contains instructions for configuring Enterprise Single Sign-On (SSO) in a three-computer scenario.

In the following scenario, computer A is the master secret server, computer B is the Single Sign-On server, and computer C holds the Credential database. Computer B can act as a runtime server, as an administration server (administration sub services of SSO use this server for managing the Credential database), or as a mapping server (administration and client sub services of SSO use this server to manage mappings).

1. If you want to add more SSO servers to your environment, follow the steps for configuring computer B. Any new SSO servers will point to the existing Credential database, and cannot be the master secret server.

   Note It is recommended that you configure the master secret server on a different computer from the Single Sign-On server and the Credential database.

To configure the master secret server and create the Credential database on Computer A

1. Perform a custom installation of Host Integration Server 2004, and install only the Enterprise Single Sign-On runtime component.
2. Run the Configuration Wizard to configure SSO on the master secret server. On the **Configuration Questions** page, in the **Is this the master secret server** drop down list, select **Yes,** and then click **Next.**
3. On the **Windows Accounts** page, specify the service account credentials for the SSO service. This must be a member of the SSO Administrators group.
4. On the **Database Configurations** page, specify the location of the SQL Server (computer C) and the name of the Credential database (SSODB).
5. Back up the master secret. For more information, see Backing Up the Master Secret.

To configure the SSO server on Computer B

1. Install Enterprise Single Sign-On on Computer B.

   Note This can be a Host Integration Server computer, or an SSO-only server (SSO runtime components.)

2. Run the Configuration Wizard to configure SSO. On the **Configuration Questions** page, in the **Is this the master secret server** drop down list, select **No**, and then click **Next**.
3. On the **Windows Accounts** page, specify the service account credentials for the SSO service. This must be a member of the SSO Administrators group.
4. On the **Database Configurations** page, point to the location of the SQL Server (computer C) and the name of the Credential database (SSODB).

See Also

Clustering the Master Secret Server

Installing Enterprise Single Sign-On

Removing Enterprise Single Sign-On

If you remove Host Integration Server 2004, Enterprise Single Sign-On (SSO) is no longer configured, but it is not removed. You must remove SSO separately. You can also restore configuration information including the master secret to reuse existing data. For more information, see Restoring the Master Secret.

To remove Enterprise Single Sign-On

1. Back up the master secret key. For more information, see Backing Up the Master Secret.
2. Uninstall Host Integration Server 2004.
3. On the **Start** menu, point to **Settings**, and then click **Control Panel**.
4. Click **Add/Remove Programs**.
5. In the **Add/Remove Programs** dialog box, click **Microsoft Enterprise Single Sign-On**, and then click **Remove**.
6. Click **Yes** when prompted to confirm the removal of Microsoft Enterprise Single Sign-On.

> **Note** If you have BizTalk Server Runtime, Development, or Administration features installed, or Host Integration Server Administration features installed, you will not be able to uninstall the SSO Runtime or Administration components until all dependencies are removed.

Unattended Installation and Uninstallation

> **Note** You will need the original installation media to perform unattended installs or uninstalls of Single Sign-On Server or Client versions.

For information on unattended installation and uninstallation, see Installing the Product.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Using Enterprise Single Sign-On

You use ssomanage, the Single Sign-On management utility, to update the Credential database, to add, delete and manage applications, and to administer user mappings.

Only Single Sign-On Administrators can perform these tasks.

This section contains:

- Setting the Enterprise Single Sign-On Server
- Enabling Enterprise Single Sign-On
- Changing the Master Secret Server
- Disabling Enterprise Single Sign-On
- Updating the Credential Database
- Displaying the Credential Database Information
- Configuring the Enterprise Single Sign-On Tickets
- Auditing Enterprise Single Sign-On
- Enabling SSL for Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Setting the Enterprise Single Sign-On Server

Each time you use ssomanage, you must first point the user to the Single Sign-On server you want to connect to.

You can do this in one of two ways:

- Individual users can point themselves to the correct Single Sign-On Server.
- A local computer administrator for the Single Sign-On server can point all the members of the Single Sign-On Users account to this server.

To set the Enterprise Single Sign-On Server for a single user

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –server <*Single Sign-On Server*>**, where <*Single Sign-On Server*> is the computer name of the Single Sign-On Server the user wants to connect to.

To set the Enterprise Single Sign-On Server for all users

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –serverall <*Single Sign-On Server*>**, where <*Single Sign-On Server*> is the computer name of the Single Sign-On Server all members of the Single Sign-On Users account will be pointed to.

To determine the Enterprise Single Sign-On Server to which a user is connected

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –showserver**.

   Note This command displays the settings for the current user as well as for other users if they exist.

See Also

Enabling Enterprise Single Sign-On

Disabling Enterprise Single Sign-On

Displaying the Credential Database Information

Using Enterprise Single Sign-On

Enabling Enterprise Single Sign-On

This command enables the entire Enterprise Single Sign-On (SSO) system.

After you run the enabling command, there is a short delay before all Single Sign-On Servers are enabled, as each polls the Credential database for the latest global information.

If you want to configure affiliate applications and mappings in the SSO system, you must also create an affiliate application. After an SSO affiliate administrator creates an affiliate application, an application administrator can make changes to it, and application users (end-users) can create their own mappings. For more information, see Managing Affiliate Applications and Managing User Mappings.

To enable the SSO system

1. Click **Start**, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –enablesso**.

To enable SSO to create affiliate applications and mappings

1. Log on as an SSO administrator or SSO affiliate administrator to the SSO Server, or on a computer that has the SSO administration sub services of SSO.
2. On the **Start** menu, click **run**, and then type **cmd**.
3. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -enablesso** to enable the Enterprise Single Sign-On service.
5. Log on as an SSO affiliate administrator.
6. Type **ssomanage -createapps <*application file*>** to create an affiliate application, where <application file> is the XML file that contains definitions for the affiliate applications.

See Also

Setting the Enterprise Single Sign-On Server

Disabling Enterprise Single Sign-On

Updating the Credential Database

Using Enterprise Single Sign-On

Changing the Master Secret Server

After you set up the master secret server and configure the Credential database, you can change the master secret server if the original master secret server fails and cannot be recovered. To change the master secret server, you need to promote an SSO server to become the master secret server.

To promote a Single Sign-On Server to master secret server

1. Create an XML file that includes the name of the SSO server you want to promote to master secret server. For example,

```
<sso>
  <globalInfo>
     <secretServer>SSO Server name</secretServer>
  </globalInfo>
</sso>
```

2. On the **Start** menu, click **run**, and then type **cmd**.
3. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage –updatedb** <***update file***>, where <*update file*> is the name of the XML file you create in step 1.
5. Restart the Master Secret Server.
6. Type **ssoconfig –restoresecret <*restore file*>**, where <*restore file*> is the path and name of the file where the master secret is stored.

See Also

Master Secret Server

Clustering the Master Secret Server

Updating the Credential Database

Using Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Disabling Enterprise Single Sign-On

This command disables the entire Single Sign-On system.

There will be a short delay for all Single Sign-On Servers to be disabled, as they poll the Credential database for the latest global information.

To disable Enterprise Single Sign-On

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –disablesso**.

See Also

Enabling Enterprise Single Sign-On

Using Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Updating the Credential Database

You use the commands described in this section to change the global information in the Credential database, such as the master secret server identification, the account names, auditing in the database, ticket timeout, credential cache timeout, and so on.

Changing timeouts for the SSO System

You can modify two timeouts at the Enterprise Single Sign-On (SSO) system level:

Ticket timeout. This property specifies the length of time for which a ticket SSO issues is valid. To satisfy most of the scenarios in an enterprise that use SSO, the default ticket timeout is 2 minutes. The SSO administrator can change this based on the application requirements.

Credential Cache timeout. This property specifies the credential cache timeout for all SSO Servers. SSO Servers cache the credentials after the first lookup. By default, the credential cache timeout is 60 minutes. The SSO administrator can change this to a suitable value based on the security requirements.

You change both of these timeouts by updating the Credential database.

A sample XML file for updating the Credential database is:

```
<sso>
<globalnfo>
<ssoAdminAccount>Domain\Accountname</ssoAdminAccount>
<ssoAffiliateAdminAccount>Domain\Accountname</ssoAffiliateAdminAccount>
<secretServer>ComputerA</secretServer>
<auditDeletedApps>1000</auditDeletedApps>
<auditDeletedMappings>1000</auditDeletedMappings>
<auditCredentialLookups>1000</auditCredentialLookups>
<ticketTimeout>2</ticketTimeout>
<credCacheTimeout>60</credCacheTimeout>
</globalInfo>
</sso>
```

To update the Credential database

1. Click **Start**, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –updatedb <*update file*>**, where <*update file*> is the path and name of the file.

See Also

Configuring the Enterprise Single Sign-On Tickets

Using Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Displaying the Credential Database Information

You can view credential database information by using the ssomanage command.

To display the Credential database information

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –displaydb**.

To display the Credential database the SSO Server is connected to

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –showdb**.

The following table describes the values displayed by these procedures.

Property	**Value**
SQL Server	*<SQL Server name>*
SQL Server database	*<SQL Server database name>*
Single Sign-On Secret Server name	*<Single Sign-On Server name>*
Single Sign-On Administrators account	Domain\account name
Single Sign-On Affiliate Administrators account	Domain\account name
Size of audit table for deleted applications (number of audit entries)	1000 (default)
Size of audit table for deleted user mappings (number of audit entries)	1000 (default)
Size of audit table for external credential lookups (number of audit entries)	1000 (default)
Ticket timeout (in minutes)	2 (default) This value can be an integer between 1 to 525600
Credential cache timeout (in minutes)	60 (default)
Single Sign-On Status	Enabled/disabled
Tickets allowed	Yes/no (default)
Validate tickets	Yes (default)/no

See Also

Configuring the Enterprise Single Sign-On Tickets

Using Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring the Enterprise Single Sign-On Tickets

You use this command to control ticket behavior for the entire Single Sign-On system, including whether to allow tickets, and whether the system must validate the tickets. For more information about tickets and tickets validation, see SSO Tickets.

To configure the Enterprise Single Sign-On tickets

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –tickets <*allowed yes/no*> <*validate yes/no*>**, where <*allowed yes/no*> indicates whether tickets will be allowed or not, and <*validate yes/no*> indicates whether tickets will need to be validated after they are redeemed.

> **Note** You can use yes, no, on, or off to indicate whether to allow and/or validate tickets. These words are case independent, and must be used regardless of your language settings.

See Also

Understanding Enterprise Single Sign-On

Using Enterprise Single Sign-On

Auditing Enterprise Single Sign-On

Use this command to set both the positive and negative auditing levels.

SSO administrators can set the positive and negative audit levels that suit their corporate policies. You can set positive and negative audits to one of the following levels:

0 = None

1 = Low

2 = Medium

3 = High. This level issues as many audit messages as possible.

The default value for positive auditing is 0 (none), and the default value for negative auditing is 1(low).

> To change the database level auditing, you must update the Credential database using an XML file. A sample XML file for updating the Credential database is:

```
<sso>
<globalnfo>
<auditDeletedApps>1000</auditDeletedApps>
<auditDeletedMappings>1000</auditDeletedMappings>
<auditCredentialLookups>1000</auditCredentialLookups>
</globalInfo>
</sso>
```

To audit Single Sign-On

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoconfig –auditlevel <** ***positive level*****> <*****negative level*****>**, where <*positive level*> is the level of auditing when actions succeed, and <*negative auditing*> is the level of auditing when actions fail.

To audit the Credential database

1. Click **Start**, click **run**, and then type **cmd**.
2. At the command line prompt, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –updatedb <*****update file*****>**, where <*update file*> is the path and name of the file.

See Also

Updating the Credential Database

Using Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Enabling SSL for Enterprise Single Sign-On

Use this command to enable Secure Sockets Layer (SSL) between all the Enterprise Single Sign-On (SSO) servers and the Credential database.

To enable SSL for Enterprise Single Sign-On

1. Click **Start**, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –setssl <*yes/no*>**, where <*yes/no*> indicates whether you want to enable SSL in the SSO system.

See Also

Using Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Managing the Master Secret

The master secret is the key used to encrypt all the information stored in the Credential database. If the master secret server crashes and you lose the secret, you will not be able to retrieve the information stored in the Credential database. Therefore, it is very important to back up the master secret as soon as you generate it.

This section contains:

- Generating the Master Secret
- Backing Up the Master Secret
- Restoring the Master Secret

Generating the Master Secret

You must have administrator rights on the master secret server in order to perform this task. In addition, you must perform this task from the master secret server.

The first server where you install Enterprise Single Sign-On becomes the master secret server.

> **Important** There can be only one master secret server in your SSO system.
>
> **Note** When Enterprise Single Sign-On is installed as part of the Host Integration Server 2004 installation, the master secret is generated as part of the Configuration Wizard. You will only need to perform this task if you want to generate a new master secret.

To generate the master secret

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoconfig –generatesecret <*backup file*>**, where <*backup file*> is the name of the file that contains the master secret.

   You will be prompted to enter a password to protect the file you just created.

See Also

Backing Up the Master Secret

Master Secret Server

Managing the Master Secret

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Backing Up the Master Secret

You can back up the master secret from the master secret server onto an NTFS file system or removable media, such as a floppy disk.

You must be a Single Sign-On Administrator and a Windows administrator to perform this task. The SSO system will prompt you for a password. To restore the secret later, you must specify the same password.

> **Warning** If the master secret server crashes and you lose the key, or if the key becomes corrupted, you will not be able to retrieve data stored in the Credential database. You must back up the master secret, or you risk losing data from the Credential database.

To back up the master secret

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssoconfig –backupsecret <*backup file*>**, where <*backup file*> is the path and name of the file where the master secret will be backed up. For example, A:\ssobackup.bak
5. Provide a password to protect this file. You will be prompted to confirm the password and to provide a password hint to help you remember this password.

> **Important** You must save and store the backup file in a secure location.

See Also

Generating the Master Secret

Restoring the Master Secret

Master Secret Server

Managing the Master Secret

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Restoring the Master Secret

As part of data recovery procedures, you may need to restore the master secret to re-use existing data. In order to perform this task, you must log on to the master secret server with an account that is both a Windows administrator and an SSO administrator.

To restore the master secret

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssoconfig –restoresecret <*restore file*>**, where <*restore file*> is the path and name of the file where the master secret is stored.

See Also

Generating the Master Secret

Backing Up the Master Secret

Master Secret Server

Managing the Master Secret

Specifying Single Sign-On Administrators and Affiliate Administrators Accounts

The Enterprise Single Sign-On (SSO) Administrators and Affiliate Administrators accounts can be host group or individual accounts. You must create these accounts before you configure the SSO system.

When using domain accounts, you must create the SSO Administrators and SSO Affiliate Administrators accounts as a domain global security groups in the domain controller. The domain administrator must create these accounts.

You must specify the Single Sign-On Administrators and Affiliate Administrators accounts in the Credential database. You must disable the Single Sign-On system before you update the Credential database with the SSO Administrators group.

The following XML code shows a sample XML for updating the Credential database:

```
<sso>
<globalInfo>
<ssoAdminAccount>Domain\Accountname</ssoAdminAccount>
<ssoAffiliateAdminAccount>Domain\Accountname</ssoAffiliateAdminAccount>
</globalInfo>
</sso>
```

Note The Configuration Wizard automatically specifies the SSO administrator and SSO affiliate administrator groups in the Credential database.

To disable the Enterprise Single Sign-On system

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage** –**disablesso**.

To update the Credential database

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –updatedb <*update file*>**, where <*update file*> is the path and name of the XML file.

To enable the Enterprise Single Sign-On system

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –enablesso**.

See Also

Enterprise Single Sign-On User Groups

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Managing Affiliate Applications

This section provides information on how to create and configure affiliate applications.

This section contains:

- Creating an Affiliate Application
- Deleting an Affiliate Application
- Updating the Properties of an Affiliate Application
- Enabling an Affiliate Application
- Disabling an Affiliate Application
- Listing Affiliate Applications
- Listing the Properties of an Affiliate Application
- Clearing the Application Cache
- Setting the Enterprise Single Sign-On Server Using the Client Utility
- Displaying the Enterprise Single Sign-On Server Using the Client Utility
- Setting Credentials for the Affiliate Application Using the Client Utility

Creating an Affiliate Application

Use this command to create one or more applications, as specified by the XML file. An example XML file for Windows Initiated SSO is:

```
<sso>
<application name="SAP">
<description>The SAP application</description>
<contact>someone@example.com</contact>
<appuserAccount>domain\AppUserAccount</appuserAccount>
<appAdminAccount>domain\AppAdminAccount</appAdminAccount>
<field ordinal="0" label="User Id" masked="no" />
<field ordinal="1" label="Password" masked="yes" />
<flags groupApp="no" configStoreApp="no" allowTickets="no" validateTickets="yes" allowLocalAc
counts="no" timeoutTickets="yes" adminAccountSame="no" enableApp="no" />
</application>
</sso>
```

After you create an affiliate application, you cannot modify the following properties:

- Name of the affiliate application
- Fields associated with the affiliate application
- Affiliate application type (host group, individual, or configuration store)
- Administration account same as affiliate administrators group. (Specifying this flag will always use the affiliate administrators group as the administrator account for this affiliate application)

  Important You can use local accounts for the administration account and user account by setting the allowLocalAccounts flag to yes. However, you should only use this flag in single-computer scenarios.

  Security You must be an SSO administrator or SSO affiliate administrator to perform this task.

After you create the affiliate application, you must enable it. For more information, see Enabling an Affiliate Application.

To create an affiliate application

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –createapps <*application file name*>**, where <*application file name*> is the XML file.

See Also

SSO Affiliate Applications

Enabling an Affiliate Application

Deleting an Affiliate Application

Managing User Mappings

Managing Affiliate Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Deleting an Affiliate Application

Use this command to delete the specified affiliate application from the Credential database.

> **Important** When you delete an affiliate application, the SSO system automatically deletes all mappings associated with it.

> **Security** You must be an SSO administrator or SSO affiliate administrator to perform this task.

To delete an affiliate application

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –deleteapp <*application name*>**, where <*application name*> is the name of the affiliate application you want to remove from the Credential database.

See Also

SSO Affiliate Applications

Enabling an Affiliate Application

Managing User Mappings

Managing Affiliate Applications

Updating the Properties of an Affiliate Application

Use this command to update one or more application properties, as specified by the XML file. You must be an Affiliate Administrator to perform this task. The following is an example XML file that lists the fields you can update.

```
<SSO>
<application name="SSOApplication">
<description>An SSO Application</description>
<contact>someone@companyname.com</contact>
<appUserAccount>DomainName\AppUserGroup</appUserAccount>
<appAdminAccount>DomainName\AppAdminGroup</appAdminAccount>
<flags allowTickets="no" validateTickets="yes"  timeoutTickets="yes" enableApp="no" />
</application>
</SSO>
```

After you create an affiliate application, you cannot modify the following properties:

- Name of the affiliate application
- Fields associated with the affiliate application
- Affiliate application type (host group, individual, or configuration store)
- Administration account same as affiliate administrators group. (Specifying this flag will always use the affiliate administrators group as the administrator account for this affiliate application)

  Important You can use local accounts for the administration account and user account by setting the allowLocalAccounts flag to yes. However, you can only use this flag in single-computer scenarios.

  Security You must be an SSO administrator, SSO affiliate administrator, or application administrator to perform this task.

  Security You must be an SSO administrator to modify the ticketing flags (validateTickets and timeoutTickets.)

  Security You must be an SSO administrator or an SSO affiliate administrator to modify the application administration account.

To update the properties of an affiliate application

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –updateapps <*application file name*>**, where the application file name is the XML file.

See Also

SSO Affiliate Applications

Enabling an Affiliate Application

Managing User Mappings

Managing Affiliate Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Enabling an Affiliate Application

Use this command to enable the specified affiliate application.

To enable an affiliate application

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –enableapp <*application name*>**, where <*application name*> is the name of the affiliate application you want to enable.

See Also

SSO Affiliate Applications

Creating an Affiliate Application

Managing User Mappings

Managing Affiliate Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Disabling an Affiliate Application

Use this command to disable the specified affiliate application.

To disable an affiliate application

1. Click **Start**, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –disableapp <*application name*>**, where <*application name*> is the name of the affiliate application you want to disable.

See Also

SSO Affiliate Applications

Enabling an Affiliate Application

Managing User Mappings

Managing Affiliate Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Listing Affiliate Applications

Use this command to list all the affiliate applications. If the user is a member of the Application Administrators account, this command will only display the application for which the user is an administrator.

To list affiliate applications using the administration utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage -listapps [all]** where **all** is an optional parameter that will also display applications using the Configuration Store feature. If the user running this command is an Application administrator, it will only list the applications for which they are an administrator. If the user running this command is an Affiliate Administrator or an SSO Administrator, it will list all the affiliate applications.

To list affiliate applications using the client utility

1. 1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. 3. Type **ssoclient –listapps** to list the affiliate applications. This will list only the affiliate applications that the user performing this task is a member of, i.e., they need to belong the application user group account for that affiliate application.

See Also

SSO Affiliate Applications

Creating an Affiliate Application

Managing User Mappings

Managing Affiliate Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Listing the Properties of an Affiliate Application

This command shows the following information about the affiliate application. For more information about the properties for an affiliate application, see SSO Affiliate Applications.

The SSO system obtains this information from the xml file that you used to update the affiliate application. For more information, see Updating the Properties of an Affiliate Application.

To display the properties of an affiliate application using the administration utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –displayapp <*application name*>**, where <*application name*> is the name of the Affiliate Application you want to display the properties for.

To display the properties of an affiliate application using the client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*install drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient –displayapp <*application name*>**, where <*application name*> is the name of the Affiliate Application you want to display the properties for.

See Also

Managing User Mappings

Managing Affiliate Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Clearing the Application Cache

Use this command to remove the contents of the credential cache (all the information associated with the affiliate application) for the specified application on all of the Single Sign-On Servers.

To clear the cache

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –purgecache <*application name*>**, where <*application name*> is the name of the affiliate application you want to purge the cache for.

See Also

SSO Affiliate Applications

Managing Affiliate Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Setting the Enterprise Single Sign-On Server Using the Client Utility

Each time you use ssoclient, you must first point the user to the correct Single Sign-On server that contains their configuration information.

To set the SSO Server for a user using the client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient –server <*Single Sign-On Server*>**, where <*Single Sign-On Server*> is the name of the Single Sign-On server the user wants to connect to.

See Also

SSO Affiliate Applications

Managing Affiliate Applications

Displaying the Enterprise Single Sign-On Server Using the Client Utility

Use this command to display the Single Sign-On Server to which the user is currently pointing.

To display the SSO server using the client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient –showserver**.

See Also

SSO Affiliate Applications

Managing Affiliate Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Setting Credentials for the Affiliate Application Using the Client Utility

Use this command to set the credentials for a user so that the user is able to access a specific application.

This command does not display the password as you type it.

If the user mapping already exists, this command will set the credentials for that existing mapping. If you have not created the user mapping, the SSO system will prompt you for the user ID for the application.

To set credentials for the affiliate application using the client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient –setcredentials <*application name*>**, where <*application name*> is the specific application for which you want to set the credentials for.
4. When prompted for the user credentials, enter the user password for this application.
5. If you have not created the user mapping, the SSO system will prompt you for the user ID for the application.

See Also

SSO Affiliate Applications

Managing Affiliate Applications

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Managing User Mappings

This section provides information on how to create and configure the Enterprise Single Sign-On mappings.

Administrators use the ssomanage utility to manage mappings, while the application users use the ssoclient utility to manage their mappings.

> **Note** Application administrators can manage mappings associated with affiliate application for which they are an administrator, while SSO affiliate administrators and the SSO administrators can manage all mappings associated with all affiliate applications.

This section contains:

- Listing User Mappings
- Creating User Mappings
- Deleting User Mappings
- Setting Credentials for a User Mapping
- Enabling a User Mapping
- Disabling a User Mapping

Listing User Mappings

Use this command to list all the existing mappings for the specified user.

You must be an SSO administrator, application administrator, SSO affiliate administrator, or user to do this task.

Enabled user mappings appear as (E) <*domain*>\<*username*>, while disabled user mappings appear as (D) <*domain*>\<*username*>.

To list user mappings using the administration utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –listmappings <*domain*>\<*username*>** to list all the mappings a given user has in the affiliate applications he/she belongs to, where <*domain*> is the Microsoft® Windows® domain for the user account, and <*username*> is the Windows user name for which you want to list the user mappings. If the user is an Affiliate Administrator or an SSO Administrator, this command will list all the mappings for that user in all the affiliate applications.

   Or

4. Type **ssomanage –listmappings <*application name*>** to list all the user mappings for a given application.

   Or

5. If you are an application administrator, type **ssomanage –listmappings <*domain*>\<*username*> <*application name*>** to list all the mappings a given user has in the affiliate applications for which you are an administrator.

To list user mappings using the client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient –listmappings** to list all the mappings you have..

See Also

Creating User Mappings

SSO Mappings

Managing Affiliate Applications

Managing User Mappings

Creating User Mappings

Use this command to create one or more user mappings, as specified in the XML file. The following is an example XML file.

```
<sso>
<mapping>
<windowsDomain>domain</windowsDomain>
<windowsUserId>WindowsUserName</windowsUserId>
<externalApplication>Application name1</externalApplication>
<externalUserId>App1UserName</externalUserId>
</mapping>
<mapping>
<windowsDomain>domain</windowsDomain>
<windowsUserId>WindowsUserName</windowsUserId>
<externalApplication>Application name2</externalApplication>
<externalUserId>App2UserName</externalUserId>
</mapping>
</sso>
```

If a user account is changed, you must use this command create a mapping for the new user account. You should also remove the old user mapping. For more information about removing a mapping, see Deleting User Mappings.

After you create a user mapping, you must enable it before you can use this mapping in the SSO system. For more information, see Enabling a User Mapping.

> **Important** Only domain groups are supported for user mappings

To create user mappings using the administration utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –createmappings <*mappings file name*>**, where <*mappings file name*> is the name of file that contains the user mapping(s) you want to create.

To create user mappings using the client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient –setcredentials <*application name* >**, where <*application name* > is the name of affiliate application that the user wants to create a mapping for.

To create user mappings using the administration utility for host initiated SSO

1. If the affiliate application is used only for host initiated SSO, then there are

See Also

SSO Mappings

Managing Affiliate Applications

Managing User Mappings

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Deleting User Mappings

Use these commands to delete one or more user mappings, as specified in the XML file. The following is an example XML file.

```
<sso>
<mapping>
<windowsDomain>domain</windowsDomain>
<windowsUserId>WindowsUserName</windowsUserId>
<externalApplication>Application name1</externalApplication>
<externalUserId>App1UserName</externalUserId>
</mapping>
<mapping>
<windowsDomain>domain</windowsDomain>
<windowsUserId>WindowsUserName</windowsUserId>
<externalApplication>Application name2</externalApplication>
<externalUserId>App2UserName</externalUserId>
</mapping>
</sso>
```

If a user is not a member of the Application Users account, or does not exist in Active Directory, you should use this command to remove the user mapping from the Credential database.

If a user account is changed, you must use this command to remove the old user mapping, and then create a new user mapping for the new user account. For more information about creating a mapping, see Creating User Mappings.

To delete user mappings using the administration utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –deletemappings <*mappings file name*>**, where <*mappings file name*> is the name of the file that contains the user mapping(s) you want to delete.

To delete a specific user mapping using the administration utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –deletemapping <*domain*>\<*username*> <*application name*>**, where <*domain*> is the Windows domain for the user account, <*username*> is the Windows user name, and <*application name*> is the specific application for which you want to remove the user mapping.

To delete a user mapping using the client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient –deletemapping <*application name*>**, where <*application name*> is the name of the affiliate application you want to remove the user mapping for.

See Also

SSO Mappings

Managing Affiliate Applications

Managing User Mappings

Setting Credentials for a User Mapping

Use this command to set the credentials for a user to access a specific application.

This command does not display the password as you type it.

If the user mapping already exists, this command sets the credentials for that existing mapping. If you have not created the user mapping, the SSO system will prompt you for the user ID for the application.

To set credentials for an user mapping

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –setcredentials <*domain*>\<*username*> <*applicationname*>**, where <*domain*> is the Windows domain for the user account, <*username*> is the Windows user name, and <*applicationname*> is the specific application for which you want to set the credentials for.
4. When the SSO system prompts you for the user credentials, enter the user password for this application.
5. If you have not created the user mapping, the SSO system will prompt you for the user ID for the application.

To set credentials for a user mapping from client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient -setcredentials <*application name*>**, where <*application name*> is the name of the affiliate application you want to remove the user mapping for.

See Also

Creating User Mappings

SSO Mappings

Managing Affiliate Applications

Managing User Mappings

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Enabling a User Mapping

You must enable a user mapping before it you can use the mapping in the Single Sign-On system.

When you enable a user mapping, it will appear as (E) <*domain*>\<*username*> when you list the user mappings.

To enable a user mapping using the administration utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –enablemapping <*domain*>\<*username*> <*application name*>**, where <*domain*> is the Windows domain for the user account, <*username*> is the Windows user name for which you want to enable the credentials, and <*application name*> is the name of the affiliate application you want to remove the user mapping for and then press ENTER.

To enable a user mapping using the client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient –enablemapping <*application name*>**, where <*application name*> is the name of the affiliate application you want to remove the user mapping for.

See Also

Creating User Mappings

SSO Mappings

Managing Affiliate Applications

Managing User Mappings

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Disabling a User Mapping

You can disable a user mapping when you want to turn off all operations associated with a given mapping. You must disable a user mapping before you can remove it.

When you disable a user mapping, it will appear as (D) <*domain*>\<*username*> when you list the user mappings.

To disable a user mapping using the administration utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssomanage –disablemapping <*domain*>\<*username*> <*application name*>**, where <*domain*> is the Windows domain for the user account, and <*username*> is the Windows user name for which you want to disable the credentials, and <*application name*> is the name of the affiliate application you want to remove the user mapping for.

To disable a user mapping using the client utility

1. On the **Start** menu, click **run**, and then type **cmd**.
2. At the command line, go to the Enterprise Single Sign-On installation directory. The default installation directory is <*drive*>:\Program Files\Common Files\Enterprise Single Sign-On.
3. Type **ssoclient –disablemapping <*application name*>**, where <*application name*> is the name of the affiliate application you want to remove the user mapping for.

See Also

SSO Mappings

Managing Affiliate Applications

Managing User Mappings

Host Initiated Single Sign-On

Host initiated Single Sign-On enables a request from the host system to access a resource on a Windows system. The host system (for example, a RACF account) exists in a non-Windows environment and under the context of a non-Windows user. The Single Sign-On Credential Store maps host accounts to Windows accounts, enabling this access.

The following topics describe configuration specific to Host initiated SSO.

This section contains:

- Configuration Requirements for Host Initiated SSO
- Enabling and Disabling Host Initiated SSO
- Creating Affiliate Applications for Host Initiated SSO
- Validating Passwords for Host Initiated SSO
- Managing User Mappings for Host Initiated SSO
- Troubleshooting Host Initiated SSO

Configuration Requirements for Host Initiated SSO

Although Enterprise SSO and host initiated SSO have certain aspects in common, certain platform and Active Directory requirements are unique to host initiated SSO. This topic discusses those requirements, and lists the steps to check or create them on your system.

- Host initiated SSO can be executed only on a native Windows 2003 domain environment.
- The service account for SSO Service that is performing host initiated SSO must be configured to have TCB privileges. (You can configure this for the service account in the domain security policy.)

In addition, certain requirements are necessary when using Transaction Integrator for Host Initiated Processing. TI for HIP leverages host initiated SSO to achieve Single Sign-On for non-Windows users.

For example, service account for TI for HIP service runs under a service account domainname\hipsvc. This service can host applications that want to access remote or local resources on Windows with the Windows account that correspond to the non-Windows account.

The domainname\hipsvc account must belong to the Application Administrator group account for the Affiliate Application that is being used for Single Sign-On.

The domainname\hipsvc account must have constrained delegation privileges to use host initiated Single Sign-On. This can be configured by the domain administrator in Active Directory. Delegation can be configured for accounts that have registered SPNs. Constrained delegation allows the service account to access only components that are specified by the administrator.

To check your domain function level

1. In your **Active Directory Domains and Trusts** MMC snap-in, right click the node **Active Directory Domains and Trusts**, and then click **Raise Forest Functional Level**.
2. Verify that the functional level is **Windows Server 2003**. If it is not, refer to your Active Directory documentation before you attempt to change the setting.

To create an SPN

1. Download the **setspn** utility from the following location: http://go.microsoft.com/fwlink/?LinkId=33178 On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **setpsn -a hipsvc\computername.domain.com domain\hissvc**

   where **hipsvc\computername.domain.com** is the service that will perform the operation and the computer it is running on, and **domain\hissvc** is the service account for hipsvc.

After doing this, you can configure constrained delegation in Active Directory for this service account (domain\hissvc) to access the appropriate resource in the network.

To give TCB privileges for the SSO service account

- Under your **Domain Security Policy - Local Policies - User Rights Assignment**, add the SSO Service account to the **Act as part of operating system** policy.

  For more information on Kerberos Protocol Transition and Constrained Delegation, go to http://go.microsoft.com/fwlink/?LinkId=33232

See Also

Host Initiated Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Enabling and Disabling Host Initiated SSO

By default, host initiated Single Sign-On is not enabled in the Single Sign-On system, and must be enabled by the SSO Administrator.

To enable host initiated SSO

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -enable hisso**.

Disabling SSO applies to the entire SSO system, and all operations related to host initiated SSO are turned off.

To disable host initiated SSO

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. 3Type **ssomanage -disable hisso** as appropriate.

See Also

Host Initiated Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating Affiliate Applications for Host Initiated SSO

You can define two types of applications:

- **Individual** There is a 1-1 relationship between Windows users and non-Windows users.
- **Host Group** Multiple non-Windows users can be mapped to the same Windows account.

To create an individual type affiliate application

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage –createapps <AffApp.xml>**, where AffApp.xml is the name of the xml file.

   A sample file is shown below:

```
<?xml version="1.0"?>
<SSO>
  <application name="SSOApp_Host1">
    <description>An Individual Type Affiliate Application for Host Initiated SSO</descrip
tion>
    <contact>someone@companyname.com</contact>
    <appUserAccount>DomainName\AppUserGroup_HISSO</appUserAccount>
    <appAdminAccount>DomainName\AppAdminGroup_HISSO</appAdminAccount>
    <field ordinal="0" label="User ID" masked="no" />
    <field ordinal="1" label="Password" masked="yes" />
    <flags hostInitiatedSSO="yes" validatePassword="yes" windowsInitiatedSSO="no" enableA
pp="yes" />
  </application>
</SSO>
```

To create a host group type affiliate application

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage –createapps <AffApp.xml>**, where AffApp.xml is the name of the xml file.

   A sample file is shown below:

```
<?xml version="1.0"?>
<SSO>
  <application name="SSOApp_HostGroupApp1">
    <description>A Group Type Affiliate Application for Host Initiated SSO associating mu
ltiple non-Windows user to a single Windows user account(DomainName\WindowsUserAccount1)<
/description>
    <contact>someone@companyname.com</contact>
    <windowsAccount>DomainName\WindowsUserAccount1</windowsAccount>
    <appAdminAccount>DomainName\AppAdminGroup_HISSO</appAdminAccount>
    <field ordinal="0" label="User ID" masked="no" />
    <field ordinal="1" label="Password" masked="yes" />
    <flags hostInitiatedSSO="yes" validatePassword="yes" groupApp="yes" enableApp="yes" /
>
  </application>
</SSO>
```

To create an affiliate application supporting both Windows initiated SSO and host initiated SSO

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage –createapps <AffApp.xml>**, where AffApp.xml is the name of the xml file.

   A sample file is shown below:

```
<?xml version="1.0" ?>
- <SSO>
- <application name="SSOApp1">
  <description>An Individual Type Affiliate Application for both Host Initiated SSO and Windows Initiated SSO</description>
  <contact>someone@companyname.com</contact>
  <appUserAccount>DomainName\AppUserGroup</appUserAccount>
  <appAdminAccount>DomainName\AppAdminGroup</appAdminAccount>
  <field ordinal="0" label="User ID" masked="no" />
  <field ordinal="1" label="Password" masked="yes" />
  <flags hostInitiatedSSO="yes" validatePassword="yes" windowsInitiatedSSO="yes" enableApp="yes" />
  </application>
  </SSO>
```

See Also

Host Initiated Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Validating Passwords for Host Initiated SSO

When an affiliate application for host initiated SSO is created, password validation for the non-Windows user is enabled by default. This means when applications call SSO to obtain the Windows user token to access resources, they must provide the non-Windows user account and the non-Windows password. If the password does not match the password in the SSO credential database for that non-Windows user, access is denied. If necessary, the password validation feature can be disabled for the affiliate application. The password validation feature applies to both individual and host group type affiliate applications for host initiated SSO.

An example XML file for Individual type host initiated SSO affiliate application is:

```
<sso>
<application name="SAP">
<description>The SAP application</description>
<contact>someone@example.com</contact>
<appuserAccount>domain\AppUserGroupAccount</appuserAccount>
<appAdminAccount>domain\AppAdminGroupAccount</appAdminAccount>
<field ordinal="0" label="User Id" masked="no" />
<field ordinal="1" label="Password" masked="yes" />
<flags groupApp="no" hostInitiatedSSO=”yes” validatePassword=”yes” configStoreApp="no" allowTickets="no" validateTickets="yes" allowLocalAccounts="no" timeoutTickets="yes" adminAccountSame="no" enableApp="no" />
</application>
</sso>
```

In the case of individual applications for host initiated SSO, the appUserAccount is a group account that contains the list of Windows domain account users that have a 1:1 mapping with their corresponding non-Windows accounts.

An example XML file for host group type host initiated SSO affiliate application is:

```
<sso>
<application name="SAP">
<description>The SAP application</description>
<contact>someone@example.com</contact>
<appuserAccount>domain\AppUserAccount</appuserAccount>
<appAdminAccount>domain\AppAdminGroupAccount</appAdminAccount>
<field ordinal="0" label="User Id" masked="no" />
<field ordinal="1" label="Password" masked="yes" />
<flags groupApp="yes" hostInitiatedSSO=”yes” validatePassword=”yes” configStoreApp="no" allowTickets="no" validateTickets="yes" allowLocalAccounts="no" timeoutTickets="yes" adminAccountSame="no" enableApp="no" />
</application>
</sso>
```

In group applications for host initiated SSO, the appUserAccount must be an individual user account. It is this account that all non-Windows accounts are mapped to.

See Also

Host Initiated Single Sign-On

Managing User Mappings for Host Initiated SSO

Use the following procedures to create mappings, set credentials, and enable/disable mapping.

To create mappings in host initiated SSO

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage –createmappings <mapping file>**, where **mapping file>** is the name of the xml file.

   A sample mapping file is shown below:

   ```
   <SSO>
     <mapping>
       <windowsDomain>DomainName</windowsDomain>
       <windowsUserId>UserA</windowsUserId>
       <externalApplication>SSOApplication</externalApplication>
   <externalUserId>ExternalUserID that corresponds to UserA</externalUserId>
     </mapping>
   </SSO>
   ```

When the Validate Password feature is enabled for the affiliate application, it is necessary to set credentials, as follows:

To set credentials for individual type affiliate applications

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -setcredentials <Windows account name> <application name>**.

To set credentials for host group type affiliate applications

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -setcredentials <external account name> <application name>**.

To enable mappings for individual type affiliate applications

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -enablemapping <Windows account name> <application name>**.

To disable mappings for individual type affiliate applications

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -disablemapping <Windows account name> <application name>**.

To enable mappings for host group type affiliate applications

1. On the **Start** menu, click **Run**.

2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -enablemapping <external account name> <application name>**.

To enable mappings for individual type affiliate applications

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -disablemapping <external account name> <application name>**.

See Also

Host Initiated Single Sign-On

Troubleshooting Host Initiated SSO

The primary method of troubleshooting is tracing.

Tracing

Use the Trace command line utility to enable tracing in SSO.

> **Note** For the trace command to function, the file tracelog.exe must be in the following directory:
>
> <drive>:\Program Files\Common Files\Enterprise Single Sign-On
>
> You can download this file from the following location:
>
> http://go.microsoft.com/fwlink/?LinkId=33023

To use the trace utility

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **Trace –start –high** to set the tracing level to high and begin the trace.
5. Run the scenario with host initiated SSO.
6. Type **Trace –stop** to end the trace. A .bin file is generated in the directory above, which you can send to Microsoft for analysis.

See Also

Host Initiated Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Secure Deployment of Enterprise Single Sign-On

This section outlines a typical scenario for secure deployment of Enterprise Single Sign-On. For detailed procedures on the actions to take in SQL Server, see your SQL Server documentation.

This section contains:

- Deployment Overview
- Deployment Process

Deployment Overview

The system in this example is deployed over three domains, containing the following computers:

Domain ORCH.com

- ORCH domain controller
- HIS1, the HISSO server
- HIS2, the Master Secret Server
- HIS3, the Admin database

Domain SQL.com

- SQL domain controller
- SQL2, the SSO database

Domain HIS.com

- HIS domain controller
- HIS4 database

The key points defining this deployment are as follows:

- Domain ORCH.com and domain SQL.com have a two-way selective trust relationship.
- Domain ORCH.com is configured as native Windows 2003 Server functional level.
- All SSO services are running on an ORCH.com domain user account (Orch\SSOSvcUser). The user is configured to have access permission on the SQL2 machine in the SQL.com domain. The user is configured for protocol transition and constrain delegation within the ORCH.com domain.
- Another ORCH.com domain user (Orch\TestAppUser) is set for running test programs. This user is also configured for protocol transition and constrain delegation.

See Also

- Deployment Process

Deployment Process

The following steps give a high-level overview of secure deployment of Enterprise Single Sign-On. For detailed procedures on the actions to take in SQL Server, see your SQL Server documentation.

1. On the SQL Server domain controller, use the New Trust Wizard to create a trust with the following properties:
    - **Name:** ORCH.com
    - **Direction:** Two-way
    - **Sides:** This domain only
    - **Outgoing Trust Authentication Level - Local Domain:** Selective authentication
    - **Password:** Choose a password
    - **Confirm Outgoing Trust:** Yes
    - **Confirm Incoming Trust:** No
2. On the ORCH.com domain controller, use the New Trust Wizard to create a trust with the following properties:
    - **Name:** SQL.com
    - **Direction:** Two-way
    - **Sides:** This domain only
    - **Outgoing Trust Authentication Level - Local Domain:** Selective authentication
    - **Password:** Must be the same as password for ORCH.com
    - **Confirm Outgoing Trust:** Yes
    - **Confirm Incoming Trust:** No
3. On the ORCH.com domain controller, set the domain wide trust for Incoming from SQL.COM.
4. On the SQL.com domain controller, set the domain wide trust for Outgoing from ORCH.COM.
5. On the ORCH.com domain controller, raise the domain functional level to Windows Server 2003.
6. In the ORCH domain, create the following new users:
    - ORCH\SSOSvcUser
    - ORCH\TestAppUser
    - ORCH\AffAppUser
7. Add **Act as part of the operating system** to SSOSvcUser and TestAppUser.
8. Add **Allowed to Authenticate** privilege to ORCH\TestAdmin.
9. Add ORCH\SSOSvcUser to SQL2 in the SQL domain. (This step requires using Advanced View in Active Directory MMC.)
10. On the SQL2 computer, create the following two new logins:
    - ORCH\TestAdmin
    - ORCH\SSOSvcUser
11. On the SQL2 domain, create two domain global groups:
    - ORCH\SSOAdminGroup
    - ORCH\SSOAffAdminGroup
12. Add **Allowed to Authenticate** privilege to the ORCH\SSOAdminGroup group.
13. On the SQL2 database, create the following new login:
    - ORCH\SSOAdminGroup
14. Install the Master Secret Server as follows:
    - Log onto NTS5 using ORCH\TestAdmin.
    - Install ESSO, using SQL2 as the Master Secret Server.
15. Log onto HIS1 using ORCH\TestAdmin, and install Enterprise Single Sign-On. Configure ESSO as SSO join HIS2, using database server name SQL2.

16. Install the Enterprise Single Sign-On Admin utility on HIS3 using ORCH\TestAdmin.
17. Add the following users to the following groups:
    - Add ORCH\TestAppUser to ORCH\SSOAdminGroup
    - Add ORCH\AffAppUser to ORCH\TestAffUserGroup
18. Install SQL Server 2000a Enterprise on HIS3, and add login ORCH\AffAppUser.
19. On the HIS1 machine, open a command prompt and use the following commands to set constrain delegation and protocol transition:
    - **setspn -A MSSQLSvc/HIS3.ORCH.com:1433 ORCH\SSOSvcUser**
    - **setspn -A MSSQLSvc/HIS3.ORCH.com:1433 ORCH\TestAppUser**
20. On the **ORCH\SSOSvcUser** and **ORCH\TestAppUser** property pages, set the proper delegation for both user accounts by selecting the following options:
    - 3**Trust this user for delegation to specified services only**
    - **Use any authentication protocol**
21. Using ORCH\TestAdmin on the HIS1 computer, perform the following:
    - Add ORCH\TestAppUser to Remote Desktop User Group
    - Grant **Impersonate after authenticated** privilege to ORCH\SSOSvcUser
    - Grant **Impersonate after authenticated** privilege to ORCH\TestAppUser
22. Verify your deployment by logging onto HIS1 using ORCH\TestAppUser and running the following application configuration:

    Run LogonExternalUser Test.

```
<SSO>
   <application name="TestApp">
      <description>An SSO Test Affiliate Application</description>
      <contact>AffAppUser@ESSOV2.EBiz.Com</contact>
      <appUserAccount>ORCH\TestAffAdminGroup</appUserAccount>
      <appAdminAccount>ORCH\TestAffUserGroup</appAdminAccount>
      <field ordinal="0" label="User ID" masked="no" />
      <field ordinal="1" label="Password" masked="yes" />
      <flags
         groupApp="no"
         configStoreApp="no"
         allowTickets="no"
         validateTickets="yes"
         allowLocalGroups="yes"
         ticketTimeout="yes"
         adminGroupSame="no"
         enableApp="yes"
         hostInitiatedSSO="yes"
         validatePassword="yes"/>
   </application>
</SSO>
```

See Also

- Deployment Overview

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Password Synchronization

The purpose of Password Synchronization is to simplify administration of the SSO credential database, and to keep passwords in sync across user directories.

These two tasks are accomplished through the use of password synchronization adapters, and the topics in this section describe the command line utility for creating and managing those adapters.

There are three types of password synchronization sub-features.

The first type is **Windows to External** (for example, Active Directory to RACF). In this scenario, a Windows user's password change is captured and sent to the Enterprise SSO Server assigned to receive password changes from domain controllers. This then forwards the password change to an external system and the mapping in the SSO credential database is kept in sync with the change made on the external system.

The second type is **External to Windows - Full synchronization**. In this scenario, a password is captured on the External system and sent to the Enterprise Single Sign-On server assigned for Password Synchronization which then updates the password in the SSO credential database, and also updates the Windows user's password in Active Directory.

The third type is **External to Windows - Partial synchronization**. In this scenario a password is captured on the External system and sent to the Enterprise Single Sign-On server assigned for Password Synchronization which then updates the password in the SSO credential database.

This section contains:

- Installing Password Synchronization
- Administering Password Synchronization
- Configuring Password Synchronization
- Managing Password Synchronization

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Installing Password Synchronization

As with the other Single Sign-On features, Password Synchronization is not installed in the default Host Integration Server 2004 installation, and must be specifically selected during setup.

To install Password Synchronization

1. Run the Host Integration Server 2004 setup program and select **Custom Installation**.
2. Under the **Security Integration** feature, select the **Enterprise Single Sign-On Password Synchronization** sub feature.
3. Complete the installation.

To addition to this, Password synchronization adapters are necessary to send and receive password changes to the external system. The topics in this section describe how to configure your own adapters. You can also view a list of currently available adapters at the following location:

http://go.microsoft.com/fwlink/?LinkId=30101

You can also contact support aliases to obtain information on these Password synchronization adapters.

Finally, to capture password changes made in Active Directory, in addition to installing the ENTSSO Password Sync feature, components need to be installed on the domain controllers to capture password changes.

Both the Windows Password Capture component and Password Change Notification Service (PCNS) must be installed on all domain controllers from which you will be capturing passwords. You can find these components in the following location:

<HIS CD ROOT>\Platform\PCNS

Read the accompanying documentation (also located in the folder above) before you proceed with the installation on the domain controller.

See Also

Password Synchronization

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Administering Password Synchronization

Use the SSOPS command line utility to administer your password synchronization. Most of commands in this section are intended for use by an administrator only.

For many commands, the command output is displayed on the screen in two columns. As certain screen settings may cause truncation of data, for best results you should change the screen buffer size/Windows size to 120 characters.

The SSOPS commands are listed below. Procedures and further explanation are located throughout the rest of this topic.

Command	**Function**
-list	Lists existing adapters
-display	Displays adapter information
-create	Creates new adapter(s)
-setprops	Sets properties for adapter
-update	Updates existing adapter(s)
-delete	Deletes an existing adapter
-enable	Enables adapter
-disable	Disables adapter
-addapp	Adds application for adapter
-deleteapp	Deletes application for adapter
-reset	Resets notification or damping queues
-addtogroup	Adds adapter to adapter group
-deletefromgroup	Deletes adapter from adapter group

To list existing adapters

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -list** and press Enter.

   Adapters and descriptions will be listed. (E) denotes that the adapter is enabled, (D) denotes that it is disabled.

To display adapter information

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -display <adapter name>** and press Enter.

   The screen output will display information for the specified adapter.

   In addition to name, type, description, computer, and accounts, the following information is displayed.

Adapter Flag	**Details**
Adapter enabled	Determines whether or not the adapter is enabled. Flag: SSO_FLAG_ENABLED Attribute Name: enableApp Default: No

Allow local accounts	Determines whether or not the App Admin or App Users accounts can be local accounts. Flag: SSO_FLAG_APP_ALLOW_LOCAL Attribute Name: allowLocalAccounts Default: No
Receive password changes from adapter	Determines whether or not the adapter is allowed to receive external password changes. Flag: SSO_FLAG_PARTIAL_SYNC_FROM_EXTERNAL_TO_DB Attribute Name: syncFromAdapter Default: No
Verify old password	Determines whether the adapter will verify the old password when an external password change is received. If this flag is set then with an external password change the external adapter must supply the old external password as well as the new external password. The old external password is then compared with the existing external password in the SSO database for that external account. If they match, the password change is accepted. If they do not match, the password change is rejected. Flag: SSO_FLAG_SYNC_VERIFY_EXTERNAL_CREDS Attribute Name: verifyOldPassword Default: Yes
Change Windows password	Determines whether or not the Windows password will also be changed when an external password change is received (full sync). ENTSSO always uses the old Windows password stored in the SSO database to change the Windows password to the new value (Windows requires both the old and new password to change a users password), so this must be initialized before the Windows password change can succeed. If password sync is configured for a particular mapping, then when the external credentials are set via administrative tools (ssomanage or ssoclient -setcredentials) the Windows password stored in the SSO database will also be set.Flag: SSO_FLAG_FULL_SYNC_FROM_EXTERNAL_TO_WINDOWS Attribute Name: changeWindowsPassword Default: No
Send Windows password changes to adapter	Determines whether or not Windows password changes will be sent to the external adapter. Flag: SSO_FLAG_FULL_SYNC_FROM_WINDOWS_TO_EXTERNAL Attribute Name: syncToAdapter Default: No
Send old password to adapter	If Yes, the old password value (from the SSO database) will also be sent to the external adapter as well as the new password value. Some external systems might require both the old and new password values to change the password. Flag: SSO_FLAG_SYNC_PROVIDE_OLD_EXTERNAL_CREDS Attribute Name: sendOldPassword Default: No
Allow mapping conflicts	Determines whether or not the adapter will allow mapping conflicts. A mapping conflict occurs when mappings are not unique. In a single SSO Individual application, mappings are always one-to-one: one Windows account is mapped to exactly one external account and vice versa. However, it is possible to assign more than one application to an adapter. Thus, it is possible to have a mapping in one application that conflicts with a mapping in the other. This purpose of this flag is to prevent this from occuring. It is more secure to not allow mapping conflicts unless there is a specific, well understood requirement for this behavior. Flag: SSO_FLAG_SYNC_ALLOW_MAPPING_CONFLICTS Attribute Name: allowMappingConflicts Default: No

Adapter Description	Details
Notification retry count	Default is 1.
Notification retry delay (in mins)	Default is 5.
Maximum pending notifications	Default is 8.
Store notifications (when offline)	True/False.
Server name	Server name.
Port number	Port number.
Applications for this adapter	List of applications currently assigned to the adapter.

To create new adapters

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -create <adapter file>** and press Enter.

   The screen output will display information for the newly created adapter.

To set properties for an adapter

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -setprops <adapter name>** and press Enter.

   The screen output will display the properties for the specified adapter. You can edit them if necessary, but new values are not validated.

To update existing adapters

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -update <adapter file>** and press Enter.

   Use this command to update the settings and flags for a specified adapter. Do not use this command to set properties; use instead the -setprops command.

To delete an existing adapter

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -delete <adapter name>** and press Enter.

   The specified adapter will be deleted.

To enable an adapter

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -enable <adapter name>** and press Enter.

   The specified adapter will be enabled.

To disable an adapter

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -disable <adapter name>** and press Enter.

   The specified adapter will be disabled.

To add an application to an adapter

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -addapp <adapter name> <application name>** and press Enter.

   The specified SSO application wil be assigned to the specified adapter. This means that the passwords for the mappings in that application will now be synchronized using this adapter.

   While multiple applications can be assigned to one adapter, any given application can only be assigned to one adapter.

To delete an application from an adapter

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -deleteapp <application name>** and press Enter.

   The specified SSO application will be removed from an adapter. (Since an application can only be assigned to one adapter, it is not necessary to specify the adapter name.)

To reset notification

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -reset <adapter name | all | damping>** and press Enter.

   This command clears the damping table and/or notification queues for a single adapter or all adapters, as specified. The damping table stores a 10-minute history of password changes. Before the Enterprise SSO system accepts or sends a password change, it checks the damping table to see if it has performed the same change recently. If it has, the new change is discarded.

To add an adapter to an adapter group

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssops -addtogroup <adapter name> <adapter group>** and press Enter.

   This command adds the specified adapter to the specified adapter group. While an adapter can belong to only one adapter group, an adapter group can contain multiple adapters.

To delete an adapter from an adapter group

1. 3On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.

4. Type **ssops -deletefromgroup <adapter name> <adapter group>** and press Enter.

   This command deletes the specified adapter from the specified adapter group.

See Also

Password Synchronization

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring Password Synchronization

Use the SSOCONFIG command line utility to configure your password synchronization settings.

To specify the directory for replay files

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssoconfig -replayfiles <replay files directory> | -default** and press Enter.

   Note Replay files are not deleted when you change the service account. If you change this account, you will need to delete the replay files manually.

To display or change maximum password synchronization age

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssoconfig -syncage <maximum password age in hours>** and press Enter.

   Note The SSOCONFIG utility uses the time on the SQL Server computer as its system time. Remember this when using any commands related to time.

See Also

Password Synchronization

Managing Password Synchronization

Use the SSOMANAGE command line utility to enable or disable SSO features, and to display current SSO database settings.

To enable SSO features

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -enable** and press Enter.

To disable SSO features

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -disable** and press Enter.

To display current database settings

1. On the **Start** menu, click **Run**.
2. In the **Run** dialog box, type **cmd**, and then click **OK**.
3. At the command line, go to the Enterprise Single Sign-On installation directory. The default is <drive>:\Program Files\Common Files\Enterprise Single Sign-On.
4. Type **ssomanage -displaydb** and press Enter.

See Also

Password Synchronization

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Technical Reference

The Technical Reference section contains areas that will aid your understanding of the Host Integration Server 2004 documentation terminology, and some specific help for issues you may encounter as you use Host Integration Server 2004.

This section contains:

- Host Integration Server 2004 Glossary
- UI Help
- Administrator's Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host Integration Server 2004 Glossary

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

3270

The information display system for IBM hosts (mainframes). The system includes terminals, printers, and controllers that enable a user to access host functions.

5250

The information display system for IBM AS/400 computers.

802.2

The logical link control protocol used for communication over a Token Ring or Ethernet network. The 802.2 protocol is an IEEE standard.

1-byte unsigned Integer

An integer data type that has a positive value ranging from 0 to 255.

2-byte signed Integer

An automation integer data type that can be either positive or negative. The most significant bit is the sign bit, which is 1 for negative values and 0 for positive values. The storage size of the integer is 2 bytes. A 2-byte signed integer can have a range from -32,768 to 32,767.

2PC

See **two-phase commit (2PC)**.

4-byte Real

Also referred to as a single-precision floating-point or Single. Single variables are stored as IEEE 32-bit (4-byte) floating-point numbers, ranging in value from –3.402823E38 to –1.401298E-45 for negative values and from 1.401298E-45 to 3.402823E38 for positive values. The type-declaration character for Single is an exclamation point (!).

4-byte signed Integer

An Automation integer data type that can be either positive or negative. The most significant bit is the sign bit, which is 1 for negative values and 0 for positive values. The storage size of the integer is 4 bytes. A 4-byte signed integer can have a range from -2,147,483,648 to 2,147,483,647.

8-byte Real

Also referred to as a double-precision floating-point or Double. Double data type variables are stored as 64-bit (8-byte) numbers. A Double variable is stored as a 64-bit (8-byte) number ranging in value from 1.79769313486232E308 to –4.94065645841247E-45 for negative values, from 4.94065645841247E-324 to 1.79769313486232E308 for positive values, and 0. The type-declaration character is a number sign (#).

3270 emulator

Software that enables a microcomputer to act as a 3270 terminal, displaying information from a host system (mainframe). Emulator software can also enable a desktop computer to send print jobs from a host system to a printer connected to the microcomputer.

3270 terminal emulation

The use of software that enables a microcomputer to act as a 3270 terminal, displaying information from a host system (mainframe). Emulation software can also enable a microcomputer to send print jobs from a host system to a printer connected to the microcomputer.

5250 emulator

Software that enables a microcomputer to act as a 5250 terminal interacting with an AS/400 system.

5250 terminal emulation

The use of software that enables a microcomputer to act as a 5250 terminal interacting with an AS/400 system.

-A-

A3270

The server transaction program for the APPC 3270 Terminal Emulator facility.

abend

Short for abnormal end. The premature ending of a program because of program error or system failure.

ACID

See **atomic, consistent, isolated, and durable (ACID)**.

acknowledgment required (ACKRQD)

A field in the header of a Status-Control message. If a Status-Control request has ACKRQD set in the message header, the recipient must supply a Status-Control response before the sender sends further messages or further Status-Control requests.

ACKRQD

See **acknowledgment required (ACKRQD)**.

ActiveX® Data Objects (ADO)

A data access interface that communicates with OLE DB-compliant data sources to connect to, retrieve, manipulate, and update data.

ACTLU

SNA command sent by the system services control point (SSCP) to a logical unit (LU) to activate a session and establish session parameters.

ACTPU

SNA command sent by the system services control point (SSCP) to activate a physical unit (PU), so that any logical units (LUs) controlled by this PU are available to the SNA network.

adapter

Refers to a circuit board, network card, and similar expansion devices with a specialized function, such as controlling a video display monitor or accessing a communications line. Not the same as a driver.

administration access

The level of access available to a user. The user may be granted or denied the right to use the interfaces (Host Integration Server 2004 Setup, SNA Manager, or the **snacfg** command) to read and change the configuration file, to start and stop services and connections, or to reset LUs.

ADO

See **ActiveX® Data Objects (ADO)**.

Advanced Peer-To-Peer Networking (APPN)

An extension to SNA that features (a) greater distributed network control that avoids critical hierarchical dependencies, thereby isolating the effects of single points of failure; (b) dynamic exchange of network topology information to foster ease of connection, reconfiguration, and adaptive route selection; (c) dynamic definition of network resources; and (d) automated resource registration and directory lookup. APPN extends the LU 6.2 peer orientation for end-user services to network control and supports multiple LU types, including LU 2, LU 3, and LU 6.2.

Advanced Program-to-Program Communications (APPC)

A means of enabling programs to communicate directly with each other, across a network or within a single system. APPC uses a type of logical unit called LU 6.2, and enables transaction programs (TPs) to engage in peer-to-peer communications in an SNA environment.

(1) The general term that characterizes the LU 6.2 architecture and its various implementations in products. (2) Refers to the LU 6.2 architecture and its product implementations as a whole or to an LU 6.2 product feature in particular, such as an APPC application programming interface. (3) A method for enabling programs to communicate directly with each other across a network or within a single system. APPC uses a type of LU called LU 6.2, and enables TPs to engage in peer-to-peer communications in an SNA environment.

AFTP

See **APPC File Transfer Protocol (AFTP)**.

AFTPD

The server transaction program for the APPC File Transfer Protocol facility.

aggregation

A composition technique for implementing component objects whereby a new object can be built using one or more existing objects that support some or all of the required interfaces of the new object.

alert

A message that indicates an abnormal event or a failure.

allocate

(1) The process that an operating system uses to respond to a request from a program to reserve memory for use by the program. (2) In Advanced Program-to-Program Communications (APPC), a verb that assigns a session to a conversation. *Contrast with* **deallocate**.

American Standard Code for Information Interchange (ASCII)

A coding scheme that assigns numeric values to letters, numbers, punctuation marks, and certain other characters.

API

See **application programming interface (API)**.

APING

(1) The APPC Connectivity Tester facility. (2) The client transaction program for the APPC Connectivity Tester facility.

APINGD

The server transaction program for the APPC Connectivity Tester facility.

APPC

See **Advanced Program-to-Program Communications (APPC)**.

APPC File Transfer Protocol (AFTP)

(1) The client transaction program for the APPC File Transfer Protocol facility. (2) An interactive full-screen environment with a specific set of commands used to manage and transfer files between a client and server computer. (3) An API that provides APPC file transfer capabilities.

APPC mode

A collection of session properties used by LU 6.2-type logical units (LUs) as they carry on a session. A mode can be used by many LU pairs at the same time.

APPC mode name

The name used to represent a set of characteristics to be used in an APPC LU-LU session.

APPC verb

The mechanism by which a program accesses APPC. Each verb supplies parameters to APPC. *See also* **Advanced Program-to-Program Communications (APPC)**.

application programming interface (API)

The set of programming language constructs or statements that can be coded in an application program to invoke the specific functions and services provided by an underlying operating system or service program.

application requester (AR)

(1) The source of a request to a remote relational database management system (DBMS). (2)The ODBC driver to DB2 connector that enables C and C++ applications to issue dynamic SQL queries and call DB2 stored procedures.

application TP

An application program that uses Advanced Program-to-Program Communications (APPC) to accomplish tasks for end-users and exchange data with other transaction programs (TPs) in an SNA environment.

APPN

See **Advanced Peer-To-Peer Networking (APPN)**.

AR

See **application requester (AR)**.

array

A set of sequentially indexed elements which have the same intrinsic data type. Each element of an array has a unique identifying index number. A changes made to one element of an array does not affect the other elements.

ASCII

See **American Standard Code for Information Interchange (ASCII)**.

assembly

A collection of functionality built, versioned, and deployed as a single implementation unit (one or multiple files). An assembly is the primary building block of a .NET Framework application. All managed types and resources are marked either as accessible only within their implementation unit or as exported for use by code outside that unit. In the common language runtime, the assembly establishes the name scope for resolving requests and the visibility boundaries are enforced. The runtime can determine and locate the assembly for any running object because every type is loaded in the context of an assembly.

assembly cache

A machine-wide code cache used for side-by-side storage of assemblies. There are two parts to the cache. First, the global assembly cache contains assemblies that are explicitly installed to be shared among many applications on the computer. Second, the download cache stores code downloaded from Internet or intranet sites, isolated to the application that triggered the download so that code downloaded on behalf of one application or page does not impact other applications. *See also* **global assembly cache (GAC)**.

asynchronous verb completion

Processing of an SNA verb where the initial API call returns immediately, so that the normal operation of the program is not blocked while processing completes. When the verb completes, the application is notified through a Microsoft® Windows® message or event. *Contrast with* **synchronous verb completion**.

atomic, consistent, isolated, and durable (ACID)

An acronym that describes the four key properties required of any Windows-based transaction:

- **Atomic.** Each transaction must execute completely or not at all.
- **Consistent.** The structural integrity of the transaction database must be maintained.
- **Isolated.** A transaction cannot access data that is already involved in a transaction.
- **Durable.** The TP data must be stored securely to enable recovery of the transaction results.

> **Note** A mainframe-based transaction program (TP) differs from a Windows-based transaction. A mainframe-based TP is a COBOL program that exists in the CICS or IMS environment and contains one or more mainframe transactions. A mainframe transaction might or might not meet the ACID properties.

atomicity

A feature of a transaction that indicates that either all actions of the transaction happen or none happens.

auditing

Tracking the activities of administrators and users by recording selected types of events (for example, the changing of the configuration file) in the security log of a computer running Host Integration Server 2004.

authentication

The process of determining the identity of a user attempting to access a system. For example, passwords are commonly used to authenticate users.

automatic partnering

A setting for APPC LUs and modes that enables LU-LU pairs (with assigned modes) to be generated automatically by Host Integration Server 2004. Each time a new APPC LU or mode is created with automatic partnering enabled, Host Integration Server 2004 searches for existing LUs and modes that also have automatic partnering enabled. Host Integration Server 2004 then uses all available automatic partners to create as many unique LU-LU pairs as possible, each pair containing a remote LU, local LU, and assigned mode. Disabling an automatic partner setting after an LU or mode has been created does not remove that LU or mode from LU-LU pairs already generated.

automatic transaction

A transaction that is created by the COM+ run-time environment for an object based on the transaction attribute of a component.

Automation

Automation is COM-based technology that enables dynamic binding to COM objects at run time.

Automation client

Also called an Automation controller. An application that manipulates the objects, methods, and properties of another application (the Automation server) through Automation.

Automation object

An object that is exposed to other applications or programming tools through Automation interfaces.

Automation server

An application that enables its objects, methods, and properties to be controlled by other applications through Automation.

-B-

backup configuration file

An extra copy of the configuration file, saved by using the **File** menu **Backup Configuration** command in SNA Manager. The default extension for backup configuration file names is .SNA.

backup server

A computer running Host Integration Server 2004, and designated as a backup server, on which the configuration file is replicated by Host Integration Server 2004. Host Integration Server 2004 loads the copy of the configuration file located on a backup server if the primary server goes down. One or more computers running Host Integration Server 2004 can operate as backup servers.

Base

A part of each Host Integration Server 2004 component that provides the operating environment for the core functions of that component. The Base passes messages between components and provides functions common to all components, such as diagnostic tracing.

base client

A client that runs outside the COM+ run-time environment, but that instantiates COM+ objects.

base process

An application process in which a base client executes. A base client runs outside the COM+ run-time environment and instantiates COM+ application objects.

basic conversation

In APPC, a conversation type generally used by applications that provide services to other local applications. Basic conversations provide a greater degree of control over the transmission and handling of data than mapped conversations. *See also* **mapped conversation**.

basic transmission unit (BTU)

A standard unit of information transmitted over an SNA network. A BTU consists of the transmission header (TH), the request/response header (RH), and the request/response unit (RU). The maximum size of the BTU is controlled in VTAM by the MAXDATA= parameter and in Host Integration Server by the Max BTU Length parameter.

batch job

A predefined sequence of programs that can be run through the Job Entry Subsystem or through an automated scheduling system. Each program that runs as part of the sequence is considered a batch step. Typically data is passed from one step to the next through temporary or permanent files on the file system.

batch step

An application program that is executed as part of a larger batch job. Typically, data is read from and written to temporary or permanent files on the files systems.

BBI

See **begin bracket indicator (BBI)**.

BBIUI

See **begin basic information unit indicator (BBIUI)**.

BCI

See **begin chain indicator (BCI)**.

begin basic information unit indicator (BBIUI)

Bit 5 of Flag 2 of a Status-Control message. BBIUI is set on a Status-Control message corresponding to an outbound SNA request with BBIU (begin basic information unit). It is supplied solely for the use of SNA server components. Your application should not attempt to use it.

begin bracket indicator (BBI)

Bit 4 of Flag 1 of a Status-Control message. BBI is set if the chain carries BB (begin bracket). Note that this does not necessarily indicate that the bracket has been initiated.

begin chain indicator (BCI)

Bit 1 of Flag 1 of a Status-Control message. BCI is set if the message starts a chain.

blocking

A method of operation in which a program that issues a call does not regain control until the call completes. *See also* **synchronous verb completion**.

Boolean expression

An expression that can be evaluated either true (nonzero) or false (0). You can use the keywords True and False to supply the values of -1 and 0, respectively. The field data type Yes/No is Boolean and has the value of -1 for Yes and 0 for No.

bounded

Refers to recordsets or arrays. The last input parameter or the last output parameter in a method can be bounded. This means its actual size can vary from zero to the maximum number of elements (in an array) or rows (in a recordset) specified at design time.

bracket

A chained set of RUs and their responses, which together make up a transaction between two LUs. One bracket must be finished before another can be started.

BTU

See **basic transmission unit (BTU)**.

business rule

The combination of validation edits, logon verifications, database lookups, policies, and algorithmic transformations that constitute an enterprise's way of doing business. Also known as business logic.

byte

A unit of information consisting of eight bits. A byte, or binary term, is the smallest collection of bits that can be accessed directly. The integer value of a byte can range from 0 to 255.

-C-

caller

A client that invokes a method of an object. The caller of an object is not necessarily the creator of an object. For example, client A could create object X and pass this reference to client B, and then client B could use that reference to call a method of object X. In this case, client A is the creator, and client B is the caller. *See also* **creator**.

catalog

In Windows 2000 and later, the catalog is the COM+ application data store that maintains configuration information for components, COM+ applications, and roles. You can administer the catalog by using TI Manager.

CDI

See **change direction indicator (CDI)**.

CEI

See **chain ending indicator (CEI)**.

chain

A series of related messages or data packets that are transmitted consecutively and are treated as a single entity forming a complete message.

change direction indicator (CDI)

Bit 6 of Flag 1 of a Status-Control message. CDI is set if chain carries change direction (CD).

Channel

A channel-attached connection to a host system.

characteristics

A set of internal values maintained by CPI-C for each conversation. They can affect the operation of the entire conversation or of specific calls.

CICS

See **Customer Information Control System (CICS)**.

class

A type that defines the interface of a particular type of object. A class defines the properties of the object and the methods used to control the behavior of an object.

class factory

An object that implements the **IClassFactory** interface, which enables it to create objects of a specific class.

class ID (CLSID)

A universally unique identifier (UUID) that identifies a COM component. Each COM component has its CLSID in the Windows registry so that it can be loaded by other applications.

client

A computer or a software component using services available through Host Integration Server 2004. To run applications such as a 3270 emulator, the client uses the Host Integration Server 2004 computer to gain access host or peer systems on the SNA or TCP/IP network.

client/server

A distributed application model in which client applications request services from a server application. A server can have many clients at the same time, and a client can request data from multiple servers. An application can be both a client and a server.

CLSID

See **class ID (CLSID)**.

coaxial cable

A cable that consists of a conductor within another conductor, with insulation between the two conductors. The inner conductor is usually a small copper tube or wire, and the outer conductor is usually copper tubing or copper braid. It is the common medium used to connect LANs and 3270 devices. The maximum distance that a coaxial cable can be run between a 3270-type cluster controller and peripheral devices is 5,000 feet (1,500 meters).

code page

A table that associates specific ASCII or EBCDIC values with specific characters.

COM

See **Component Object Model (COM)**.

COM+

See **Component Services (COM+) component**; **Component Services (COM+) object**.

COMMAREA

An area of memory in the mainframe used for communications and accessible to various programs. It is similar to a data structure that contains both input parameters and return data.

Common Programming Interface for Communications (CPI-C)

A set of C-language routines that applications distributed across an SNA network can use to work together. Through CPI-C, distributed applications on computers communicating as peers can exchange data to accomplish a processing task, such as querying a remote database or copying a remote file.

An evolving application programming interface (API), embracing functions to meet the growing demands from different application environments and to achieve openness as an industry standard for communications programming. CPI-C provides access to interprogram services such as (a) sending and receiving data, (b) synchronizing processing between programs, and (c) notifying a partner of errors in the communication.

Common Service Verb (CSV)

An application programming interface (API) that provides ways of tracing, translating characters, and sending network management information to a host. Each verb supplies parameters to CSV.

communications controller

A device that directs the transmission of data over a network (for example, the IBM 3725 front-end processor).

COMP-1

Specified for internal floating-point items (single precision). The items are four bytes long. The sign is contained in the first bit of the leftmost byte, and the exponent is contained in the remaining seven bits of that byte. The last three bytes contain the mantissa.

COMP-2

Specified for internal floating-point items (double precision). The items are eight bytes long. The sign is contained in the first bit of the leftmost byte, and the remaining seven bits of that byte contain the exponent. The remaining seven bytes contain the mantissa.

COMP-3

Specified for internal decimal items. In storage, these items appear in packed decimal format. There are two digits for each character position (byte), except for the trailing character position (byte), which is occupied by the low-order digit and sign. The item can contain only the digits 0 through 9, plus a sign (in the last position), representing a value not exceeding 29 decimal digits (15 bytes).

component

A discrete unit of code built on ActiveX® controls that deliver a well-specified set of services through well-specified interfaces. Components provide the objects that clients request at run time.

Component Object Model (COM)

An open architecture for cross-platform development of client/server applications based on object-oriented technology. Clients have access to an object through the interfaces implemented on the object. COM is language-neutral, so any language that produces COM components can also produce COM applications.

Component Services (COM+) component

A Component Object Model (COM) component that executes in the COM+ run-time environment. A COM+ component is commonly known as a COM+ application. A COM+ component must be a dynamic-link library (.dll) file that implements a class factory to create objects and that describes all of the interfaces of the component in a type library to facilitate standard marshaling.

Component Services (COM+) object

A Component Object Model (COM) object that executes in the COM+ run-time environment.

concurrency

The appearance of simultaneous execution of processes or transactions by interleaving the execution of multiple pieces of work.

configuration file

A file containing setup and configuration information for Host Integration Server 2004. It defines servers, connections, LUs, users, and other items. The configuration file that is loaded when SNA Manager starts is called COM.CFG.

connection

The data communication path between a workstation or server and other computers on the SNA network. Host Integration Server 2004 offers a variety of connection types:

- 802.2 (Token Ring or Ethernet)
- Synchronous Data Link Control (SDLC)
- X.25
- Distributed function terminal (DFT)
- Channel
- Twinax

connection object

In AFTP, a connection (not necessarily active) to a partner computer.

connectivity

(1) The capability of a system or device to be attached to other systems or devices without modification. (2) The capability to attach a variety of functional units without modifying them.

connectivity option

A type of connection hardware and software through which one computer communicates with other computers.

consistency

A state in which durable data matches the state expected by the business rules that modified the data.

constructor

In C, a special initialization function that is called automatically whenever an instance of a class is declared. This function prevents errors that result from the use of uninitialized objects. The constructor has the same name as the class itself and cannot return a value.

contention loser

In an APPC LU-LU session, the LU that cannot start a conversation with its partner LU (the contention winner) without first requesting permission of the partner LU. *See also* **contention winner**.

contention winner

In an APPC LU-LU session, the LU that can start a conversation with its partner LU (the contention loser). If parallel sessions between the two LUs are being used, each LU may be the contention winner for some sessions and the contention loser for other sessions. *See also* **contention loser**.

context

The state that is implicitly associated with a given COM+ object. The context contains information about the execution environment of an object, such as the identity of the creator of an object and, optionally, the transaction encompassing the work of the object. The context of an object is similar in concept to the process context that an operating system maintains for an executing program. The COM+ run-time environment manages a context for each object.

control point

A node or other SNA component that controls network resources and coordinates the activation of sessions.

controller

A device that directs the transmission of data over a network (for example, the IBM 3725 front-end processor).

conversation

The process used by network-based applications to communicate with each other and to exchange data to accomplish processing tasks. (1) A logical connection between two transaction programs using an LU 6.2 session. Conversations are delimited by brackets to gain exclusive use of a session. (2) The interaction between TPs carrying out a specific task. Each conversation requires an LU-LU session. A TP can be involved in several conversations simultaneously. *See also* **basic conversation**; **mapped conversation**.

conversation characteristics

Internal API values that define the overall operation for a conversation or for a specific call. *See also* **application programming interface (API)**; **conversation**.

conversation ID

A unique identifier for a conversation between two transaction programs (TPs).

CPI-C

See **Common Programming Interface for Communications (CPI-C)**.

creator

A client that creates an object provided by a component (using **CreateObject**, **CoCreateInstance**, or the **CreateInstance** method). When a client creates an object, it is given an object reference that can be used to call the methods of that object. *See also* **caller**.

CSV

See **Common Service Verb (CSV)**.

Currency

An 8-byte, fixed-point data type that is useful for calculations involving money or for fixed-point calculations in which accuracy is extremely important. This data type is used to store numbers with up to 15 digits to the left of the decimal point and 4 digits to the right. The type-declaration character in Microsoft® Visual Basic® is an at sign (@). Currency can range from –922,337,203,685,477.5808 to 922,337,203,685,477.5807.

current directory

The first directory in which the operating system looks for programs and data files and stores files for output.

Customer Information Control System (CICS)

An IBM transaction processing program that provides an environment on IBM mainframes in which applications can communicate with terminals or other applications.

-D-

DACTLU

An SNA command that is sent to deactivate the session between the system services control point (SSCP) and a logical unit (LU).

DACTPU

An SNA command that is sent to deactivate the session between the system services control point (SSCP) and a physical unit (PU).

data link control (DLC)

In SNA, the protocol stack layer that transmits messages across links and manages link-level flow and error recovery.

data set members

Members of partitioned data sets that are individually named elements of a larger file that can be retrieved by name.

data source name (DSN)

The name that applications use to request a connection to an ODBC data source. DSN also means Data Set Name on the mainframe.

database

(1) A collection of data with a given structure for accepting, storing, and providing on demand data for multiple users. (2) A collection of interrelated data organized according to a database schema to serve one or more applications. (3) A collection of data fundamental to a system. (4) A collection of data fundamental to an enterprise.

Date

An 8-byte, real data type used to store dates and times as a real number. Variables are stored as 64-bit numbers. The value to the left of the decimal represents a date, and the value to the right of the decimal represents a time. The Date data type can range from January 1, 1000 to December 31, 9999.

DCOM

See **distributed COM (DCOM)**.

DDM

See **distributed data management (DDM)**.

deallocate

(1) The process an operating system uses to free memory that has been previously allocated by a program. (2) In Advanced Program-to-Program Communications (APPC), a verb that ends a conversation. *Contrast with* **allocate**.

Decimal

A data type that stores a signed, exact numeric value described as the number of digits appearing before and after the decimal point, with a maximum of 29 total digits. All possible digits cannot be represented if you are using the maximum number of digits.

default

The value that is automatically used if nothing is specified.

dependent local APPC LU

A local logical unit (LU) that enables Advanced Program-to-Program Communications (APPC) with a peer system, but only through a host (mainframe) system. The type of LU used in dependent APPC is LU 6.2.

DFT

See **distributed function terminal** (**DFT**).

digit

In COBOL, any of the numerals from 0 through 9 not used in reference to any other symbol.

direct caller

The identity of the process (base client or server process) calling into the current server process.

direct creator

The identity of the process (base client or server process) that directly created the current object.

directory
(1) A list of files that are stored on a disk or diskette. A directory also contains information about the files such as size and date of last change. (2) A named grouping of files in a file system.
display emulation
A feature that enables a personal computer to emulate an IBM 3278 or 3279 terminal. *See also* **emulation**.
display model
One of several different sizes of display:

- Model 2 is 24 lines by 80 characters
- Model 3 is 32 lines by 80 characters
- Model 4 is 43 lines by 80 characters
- Model 5 is 27 lines by 132 characters

display session
A 3270 emulation session between a networked personal computer and a host. The session is used to emulate a 3278 or 3279 display. Also called a host display session.
DISPLAY verb
An APPC verb that returns configuration information and current operating values for a computer running Host Integration Server 2004.
distributed COM (DCOM)
An object protocol that enables COM components to communicate directly with each other across a network. Because DCOM is language-neutral, any language that uses COM components can also produce DCOM applications.
distributed data management (DDM)
A function of the operating system that enables an application program or user on one system to use database files stored on remote systems. A communications network must connect the systems, and the remote systems must also be using DDM.
distributed function terminal (**DFT)**
A type of intelligent terminal supported by IBM 3270 control units, in which some of the terminal's functions are controlled by the terminal and some by the control unit. Enables multiple sessions, and connects to host systems or to peer systems through host systems. DFT terminals are often connected using coaxial cable.
distributed processing
A form of information processing in which the work is performed by separate computers that are linked through a local or wide area network, using data-transfer mechanisms that enable different programs to use and share data.
distributed program call (DPC)
An AS/400 remote communication model.
Distributed Query Processor (DQP)
Enables queries to access multiple data sources on multiple servers, even SQL and DB2, and combine views, create data warehouses, and so on. DQP supports an extended version of the SQL language that permits users to qualify table names with the databases in which they exist. This gives users the capability to formulate queries that span multiple distributed databases.
Distributed Relational Data Architecture (DRDA)
A connection protocol for distributed relational database processing that is used by IBM relational database products. The DRDA protocol comprises protocols for communication between an application and a remote database, and communication between databases. The DRDA protocol provides the connections for remote and distributed processing. The DRDA protocol is built on the Distributed Data Management Architecture.
Distributed Transaction Coordinator (DTC)
A transaction manager that coordinates transactions spanning multiple resource managers. Work can be committed as an atomic transaction even if it spans multiple resource managers, even on separate computers.
distributed unit of work (DUW)
In DB2 UDB for AS/400, this is a method of accessing distributed relational data in which a user or application can, within a single unit of work, read and update data on multiple database management systems (DBMSs). The user or application directs each SQL statement to a particular DBMS for execution at the DBMS. Each SQL statement may access only one DBMS.
DL-BASE
The type of Base used by Host Integration Server 2004 3270 emulation programs. It supports a single Host Integration Server 2004 component or a single user application and has entry points for initialization, sending messages, receiving messages, and termination. *See also* **Base**.
DLC
See **data link control (DLC)**.
DLL
See **dynamic-link library (DLL)**.
DMOD
See **Dynamic Access Module (DMOD)**.
document type definition (DTD)
Can accompany a document, essentially defining the rules of the document, such as which elements are present and the

structural relationship between the elements. It defines what tags can go in your document, what tags can contain other tags, the number and sequence of the tags, the attributes your tags can have, and optionally, the values those attributes can have.

DTDs help to validate the data when the receiving application does not have a built-in description of the incoming data. The DTD is declared within the document type declaration production of the XML file. With XML, however, DTDs are optional.

downstream connection

A connection that enables a computer running Host Integration Server 2004 to support communication between hosts and clients. Even though such clients do not use the Host Integration Server 2004 client/server interface, with a downstream connection they can access host connections available through a computer running Host Integration Server 2004.

Host Integration Server 2004 offers several types of downstream connection:

- 802.2 (Token Ring or Ethernet)
- SDLC
- X.25

downstream LU

A logical unit (LU) used by clients to access a host connection through a computer running Host Integration Server 2004. Such clients do not use the Host Integration Server 2004 client/server interface, but by using a downstream LU, can receive access to connections on a computer running Host Integration Server 2004. A downstream LU uses a downstream connection, and passes information between the client and the host.

downstream system

A client such as an IBM Communications Manager/2 system that can access host connections available on a computer running Host Integration Server 2004. Even though such clients do not use the Host Integration Server 2004 client/server interface, they can use a downstream connection and a downstream LU to communicate with the host through Host Integration Server 2004. Host Integration Server 2004 passes the information between the downstream system and the host. With Host Integration Server 2004, downstream systems appear to the host as logical units, not physical units.

DPC

See **distributed program call (DPC)**.

DPL-enabled

Compatible with the IBM Distributed Program Link (DPL) protocol.

DQP

See **Distributed Query Processor (DQP)**.

DRDA

See **Distributed Relational Data Architecture (DRDA)**.

DSN

See **data source name (DSN)**.

DTC

See **Distributed Transaction Coordinator (DTC)**.

DTD

See **document type definition (DTD)**.

duplex

Capable of simultaneously transmitting and receiving data. Also called **full-duplex** or **4-wire**. *Contrast with* **half-duplex**.

durability

A state that survives failures.

DUW

See **distributed unit of work (DUW)**.

Dynamic Access Module (DMOD)

An SNA component that provides the communications facilities needed to pass messages between the Bases.

dynamic-link library (DLL)

A binary file that contains one or more functions that are compiled, linked, and stored separately from the processes that use them. The operating system maps a DLL to the address space of the calling process when the process starts or while it is running. It uses the .dll file extension.

-E-

EBCDIC

See **Extended Binary Coded Decimal Interchange Code (EBCDIC)**.

EBI

See **end bracket indicator (EBI)**.

EBIUI

See **end basic information unit indicator (EBIUI)**.

ECI

See **end chain indicator (ECI)**.

ELM

See **enhanced listener message (ELM)**.

emulation

A process whereby one device imitates another; for example, a personal computer can emulate a 3278 terminal. *See also* **display emulation**.

end bracket indicator (EBI)

Bit 5 of Flag 1 of a Status-Control message. Set if chain carries end bracket (EB). Note that this does not indicate that the bracket has terminated.

end chain indicator (ECI)

Bit 2 of Flag 1 of a Status-Control message. Set if this message ends a chain.

enhanced listener message (ELM)

A streamlined, application-level protocol exchange sequence that sends to and receives from the host application a single data stream composed of a header followed by the application data.

ERI

See **exception response indicator (ERI)**.

Ethernet

An IEEE 802.3 standard for contention networks. Ethernet uses a bus or star topology and relies on the form of access known as Carrier Sense Multiple Access with Collision Detection (CSMA/CD) to regulate communication line traffic. Network nodes are linked by coaxial cable, by fiber-optic cable, or by twisted-pair wiring. Data is transmitted in variable-length frames containing delivery and control information and up to 1,500 bytes of data. The Ethernet standard provides for baseband transmission at 10 megabits per second.

event log

Host Integration Server 2004 records events involving communications hardware (for example, communications adapters) or software in the Windows Event Log. Events can include attempts to establish communication, successful establishment of sessions, failures of system components, attempts to use files that are damaged or missing, configuration problems, and responses from remote systems.

exception

An abnormal condition or error that occurs during the execution of a program and that requires the execution of software outside the normal flow of control.

exception request (EXR)

A request in which an intermediate component has detected an error and modified the request so the final destination is also aware of the error.

exception response indicator (ERI)

A specified response for a request. The response should be issued only if the request cannot be processed or if an error was encountered during processing.

exchange identification (XID)

An identifier that is exchanged between nodes on an SNA network, and that enables the nodes to recognize each other and to establish link and node characteristics for communicating. With Host Integration Server, there are two possible kinds of XIDs that can be exchanged: Format 0 XIDs (containing only basic information such as Node ID) and Format 3 XIDs (containing more detailed information such as Network Name and Control Point Name). *See also* **Format 0 XID**; **Format 3 XID**.

EXR

See **exception request (EXR)**.

Extended Binary Coded Decimal Interchange Code (EBCDIC)

A coding scheme developed by IBM for use with its mainframe and AS400 computers as a standard method of assigning binary (numeric) values to alphabetic, numeric, punctuation, and transmission-control characters.

Extensible Markup Language (XML)

A specification developed by the World Wide Web Consortium (W3C) that enables designers to create customized tags beyond the capabilities of standard Hypertext Markup Language (HTML). While HTML uses only predefined tags to describe elements within the page, XML enables tags to be defined by the developer of the page. Tags for virtually any data item, such as a product or an amount due, can be used for specific applications. This enables Web pages to function as database records.

Extensible Stylesheet Language (XSL)

A style sheet format for Extensible Markup Language (XML) documents. XSL is used to define the display of XML in the same way that cascading style sheets (CSS) are used to define the display of Hypertext Markup Language (HTML).

-F-

fault isolation

Containing the effects of a fault within a component, rather than propagating the fault to other components in the system.

fault tolerance

The ability of a system to recover from an error, a failure, or a change in environmental conditions (such as loss of power). True fault tolerance provides for fully automatic recovery without disruption of user tasks or files, in contrast to manual means of recovery such as restoring data loss with backup files.

file transfer

The process of sending and receiving data files to and from computers.

fill type

A value that indicates whether programs will receive data in the form of logical records or as a specified length of data.

flow

A verb flows from one LU to another.

FMHI

See **function management header indicator (FMHI)**.

FMI

See **function management interface (FMI)**.

Format 0 XID

A type of XID that supplies minimal information about the node. Format 0 XIDs have a fixed length. They can be used for 3270 and LUA communication, and cannot be used for Advanced Program-to-Program Communications (APPC). *See also* **exchange identification (XID)**, **Format 3 XID**.

Format 3 XID

A type of XID that supplies more detailed information about the node than a Format 0 XID. Format 3 XIDs have a variable length. They can be used for 3270 and LUA communication, and are the only type of XID that can be used for Advanced Program-to-Program Communications (APPC). *See also* **exchange identification (XID)**; **Format 0 XID**.

full-duplex

Capable of simultaneously transmitting and receiving data. Also called **duplex** or **4-wire**. *Contrast with* **half-duplex**.

full-duplex transmission

Two-way electronic communication that takes place in both directions simultaneously. Also called **duplex transmission** or **4-wire transmission**. *Contrast with* **half-duplex transmission**.

fully qualified LU name

The two-part network address (network.lu) that uniquely identifies a destination (typically a user) in the network.

function management header indicator (FMHI)

Headers inserted into requests containing end-user data to convey control information.

function management interface (FMI)

An interface that provides applications with direct access to SNA data flow and information about SNA control flows by means of status messages. It is particularly suited to the requirements of 3270 emulation applications.

-G-

GAC

See **global assembly cache (GAC)**.

global assembly cache (GAC)

A machine-wide code cache that stores assemblies specifically installed to be shared by many applications on the computer. Applications deployed in the global assembly cache must have a strong name.

group

A set of one or more Windows 2000 or later user accounts.

-H-

half-duplex

Capable of only one direction of communication at a time, either receiving data or transmitting data, but not doing both at the same time. Also called **2-wire**. *Contrast with* **full-duplex**.

half-duplex transmission

Two-way electronic communication that takes place in only one direction at a time. Also called **2-wire transmission**. *Contrast with* **full-duplex transmission**.

HCD

See **host column description (HCD)**.

HE

See **host environment (HE)**.

high-level language application programming interface (HLLAPI)

An API that enables you to develop and run programmer-operator applications on IBM personal computers (or compatibles) that communicate with IBM mainframes using 3270 emulation.

HIP

See **host-initiated processing (HIP)**.

HLLAPI

See **high-level language application programming interface (HLLAPI)**.

host column description (HCD)

Maps AS/400 flat file data types to OLE DB data types. The HCD is an external file stored on the computer that enables administrators to describe the host record format. At run time, the OLE DB Provider for AS/400 and VSAM transparently converts the host data to computer data using the local HCD information.

host environment (HE)

An object that defines the network and hardware characteristics of the non-Windows software platform that initiates requests to the Windows platform. The host environment consists of the host environment name, host identification, network transport type, data conversion information, default method resolution criteria, and security credential mapping.

Host Integration Server

A Microsoft® software program that enables a personal computer to communicate with remote computers such as IBM mainframes, AS/400s, or other personal computers on a TCP/IP or SNA network.

host response time

The amount of time that a host computer takes to reply to a message sent to it by a client computer. Host response time is measured from the moment that the personal computer sends the message until one of the following events: the client computer receives data back from the host, the host unlocks the client computer's keyboard, or the host enables the client computer to send more data.

host system

A computer system (usually a mainframe) that controls interactions between it and the computers connected to it. A host system makes operating systems and applications available by way of Host Integration Server 2004 to computers running software for terminal emulation or for APPC.

In SNA terminology, a host is capable of sending an ACTPU command to Host Integration Server 2004 and sets up a PU-SSCP session with Host Integration Server 2004.

host-addressable printer

A printer that is defined as a device associated with a logical unit (LU) configured as LU type 1 or 3 and that can support host printing as well as local printing.

host-initiated processing (HIP)

A non-Microsoft software platform (usually a mainframe or mid-range computer such as the AS/400) that can access and integrate its programs with the programs on a Windows server platform.

hot backup

(1) The ability to take systems online and offline without disrupting service. (2) A configuration in which one resource (such as a server running Host Integration Server 2004 software) can automatically handle sessions if another cannot. Such servers can provide hot backup for 3270, LUA, or downstream sessions through pools containing LUs from multiple servers. Servers running Host Integration Server 2004 software can provide hot backup for 5250 terminal emulation through the use of LU names that are the same on multiple servers.

-I-

I-frame

See **Information frame (I-frame)**.

identity

A COM+ application property page that specifies the user accounts authorized to use that application. You can set it to **Interactive user** (to authorize the current logged on user), to a specific user account, or to a group of users within a Windows domain.

IEEE

See **Institute of Electrical and Electronics Engineers (IEEE)**.

implicit incoming mode

A mode that defines the properties to use when Host Integration Server 2004 receives a request to start a session, and the mode named in the request is not recognized by Host Integration Server 2004. An implicit incoming mode enables greater flexibility in starting sessions with remote systems.

For a session to be established, the incoming local LU name must be recognized by Host Integration Server 2004. Then, the incoming remote LU must either be recognized explicitly or handled implicitly (if an implicit incoming remote LU has been configured). If the remote LU is recognized explicitly, but the mode is not recognized (as part of an LU-LU pair), Host Integration Server 2004 internally creates a new mode definition with the correct name, using the properties of the implicit incoming mode. Alternatively, if the remote LU is handled implicitly, Host Integration Server 2004 also handles the mode implicitly, by internally creating a mode, as described.

Note that an implicit incoming mode must be configured for any remote LU that will be used as an implicit incoming remote LU. An implicit incoming mode can be (but does not have to be) configured for remote LUs that will only be used explicitly.

implicit incoming remote LU

A remote APPC LU that defines the properties to use when Host Integration Server 2004 receives a request to start a session with a local LU, and the remote LU named in the request is not recognized by Host Integration Server 2004. An implicit incoming remote LU that enables greater flexibility in starting sessions with remote systems.

Note that for a session to be established, the local LU name must be recognized by Host Integration Server 2004. If the local LU name is recognized, but the remote LU name is not recognized as a partner for the local LU, Host Integration Server 2004 internally creates a new remote LU definition with the correct name, using the properties of the implicit incoming remote LU.

In SNA Manager, before a remote APPC LU can be used as an implicit incoming remote LU, an implicit incoming mode must be configured for it.

IMS

See **Information Management Systems (IMS)**.

independent local APPC LU

A local logical unit (LU) that enables Advanced Program-to-Program Communications (APPC) with a peer system without involving a host (mainframe) system. The type of LU used in independent APPC is LU 6.2. An independent LU does not require a host system, but can work through one.

IND$FILE

IBM file transfer program that enables files to be transferred from a personal computer to the host and from the host to the personal computer. It operates in three host environments: CICS, VM/CMS, and MVS/TSO.

Information frame (I-frame)

A standard unit of information transmitted over an SNA network. For 802.2 or SDLC communication, an I-frame is equivalent to a BTU. *See also* **basic transmission unit (BTU)**.

Information Management Systems (IMS)

A transaction processing monitor created and sold by IBM Corporation.

in-process component

A component that runs in a client's process space. This is typically a dynamic-link library (DLL).

instance

An object of a particular component class. Each instance has its own private data elements or member variables. A component instance is synonymous with object.

Institute of Electrical and Electronics Engineers (IEEE)

An organization that maintains the standards for the 802.x protocols used in communications on local area networks.

Integer

A fundamental Automation data type that holds integer numbers. An integer variable is stored as a 16-bit (2-byte) number ranging in value from –32,768 to 32,767. The type-declaration character is a percent sign (%) (ANSI character 37). In Microsoft® Visual Basic®, you can use integers to store Boolean (**True**/**False**) values.

interface

A group of logically related operations or methods that provides access to a component object.

Internet Packet Exchange/Sequenced Packet Exchange (IPX/SPX)

A set of protocols used by Novell NetWare networking software for communication across a network.

Internet Protocol (IP) routed network

A TCP/IP wide area network in which IP packets are propagated across the network through devices called IP routers.

invokable

Indicates the capability of a program to be started by another program. For example, an invokable APPC transaction program (TP) can be started in response to a request from another TP (the invoking TP).

invoked program

A program that has been activated by a call or verb. *See also* **invoking program**.

invoked TP

A host transaction program (TP) started by:

- Another (the invoking) TP.
- A Transaction Integrator Automation server working in conjunction with the TI run-time environment and Microsoft Distributed Transaction Server (DTS) included in COM+.

invoking program

A program that uses a call or verb to activate another program. Also known as the calling program or the client. *See also* **invoked program**.

invoking TP

A TP that initiates a conversation with another TP. The invoking TP starts the other TP by instructing the remote node to load the invokable TP.

IP routed network

See **Internet Protocol (IP) routed network**.

IPX/SPX

See **Internet Packet Exchange/Sequenced Packet Exchange (IPX/SPX)**.

isolation

A characteristic whereby two transactions running in parallel produce the illusion that there is no concurrency. It appears that the system is running one transaction at a time.

-J-

No terms.

-K-

No terms.

-L-

LAN

See **local area network (LAN)**.

LE

See **local environment (LE)**.

leased SDLC line

A dedicated telecommunications line using SDLC. *See also* **Synchronous Data Link Control (SDLC)**.

link service

The software component of Host Integration Server 2004 that communicates with the device driver for a particular communication adapter (802.2, SDLC, X.25, DFT, Channel, or Twinax).

listener

A local environment associated with an application, where the local environment monitors the TCP/IP or SNA network for requests to the application.

load balancing

Distribution of the processing load among several servers carrying out network tasks to increase overall network performance.

local account

An account provided in a local domain for a user whose regular account is not in a trusted domain. Local accounts cannot be used to log on interactively. Local accounts created in one domain cannot be used in trusted domains.

local area network (LAN)

A high-speed communication system consisting of hardware (computers and peripherals) and software (programs and data files) that are interconnected by cable in a way that enables these resources to be shared. The connected devices are located within a limited geographic area such as a building or campus.

local environment (LE)

An object that defines the endpoint on a Windows computer that accepts incoming requests from a non-Windows software platform. The local environment consists of the local environment name, network transport type, network transport class, and endpoint identification.

local LU

In an APPC or CPI-C conversation, the logical unit (LU) on the local end. *Contrast with* **partner LU** and **remote LU**.

local LU alias

The name by which a local logical unit (LU) is known to the local transaction program (TP).

local node

The software component of Host Integration Server 2004 that interacts with clients and other nodes on the SNA network.

local printer

A printer that is attached directly to a personal computer.

local program

In CPI-C, the program on the local end of the conversation. *Contrast with* partner program.

local TP

In an Advanced Program-to-Program Communications (APPC) or Common Programming Interface for Communications (CPI-C) conversation, the transaction program (TP) on the local end. *Contrast with* **partner TPs** and **remote transaction program**. *See also* **local LU**.

locality

A base and the components within it; that is, a Host Integration Server 2004 executable program.

locality, partner, index (LPI)

An LPI address that is used to identify each end of a connection. It has three components: locality (L), partner (P), and index (I).

logical unit (LU)

(1) A type of network-accessible unit that enables users to gain access to network resources and communicate with each other.
(2) A preset unit containing all of the configuration information needed for a user, program, or downstream system to establish a session with a host or peer computer. *See also* **LU alias**; **LU name**; **LU pool**.

logical unit application (LUA)

A conventional LU application, or the interface that these applications use. LUA enables workstations to communicate with host applications using LU 0, 1, 2, or 3 protocols.

LPI

See **locality, partner, index (LPI)**.

LPI address

Used to identify each end of a connection between two partners. It can have three components: L identifies the locality, P identifies the partner within the locality, and I identifies a logical entity within the partner. *See also* **locality**; **partner**.

LU

See **logical unit (LU)**.

LU alias

A string that identifies an APPC or CPI-C logical unit (LU) to transaction programs (TPs) in the same organizational unit (OU). An LU alias is used only locally by Host Integration Server 2004, but it also can be used by any program in the OU of the host mainframe system. *See also* **LU name**.

LU name

For 3270 or LUA communication, a name that identifies a logical unit (LU). For independent APPC or CPI-C, a name that (when used with the network name) identifies an LU to other components on an SNA network. For dependent APPC or CPI-C, a name that identifies an LU to local software, such as the Windows Event Viewer. *See also* **LU alias**.

LU pool

A number of logical units (LUs) of the same type that are made available as a group. A user or LU application addressing the pool will connect to the next available LU in the pool for that session only. *See also* **logical unit (LU)**.

LU type

Logical unit type. A subset of the SNA protocol that characterizes the communication between two LUs.

LU type 0

A logical-unit protocol with minimal constraints, on which special applications can be built for SNA.

LU type 1

A logical-unit protocol used by a host application communicating with a printer, sending data that conforms to the 3270 SNA Character String (SCS) definition.

LU type 2

A logical-unit protocol used by a host application communicating with a 3270-type display terminal, using the SNA 3270 data stream.

LU type 3

A logical-unit protocol used by a host application communicating with a printer, sending data that is 3270 data stream compatible (DSC).

LU type 6.2

A logical-unit protocol used by two applications or transaction programs (TPs) communicating as peers in an SNA environment. LU 6.2 works in combination with node type 2.1 to provide Advanced Program-to-Program Communications (APPC) using independent LUs. LU 6.2 also works with node type 2.0 to provide APPC with dependent LUs.

LU-LU session

A logical, two-way exchange between two logical units (LUs) over a specific connection for a specific amount of time.

LUA

See **logical unit application (LUA)**.

-M-

MAC address

A 12-byte hexadecimal address used by the media access control (MAC) layer of an 802.2 connection. It corresponds to the VTAM MACADDR= parameter and to the Remote Network Address parameter for an 802.2 connection with Host Integration Server 2004.

management object

A TI component that manages or provides access to administration information. Typically, management objects are visible only when errors or messages are reported or placed in the Windows Event Log.

mapped conversation

A conversation in which the sending program sends one logical record at a time and the receiving program receives one record at a time. *See also* **conversation**.

marshaling

The process of packaging and sending interface method parameters across thread or process boundaries.

member server

A server that does not contain a configuration file. One or more servers can operate as member servers. The other types of servers are the primary server and backup servers.

method

A procedure (function) that acts on an object.

Microsoft .NET

Microsoft® .NET is a set of software technologies for connecting information, people, systems, and devices. This new generation of technology is based on Web services—small building-block applications that can connect to each other as well as to other, larger applications over the Internet.

mode

A collection of session properties used by LU 6.2-type logical units (LUs) as they carry on a session. A mode can be used by many LU pairs at the same time.

mode name

The name used by the initiator of a session to designate the characteristics desired for the session, such as traffic pacing values, message-length limits, Sync Point and cryptography options, and the class of service within the transport network.

model

One of several different sizes of display:

- Model 2 is 24 lines by 80 characters
- Model 3 is 32 lines by 80 characters
- Model 4 is 43 lines by 80 characters
- Model 5 is 27 lines by 132 characters

Messaging-oriented middleware

Messaging-oriented middleware (MOM) is a set of products that connects applications running on different systems by sending and receiving application data as messages. Examples are RPC, CPI-C, and message queuing.

multidrop

A connection in which one primary node communicates with multiple secondary nodes concurrently over the same physical transmission medium.

multiple sessions

In CPI-C, two or more concurrent sessions with different partner LUs. *See also* **LU-LU session**.

Multiple Virtual Storage (MVS)

An operating system for large IBM mainframe computers. Implies MVS/370, the MVS/XA product, and the MVS/ESA product.

MVS

See **Multiple Virtual Storage (MVS)**.

-N-

NAU

See **network addressable unit (NAU)**.

NC

See **network control (NC)**.

NCP

See **Network Control Program (NCP)**.

.NET Framework

An integral Microsoft® Windows® component for building and running the next generation of applications and XML Web services.

NetView

A reporting system that runs on an IBM host (mainframe), forwarding alerts and other information back and forth between the host and personal computers, and other network addressable units that connect to the host.

NetView alert

A message sent to the NetView reporting system, indicating an abnormal event or a failure.

NetView user alert

A message sent by a 3270 user to a host system operator through NetView, requesting an action such as mounting a tape or changing forms on a printer. Also called user alert.

NetWare

A collection of networking software products from Novell, Inc.

network

Computer systems, controllers, terminals, and software connected in a way that enables them to communicate with each other.

network addressable unit (NAU)

The basic functional entities in an SNA environment that are the source or destination of all information flowing within the SNA network. The NAU can be a logical unit (LU), a physical unit (PU), or a system services control point (SSCP).

network control (NC)

A set of SNA-defined requests and responses used to control explicit and virtual routing.

Network Control Program (NCP)

An IBM program that supports communication controllers in single-domain, multiple-domain, and interconnected networks.

Network Management Vector Transport (NMVT)

SNA message containing network or system management information.

network name
A name identifying an SNA network. The network name is used in combination with other identifiers, either a control point name (to identify a control point or node) or an LU name (to identify an APPC LU, particularly an independent local APPC LU). The combination of a network name with a control point name is sometimes called a network qualified control point name. The combination of a network name with an LU name is sometimes called a fully qualified network name.

NMVT
See **Network Management Vector Transport (NMVT)**.

node
(1) A server, controller, workstation, printer, or other processor that implements SNA functions. SNA defines three kinds of nodes: the host subarea node, which functions to control and manage a network; the communication controller subarea node, which routes and controls data flow through the network; and peripheral nodes, which include printers, workstations, cluster controllers, and distributed processors.

(2) A branch on a navigation tree.

node type 2.1
An SNA component, such as an intelligent terminal or a personal computer, that works together with LU type 6.2 to support peer-to-peer communications, allowing the logical units (LUs) to function independently from the host.

null
A value that indicates missing or unknown data.

-O-

object
A run-time instance of a Component Object Model (COM) component. An object is created by a component's class factory. Object is synonymous with instance.

object variable
A variable that contains a reference to an object.

OCCURS DEPENDING ON
Code syntax that specifies variable-length tables. This is the COBOL version of an array that contains a variable number of elements.

OCCURS *fixed times*
Code syntax that specifies fixed-length tables. This is the COBOL version of an array.

ODBC
See **open database connectivity (ODBC)**.

ODBC resource dispenser
A resource dispenser that manages pools of database connections for COM+ components that use the standard open database connectivity (ODBC) programming interfaces.

open database connectivity (ODBC)
A set of standards that enables universal access to relational data, including Microsoft relational databases and mainframe databases.

open transaction management architecture (OTMA)
A high-performance, connectionless protocol used by IMS to communicate efficiently with Multiple Virtual Storage (MVS) applications without using the SNA protocol.

operator-loaded TP
An invokable transaction program (TP) that is manually loaded and started by an operator.

original caller
The identity of the base client that initiates an activity.

original creator
The identity of the base client that created the current object. The original caller and original creator are different only if the original creator passed the object to a different base client. *See also* **original caller**.

OS/390
The IBM operating system for the IBM S/390 family of enterprise servers and that includes and integrates functions previously provided by other IBM software products such as the MVS operating system.

OS/400
The IBM operating system for the IBM AS/400.

OTMA
See **open transaction management architecture (OTMA)**.

out-of-process component
A component that runs in a separate process space from its client.

-P-

pacing receive count
The maximum number of frames for the local logical unit (LU) to receive from the partner LU before the local LU sends a response.

pacing send count
The maximum number of frames for the local logical unit (LU) to send without receiving an SNA pacing response from the partner LU.

packet
A transmission unit of fixed maximum size, used as the basic unit on a packet-switching network. A packet contains both a header and data.

In data communication, a sequence of binary digits, including data and control signals, that is transmitted and switched as a composite whole. The data, control signals, and possibly error control information are arranged in a specific format.

packet switching
A message-delivery technique in which small units of information (packets) are relayed through stations in a computer network along the best route currently available between the source and the destination. Packet-switching networks are considered to be fast and efficient. The protocol used on packet-switching networks is X.25. *See also* **X.25**.

parallel sessions
Multiple concurrent sessions between a pair of LU 6.2-type logical units (LUs), allowing multiple operations to be performed simultaneously.

parameter
A variable used as input to a program, operating system, or API to govern how systems, programs, or functions perform.

partitioned data set (PDS)
A data set in direct access storage that is divided into partitions, called members, each of which can contain a program, part of a program, or data.

partner
An addressable component of a locality; that is, code to which messages can be sent. *See also* **locality**.

partner LU
In an APPC or CPI-C conversation, the LU on the far end. The partner LU serves the partner Transaction Processor. *Contrast with* **local LU**; *see also* **remote LU**.

partner LU alias
A name that identifies a partner logical unit (LU) to partner transaction programs (TPs).

partner LU name
A name that identifies a partner logical unit (LU) to other LUs on the LU 6.2 session.

partner program
For CPI-C, the program receiving the CPI-C call.

partner TPs
Two transaction programs (TPs), residing on the same or separate nodes that are configured to communicate with each other. Partner TPs use partner LUs.

password
A string of characters that a user, a program, or a computer operator must specify to meet security requirements before gaining access to a system and to the information stored within it.

path
(1) In SNA, the series of nodes and communications links over which data must travel from one LU to another. (2) A sequence of folders that identify the location of a file. (3) A path exists between two localities when the DMODs in the localities can successfully pass messages between them. A path must exist between two localities before a connection can exist between partners in these localities. *See also* **Dynamic Access Module (DMOD)**; **locality**.

pattern-matching character
A special character such as an asterisk (*) or a question mark (?) that can be used to represent one or more characters. Any character or set of characters can replace a pattern-matching character. *Synonymous with* wildcard character.

PC Support
A set of IBM programs that helps personal computer users access, share, and store information on an AS/400.

PDS
See **partitioned data set (PDS)**.

peer system
A mainframe, midrange, or personal computer that communicates with another computer as an equal partner, with both computers sharing control over the communication.

peer-to-peer
A type of communication in which two systems communicate as equal partners sharing the processing and control of the exchange, as opposed to host-terminal communication in which the host does most of the processing and controls the exchange.

permanent virtual circuit (PVC)
A type of circuit used by an X.25 connection, in which the circuit is constantly active, and the destination address is preset.

permissions

Settings that grant or deny a particular kind of access to a particular file, folder, or other object. For example, granting read permission but denying write permission for File1.ext for Domain Admins means that the members of Admins group can read but not change File1.ext.

physical unit (PU)

A network-addressable unit that provides the services needed to use and manage a particular device, such as a communications link device. A PU is implemented with a combination of hardware, software, and microcode.

PIC S9(4) COMP Integer

A 16-bit COBOL data type that represents signed arithmetic operations occupying 2 bytes of storage. This is normally analogous to an Integer data type in Microsoft® Visual Basic® and a Short Integer in C when referring to 32-bit. It can take on values from –9999 to +9999 or –32768 to +32767. It is similar to a Short in C.

PIC S9(9) COMP Integer

A 32-bit COBOL assignment statement to represent signed arithmetic operations that occupy 4 bytes of storage. It can take on values from –999999999 to +999999999 or –2147483648 to +2147483647 depending on compiler options. It is similar to a Long Integer in C.

PIC X

Specifies a single COBOL EBCDIC character.

PIC X No Translation

A character string handled like binary data. There is no translation from EBCDIC to Unicode or from Unicode to EBCDIC.

PICTURE clause

Specifies the general characteristics and editing requirements of an elementary item. The PICTURE character string is made up of COBOL characters used as symbols and can contain a maximum of 30 characters.

pipe

A portion of memory that can be used by one process to pass information along to another.

PLU

See **primary logical unit (PLU)**.

pool

See LU pool.

pooling

A performance optimization based on using collections of pre-allocated resources, such as objects or database connections. Pooling results in more efficient resource allocation.

primary logical unit (PLU)

On an SNA session, the LU on the node that sent the session activation request.

primary server

The server designated to contain the primary configuration file. There can be only one primary server active in a subdomain. *See also* **backup server**.

printer emulation

The ability of a personal computer-type printer to emulate a 3287 or 4224 printer to print host data.

printer session

A 3270 emulation session between a host and a local area network printer connected to a personal computer. The printer emulates the type of printer normally used by a host system.

private assembly

An assembly that is available only to clients in the same directory structure as the assembly. *See also* **assembly**.

ProgID

See **programmatic identifier (ProgID)**.

programmatic identifier (ProgID)

A name that identifies a COM component. For example, a ProgID could be Bank.MoveMoney.

programmatic security

Procedural logic provided by a component to determine if a client is authorized to perform the requested operation. *See also* **declarative security**.

protocol

(1) A set of semantic and syntactic rules that determine the behavior of functional units in achieving communication. (2) In Open Systems Interconnection architecture, a set of semantic and syntactic rules that determine the behavior of entities in the same layer in performing communication functions. (3) In SNA, the meanings of, and the sequencing rules for, requests and responses used for managing the network, transferring data, and synchronizing the states of network components.

proxy

An interface-specific object that provides the parameter marshaling and communication required for a client to call an application object that is running in a different execution environment, such as on a different thread or in another process. The proxy is located with the client and communicates with a corresponding stub that is located with the application object that is being called. In the case of TI, the TI run-time environment serves as the proxy to the mainframe transaction program (TP).

PU

See **physical unit (PU)**.

PU 2.0

In an SNA network, the component that defines controller and terminal-type resources similar to an IBM 3274 Control Unit.

PU 2.1

In an SNA network, a component such as an intelligent terminal or a personal computer that works together with logical unit (LU) type 6.2 to support peer-to-peer communications, allowing the LUs to function independently from the host.

PVC

See **permanent virtual circuit (PVC)**.

-Q-

QLLC

See **qualified logical link control (QLLC)**.

qualified logical link control (QLLC)

A protocol that permits SNA sessions to occur over X.25 networks.

queued TP

An invokable transaction program (TP) that can be started by only one incoming allocate command at a time. Incoming allocate commands that arrive while the queued TP is running do not start the program again, but are queued until the program issues another **RECEIVE_ALLOCATE** or until it finishes execution.

-R-

race condition

A condition in which a feedback circuit interacts with the internal circuit processes in a way that produces chaotic output behavior.

RE

See **remote environment (RE)**.

Record Level Input/Output (RLIO)

A protocol of IBM Distributed Data Management architecture.

remote component

Components used by a client on a different computer.

remote environment (RE)

A collection of properties that describes a region on the mainframe, or in the case of diagnostic tools such as Capture and Playback, a simulated region. You can view and change these properties by using TI Manager.

remote LU

In an APPC or CPI-C conversation, the logical unit (LU) on the remote end. *Contrast with* **local LU**. *See also* **remote transaction program**.

remote network address

For an 802.2 connection, a 12-digit hexadecimal address that identifies a remote host, peer, or downstream system. The Remote Network Address in Host Integration Server 2004 corresponds to the VTAM MACADDR= parameter in the PORT definition.

remote node

(1) The node at the other end of a connection. (2) The node that contains the logical unit (LU) at the other end of a session. (3) The node that contains the transaction program (TP) at the other end of a conversation.

remote node ID

One of the types of identifiers that can be used to identify a remote node. The remote node ID is an 8-digit hexadecimal number. The first three digits are called the block number, and correspond to the VTAM parameter IDBLK. The last five digits are called the node number, and correspond to the VTAM parameter IDNUM.

remote procedure call (RPC)

A standard that enables one process to make calls to functions that are executed in another process. The processes can be on the same computer or on different computers in the network.

remote transaction program

In an Advanced Program-to-Program Communications (APPC) or Common Programming Interface for Communications (CPI-C) conversation, the transaction program (TP) on the remote end. *Contrast with* **local TP**. *See also* **remote LU**.

remote unit of work (RUW)

(1) The form of SQL distributed processing in which the application is on a system different from the relational database, and a single application server services all remote unit-of-work requests within a single logical unit of work. (2) A unit of work that allows for the remote preparation and execution of SQL statements.

Report Program Generator (RPG)

A column-oriented programming language designed for writing application programs for business data processing. RPG requires that certain information, such as control codes and field names, must be placed into specific columns of the program statements.

Request Unit Interface (RUI)

A basic interface that enables programs to acquire and release control of conventional LUs. The RUI also reads and writes request/response headers (RHs), transmission headers (THs), and request/response unit (RU) data. *Contrast with* **Session Level Interface (SLI)**.

request/response unit (RU)

Under SNA, a message that controls the session, data flow, and function management aspects of the SNA protocol.

resource dispenser

A service that synchronizes and manages nondurable resources within a process. This service provides for efficient sharing by COM+ objects. For example, the ODBC resource dispenser manages pools of database connections.

Resource Dispenser Manager

A dynamic-link library (.dll) file that coordinates work among a collection of resource dispensers.

resource manager

A system service that manages durable data. Server applications use resource managers to maintain the durable state of the application, such as the record of inventory on hand, pending orders, and accounts receivable. The resource managers work in cooperation with the transaction manager to provide the application with a guarantee of atomicity and isolation (using the two-phase commit protocol). Microsoft® SQL Server™ is an example of a resource manager.

Response Time Monitor (RTM)

A 3270 and NetView facility that monitors the amount of time it takes for a host to respond during 3270 display sessions.

RLIO

See **Record Level Input/Output (RLIO)**.

role

A symbolic name that defines a class of users for a set of components. Each role defines which users are allowed to invoke interfaces on a component.

root

The topmost node in a directory structure.

root directory

The first directory on a drive in which all other files and subdirectories exist.

RPC

See **remote procedure call (RPC)**.

RPG

See **Report Program Generator (RPG)**.

RTM

See **Response Time Monitor (RTM)**.

RU

See **request/response unit (RU)**.

RUW

See **remote unit of work (RUW)**.

-S-

SAA

See **Systems Application Architecture (SAA)**.

safe reference

A reference to the current object that is safe to pass outside the context of the current object.

SAP address

See **service access point (SAP) address**.

SC

See **session control (SC)**.

schema

The definition of the structure of an XML file. A schema contains property information as it pertains to the records and fields within the structure. *See also* **document type definition (DTD)**.

SDLC

See **Synchronous Data Link Control (SDLC)**.

security ID (SID)

A unique name that identifies a logged-on user to the security system. SIDs can identify one user or a group of users.

security key

An identifier used by two APPC logical units (LUs) to validate security when a session is activated. The security key performs a function similar to that of a password, but at the LU-LU session level rather than at the TP-conversation level.

security log

The location in which events related to security are recorded when auditing is set up for such events. For example, auditing can be set up to create a security log entry every time the configuration file is changed on a server. *See also* **event log**.

security password

The password that is required, along with the security user ID, to gain access to an invoked program when using conversation security.

security user ID

The user ID (also known as user name) that is required, along with the security password, to gain access to an invoked program when using conversation security.

semaphore

A flag variable that is used to govern access to shared system resources.

server

(1) A functional unit that provides shared services to workstations over a network; for example, a file server, a print server, or a mail server. (2) In a network, a data station that provides facilities to other stations; for example, a file server, a print server, or a mail server.

server process

A process that hosts COM+ application components in Windows 2000 or later. For example, to use TI, you can drop a TI component (type library) into a COM+ application to create an Automation server that a client application can call. When a client application calls a method on the TI Automation server, the Windows 2000 or later run-time environment loads the TI Automation server along with the TI run-time environment into a surrogate server process that automates the mainframe transaction and passes the results back to the client application.

service access point (SAP) address

A value that codes for access to certain services on an 802.2 connection within an SNA network. The Remote SAP Address parameter is used for 802.2 connections in Host Integration Server 2004, and corresponds to the VTAM parameter called SAPADDR= in the PU definition.

service TP

A transaction program (TP) that uses APPC to perform services related to SNA functionality. *See also* **application TP**; **transaction program (TP)**.

session

(1) A period of time when a connection is active and communication can take place. (2) A set of resources that when activated allow communication to take place. (3) In network architecture, for the purpose of data communication between functional units, all the activities that take place during the establishment, maintenance, and release of the connection. (4) A logical connection between two network-accessible units (NAUs) that can be activated, tailored to provide various protocols, and deactivated as requested. Each session is uniquely identified in a transmission header (TH) accompanying any transmissions exchanged during the session. *See also* **LU-LU session**.

session control (SC)

A subcomponent of a transmission control component of a half-session, responsible for activating and deactivating the session and data flow and for receiving the data flow following an error.

Session Level Interface (SLI)

A higher-level interface that facilitates the opening and closing of SNA sessions with host LU 0, LU 1, LU 2, and LU 3 application programs. The SLI permits application programs to control the data traffic at a logical message level. *Contrast with* **Request Unit Interface (RUI)**.

session limit

The maximum number of parallel sessions that can be active between two APPC LUs. When an LU-LU session is established, the session limit is negotiated between the two LUs.

severity level

A number that indicates the severity of an audit or error message. Audit messages provide information and have severity 6, 8, or 10. Error messages have severity 12 or 16, indicating a problem that needs to be corrected.

shared assembly

An assembly that can be referenced by more than one application. An assembly must be explicitly built to be shared by giving it a cryptographically strong name. *See also* **assembly**; **private assembly**.

SID

See **security ID (SID)**.

side information table

In CPI-C, a table that stores the initialization information required for two programs to communicate. The table resides in the operating system's memory and the system administrator maintains it by accessing a symbolic destination name. The table is derived from the configuration file for Host Integration Server 2004.

single session

A limit of one session between a pair of Advanced Program-to-Program Communications (APPC) logical units (LUs), which limits the associated transaction programs (TPs) to one operation at a time.

SLI

See **Session Level Interface (SLI)**.

SNA

See **Systems Network Architecture (SNA)**

SNA service TP

A transaction program (TP) that uses APPC to perform services related to SNA functionality.

SNA subdomain

With SNA Server version 2.11 and SNA Server version 3.0 or later, you can have several SNA subdomains in a Windows 2000

Server or later domain.

A Windows 2000 Server or later domain:

- Can contain several SNA subdomains.
- Can contain several primary servers, provided that each one is set up in its own subdomain.

With regard to Host Integration Server 2004, each subdomain:

- Contains one primary server.
- Can contain up to 14 backup servers.
- Cannot contain computers running Host Integration Server 2004 from other Windows 2000 Server or later domains.

Host Integration Server 2004 Setup requires you to specify the name of the subdomain to which the server will belong. One of the SNA subdomains can have the same name as that of the Windows 2000 Server or later domain in which all the servers operate.

Because each subdomain can have only one primary server, it is not advisable to implement an SNA subdomain across slow bridges or routers. Multiple servers in a single subdomain can produce unwanted traffic on the wide-area network.

SnaBase

The SNA Workstation Process. It is present at all times on personal computers whose users want to participate in the SNA network and on personal computers where dynamic loading is to be performed.

SNALink

Link support software that integrates hardware components into a Host Integration Server 2004 system. An SNALink is defined when a Host Integration Server 2004 system is installed. An SNALink can support only one physical connection from the server.

source TP Name

The host system attempts to identify the source of a request for monitoring, reporting, and so on. The source must be a TP name. MSTX is the default, because it is usually an MS Transaction Server process.

SSCP

See **system services control point (SSCP)**.

string expression

Any expression that evaluates to a sequence of contiguous characters.

stub

An interface-specific object that provides the parameter marshaling and communication required for an application object to receive calls from a client that is running in a different execution environment, such as on a different thread or in another process. The stub is located with the application object and communicates with a corresponding proxy that is located with the client that calls it. In the case of TI, the TI run-time environment serves as the proxy.

subdirectory

A directory contained within another directory in a file system hierarchy.

subdomain

A collection of computers running Host Integration Server 2004 that share a single configuration. A subdomain contains one primary server and can also contain one or more backup servers. All servers in a subdomain must belong to the same Windows domain. *See also* **backup server**; **primary server**.

SVC

See **switched virtual circuit (SVC)**.

switched SDLC line

A standard telephone line used for SDLC connections on an SNA network. The line is dialed in one of three ways: manually, by a modem that stores the phone number, or by a modem that accepts a phone number string from the software.

switched virtual circuit (SVC)

A type of circuit used by an X.25 connection, in which the circuit is not constantly active, but is called and cleared dynamically. The destination address is supplied when the circuit is called.

Synchronous Data Link Control (SDLC)

A type of link service used for managing synchronous data transfer over standard telephone lines (switched lines) or leased lines.

synchronous transmission

Transmission in which the data characters and bits are transmitted at a fixed rate, with the transmitter and receiver being synchronized. This eliminates the need for individual start and stop bits surrounding each byte. Both SDLC and X.25 use synchronous transmission.

synchronous verb completion

Processing of an SNA verb where the operation of the program is blocked until processing completes. *Contrast with* **asynchronous verb completion**.

system administrator

A person who configures, maintains the configuration of, helps users diagnose problems with, and manages a computer system. With Host Integration Server 2004, this person can also be the LAN administrator or a TI developer.

system services control point (SSCP)

(1) A host system network component that provides network services for dependent nodes. (2) An SNA network component that helps control and maintain communication flow between PUs and LUs on the network. Multiple SSCPs can work together to coordinate communications.

Systems Application Architecture (SAA)

Guidelines created by IBM to help developers standardize applications so they function in different operating environments with minimal program modification and retraining of users.

Systems Network Architecture (SNA)

The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks

-T-

TCP/IP

See **Transmission Control Protocol/Internet Protocol (TCP/IP)**.

terminal

A device that can send or receive data over a data communications channel. Host Integration Server 2004 includes emulation of 3278 and 3279 terminals.

TH

See **transmission header (TH)**.

thread

The basic entity to which the operating system allocates CPU time. A thread can execute any part of the application's code, including a part currently being executed by another thread. All threads of a process share the virtual address space, global variables, and operating system resources of the process.

TI

See **Transaction Integrator (TI)**.

Token Ring

A type of LAN using the 802.2 protocol, in which a token is passed in a ring around the network, permitting a computer on the network to transmit data only when that computer has the token.

TP

See **transaction program (TP)**.

trace file

A file containing records of internal activities on the SNA network, including calls made to APIs, the activities of APIs, and the activities of communication links and internal flows.

trace message

A message that includes the current status of various COM+ activities, such as startup and shutdown.

tracing

The action of tracking the activities of an application programming interface (API), communication links, and internal flows, including the calls made to APIs. Tracing stores a history of activity in trace files.

transaction

Data entered into a system (such as a customer deposit to a bank account) triggering a certain action (such as updating an account balance).

An atomic unit of work in COM-based systems that either succeeds or fails as a whole or a section of a mainframe COBOL transaction program (TP). A mainframe-based transaction is a section of COBOL code within a transaction program (TP) that completes a certain task or set of tasks.

A mainframe transaction may or may not be an ACID (atomic, consistent, isolated, and durable) transaction. A mainframe-based TP is the actual COBOL program file that contains one or more transactions (sections of COBOL code). A Windows-based transaction is always an ACID transaction that is coordinated by the Microsoft Distributed Transaction Coordinator (DTC).

Data entered into a system (such as a customer deposit to a bank account) triggers a certain action or set of actions (such as updating an account balance) that must all occur or that must all not occur; that is, they act as a unit. That unit is called a transaction in Windows-based terminology.

Each method in a TI component invokes a single mainframe transaction in a mainframe TP. After being invoked, a mainframe transaction can call other transactions in the same or in a different TP.

transaction context

An object used to allow a client to dynamically include one or more objects in one transaction.

transaction ID

The identifier used to invoke a particular CICS or IMS application (transaction program); in CICS, it is the name of the transaction. A transaction ID (TRANID) can be up to four characters in length. The acceptable characters are A-Z, a-z, 0-9, dollar sign ($), at sign (@), period (.), slash mark (/), hyphen (-), underscore (_), percent sign (%), ampersand (&), question mark (?), exclamation point (!), colon (:), vertical bar (|), quotation mark ("), equal sign (=), caret (^), comma (,), semicolon (;), less than sign (<), and greater than sign (>).

Transaction Integrator (TI)

A Windows server-based program that enables you to integrate mainframe or midrange computer transaction programs with component-based and .NET Framework applications.

transaction manager

The transaction manager creates transaction objects and manages their atomicity and durability. Applications request the creation of a transaction object by calling the transaction manager's **BeginTransaction** method.

transaction program (TP)

A COBOL-based mainframe transaction program file. An application program that uses Advanced Program-to-Program Communications (APPC) to exchange data with another TP on a peer-to-peer basis. Within the context of TI, a TP is the mainframe-based CICS or IMS program file that a TI Automation server automates. A TP can contain one or more transactions that are managed on the mainframe side. Each method in a single TI Automation server invokes a single TP. That TP then uses the information passed into it by the TI Automation server to determine which mainframe transaction to run within the TP. Each mainframe transaction within a TP can call other transactions. It is dependent upon how the mainframe COBOL application developer has designed the system.

(1) An application program that uses APPC or CPI-C to exchange data with another TP on a peer-to-peer basis. (2) A program that processes transactions in an SNA network. There are two kinds of transaction programs: application transaction programs and service transaction programs. *See also* **conversation**.

Transmission Control Protocol/Internet Protocol (TCP/IP)

The transport protocol in use by many academic, military, scientific, and commercial organizations to provide communication across wide area networks (WANs). TCP/IP provides communication across interconnected networks that include a variety of different operating systems (such as VMS, UNIX, and Windows 2000 or later).

transmission header (TH)

A header prefix to a message unit flowing within the Path Control Network (PCN), and containing PCN-specific data about routing, sequencing, blocking, and route pacing.

Twinax

A twinaxial connection to a peer system.

twisted-pair cable

Two paired wires, with each wire twisted two or more times per inch to help cancel out noise.

two-phase commit (2PC)

A protocol that ensures that transactions that apply to more than one server are completed on all the servers or none at all. Two-phase commit is coordinated by the transaction manager and supported by resource managers.

type library

A file (or component within another file) that contains Automation descriptions of exposed objects, properties, and methods. Object library (.olb) files contain type libraries. Type libraries that are shipped as stand-alone files use the file extension .tlb. A TI component is an example of a type library (.tlb file).

-U-

UDA

See **universal data access (UDA)**.

UDT

See **user-defined type (UDT)**.

unbounded

Refers to recordsets or arrays. In TI, the rows in a recordset or the elements in an array are transmitted one at a time. Therefore, the mainframe application program must issue multiple receives or sends until all data is transmitted.

This type of parameter or return value can be defined as unbounded for the **CICS Using LU 6.2** and **IMS Using LU 6.2** models only. The number of rows in a recordset or the number of elements in an array is not determined (that is, bounded) before run time. Unbounded parameters or return values can occur anywhere in the Automation method. However, a parameter or return value of this type is always transmitted to and from the mainframe after all other data. TI supports, at most, a single unbounded input parameter and a single unbounded output parameter or a single unbounded in/out parameter.

universal data access (UDA)

A Microsoft data access method which supplies access to information across the enterprise. Universal data access provides high-performance access to a variety of information sources, including relational and non-relational, and an easy to use programming interface that is tool and language independent.

user alert

A message sent by a 3270 user to a host system operator by way of NetView, requesting an action such as mounting a tape or changing forms on a printer.

user identifier

A string of characters that uniquely identifies a user to a system.

user name

The name (also known as user ID) that identifies a Windows user account.

user-defined type (UDT)

A data type that is defined in a program. User-defined data types generally contain many different data types that are defined by the programming language being used. In COBOL, UDTs are called RECORDS (that is, any declaration containing lower-level numbers).

-V-

variable-length string

A fundamental data type that holds character information. A String variable can contain approximately 65,535 bytes (64 KB), and it is either fixed-length or variable-length. Strings usually have one character per byte; however, TI supports Unicode BSTR strings that occupy 16 bits per character. Fixed-length strings are declared to be a specific length, and variable-length strings can be any length up to 64 KB, less a small amount of storage overhead.

VCB

See **verb control block (VCB)**.

verb

Command from one LU to another to exchange data and perform tasks. *See also* **APPC verb**.

verb control block (VCB)

A structure made up of variables, which identifies the verb to be executed, supplies information to be used by the verb, and contains information returned by the verb when execution is complete.

VINES

See **VIrtual NEtworking System (VINES)**.

VIrtual NEtworking System (VINES)

A collection of networking software products from Banyan Systems, Inc. VINES includes an addressing system called StreetTalk.

Virtual Telecommunications Access Method (VTAM)

A set of IBM mainframe programs that control communications between mainframe applications and the terminals and computers that connect to the mainframe.

VTAM

See **Virtual Telecommunications Access Method (VTAM)**.

-W-

WAN

See **wide area network (WAN)**.

wide area network (WAN)

A high-speed communication system, consisting of hardware (computers and peripherals) and software (programs and files), that provides communications services and enables resources to be shared over a larger geographic area than that served by a LAN. *Contrast with* **local area network (LAN)**.

wildcard character

Synonym for pattern-matching character.

Windows-initiated processing (WIP)

A Windows server platform can access and integrate its programs with the programs on a non-Microsoft server platform (usually a mainframe or mid-range computer such as the AS/400).

WIP

See **Windows-initiated processing (WIP)**.

-X-

X.25

The CCITT standard used for communication over a packet-switching network. X.25 uses the protocol called qualified logical link control (QLLC).

XID

See **exchange identification (XID)**.

XML

See **Extensible Markup Language (XML)**.

XML Schema Definition (XSD)

A language proposed by the W3C XML Schema Working Group for use in defining schemas. Schemas are useful for enforcing structure and constraining the types of data that can be used validly within other XML documents. Unlike DTD, which requires its own language and syntax, XSD uses XML syntax for its language. XSD closely resembles and extends the capabilities of XDR. The W3C now recommends the use of XSD as a standard for defining XML schemas.

XSD

See **XML Schema Definition (XSD)**.

XSL

See **Extensible Stylesheet Language (XSL)**.

-Y-

No terms.

-Z-

No terms.

UI Help

This section contains the user interface (UI) Help displayed when you press the F1 key or the **Help** button in the Microsoft® Host Integration Server 2004 or Microsoft® Visual Studio® .NET 2003 UI.

This section contains:

- Visual Studio Help
- Transaction Integrator Manager Help
- Data Integration Help
- Network Integration Help
- Installation Help
- Messaging Help
- Trace Utility Help

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Visual Studio Help

Microsoft® Visual Studio® .NET 2003 provides a graphical user interface for creating, viewing, and editing the objects used by the host-initiated processing (HIP) and Windows-initiated processing (WIP) environments in Transaction Integrator (TI). TI objects are created and edited within a TI Project, one of several project types supported by the Visual Studio .NET design environment.

The user interface for a TI Project includes a tree view in the Solution Explorer window, wizards, dialog boxes, and properties displayed in the Properties window. The tree view presents a two-pane design tool. The left pane displays a hierarchical representation of the components of a type library or .NET assembly. The right pane displays a list of details about the properties associated with the contents of the library or assembly selected in the left pane. You can customize the details view to display other types of information, for example, a COBOL, RPG, or IDL source code. You can display Help topics about the individual user interface controls by highlighting a control or node and pressing the **F1** key.

The TI wizards in a project have Help buttons on each wizard page. Clicking Help on the page takes you to the relevant Help topic in this section. You can display Help topics about the individual user interface controls by clicking Help on the Visual Studio wizard page or dialog box or by highlighting a control or node and pressing the F1 key. All of the TI Project Help topics are combined in this section for easy reference and review.

This section contains:

- COM Library Nodes
- .NET Library Nodes
- Wizards and Dialog Boxes (TI Project)
- Properties (TI Project)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

COM Library Nodes

When you view a COM type library (.tlb for client and .tim for server) from within a TI Project, the Visual Studio design environment displays the objects in the library in a tree view in the left pane and a details view in the right pane. Double-click the node to expand the node and right-click the node to display a shortcut menu.

The topics in this section describe the functionality of each menu and each command in the navigation tree. This section contains:

- Library Name Node
- Interface Name Node (COM)
- Method Name Node (COM)
- Parameter Name Node (COM)
- Recordsets Node
- Recordset Name Node
- Recordset Column Name Node
- User-Defined Types Node
- User-Defined Type Name Node
- User-Defined Type Member Name Node

Library Name Node

Use the ***library name*** node to support Microsoft® Visual Basic® 6.0, transactions, and select the remote environment class.

Double-click the ***library name*** node to expand it. The right pane displays the following information about the node's children:

- **Name**. The object name.

Right-click the ***library name*** node to display the following nine options:

- **Import**. Displays a menu with two options:
  - **Host Definition**. Launches the COBOL Import Wizard or RPG Import Wizard to help you import COBOL or RPG to the interface definition.
  - **Library**. Launches the **Import Library** open file dialog box to help you to import an existing type library or assembly to the interface definition.
- **Export Host Definition**. Launches the **Export Host Definition** file save dialog box to help you generate a COBOL or RPG copy book equivalent to the current library.
- **Lock**. Marks the library as read-only. The library is automatically marked as locked if it is registered in a COM+ application or IIS virtual directory.
- **Rename**. Renames the library.
- **Properties**. Displays the **Properties** window.

See Also

Library Properties

Interface Name Node (COM)

Recordsets Node

User-Defined Types Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Interface Name Node (COM)

Use the ***interface name*** node to set the name of the interface in a component.

Double-click the ***interface name*** node to expand it. The right pane displays the following information about the interface methods:

- **Method Name**. The method name.
- **Return Type**. The method return type.
- **Host Data Type**. The COBOL or RPG equivalent of the method's return type.
- **Array Size(s)**. If the return type is an array, this column will contain the number of dimensions and their sizes. For example, a single dimension of size 10 will be displayed as (10); a 3-dimensions array with sizes 2, 4, and 6 will be displayed as (2, 4, 6).
- **Rows**. The number of recordset rows if the return type of the method is a recordset.
- **Link-to-Program Name**. The name of an executable running under the host environment that will be linked to by this method and passed a COMMAREA. It is valid only for link models.
- **TP Name**. The name of the transaction program (TP) used by the method to locate a program to be executed. In the case of link models, it identifies the mirror transaction identifier which parses the distributed program link (DPL) header and identifies the link-to-program name.
- **Meta Data**. Indicates whether the host is sent no metadata, only the name of the method, or all metadata.

Right-click the ***interface name*** node to view the following seven options:

- **Add Method**. Adds a new method .
- **Paste**. Inserts a method into the current interface definition.
- **Rename**. Renames the interface.
- **Properties**. Displays the **Properties** window.

See Also

Interface Properties

Method Name Node (COM)

Library Name Node

Method Name Node (COM)

Use the ***method name*** node to define the conditions for interacting with the host environment, including the value for the initial buffers, whether to include all information.

Double-click the ***method name*** node to expand it. The right pane displays the following information about the method parameters:

- **Parameter Name**. The name of the parameter.
- **Type**. The data type of the parameter.
- **Direction**. The direction of the parameter: in only, in and out, or out only.
- **Host Data Type**. The COBOL or RPG data type that best describes the parameter type.
- **Array Size(s)**. The size and number of the dimensions of the parameter, if it is an array.
- **Rows**. The number of recordset rows if the parameter type is a recordset.

Right-click the ***method name*** node to view the following seven options:

- **Add Parameter**. Adds a new In\Out integer parameter to the method.
- **Cut**. Copies the selected method to the Clipboard and deletes it.
- **Copy**. Copies the selected method to the Clipboard.
- **Paste**. Inserts a parameter from the Clipboard into the current method definition.
- **Delete**. Deletes the method.
- **Rename**. Renames the method.
- **Properties**. Displays the **Properties** window.

See Also

Method Properties

Parameter Name Node (COM)

Interface Name Node (COM)

Parameter Name Node (COM)

Use the ***parameter name*** node to define the information passed as a parameter and what precision and scale is to be used.

Double-click the ***parameter name*** node to expand it. The right pane does not display any additional information.

Right-click the ***parameter name*** node to view the following eight options:

- **Move Up**. Moves a parameter up in the list.
- **Move Down**. Moves a parameter down in the list.
- **Cut**. Copies the selected parameter to the Clipboard and deletes it.
- **Copy**. Copies the selected parameter to the Clipboard.
- **Paste**. The paste command is disabled because parameters do not have any child elements.
- **Delete**. Deletes the selected parameter.
- **Rename**. Renames the selected parameter.
- **Properties**. Displays the **Properties** window.

See Also

Parameter Properties

Recordsets Node

Use the **recordsets** node to define the table passed as a parameter or return value.

Double-click the **recordsets** node to expand it. The right pane displays the following information about the defined recordsets:

- **Name**. The name of each recordset.

Right-click the **recordsets** node to view the following seven options:

- **Add Recordset**. Adds a new recordset definition.
- **Paste**. Inserts a recordset column from the Clipboard into the current folder.
- **Properties**. Displays the **Properties** window.

See Also

Recordset Properties

Recordset Name Node

Library Name Node

Recordset Name Node

Use the ***recordset name*** node to define the name of the recordset.

Double-click the ***recordset name*** node to expand it. The right pane displays the following information about the recordset columns:

- **Recordset Column Name**. The name of the recordset column.
- **Type**. The data type of the recordset column.
- **Host Data Type**. The COBOL or RPG data type that best describes the recordset column type.

Right-click the ***recordset name*** node to view the following seven options:

- **Add Recordset Column**. Adds a new integer column to the selected recordset.
- **Cut**. Copies the contents of the recordset to the Clipboard and deletes it.
- **Copy**. Copies the contents of the recordset to the Clipboard.
- **Paste**. Inserts the column from the Clipboard into the current recordset definition.
- **Delete**. Deletes the current recordset.
- **Rename**. Renames the recordset.
- **Properties**. Displays the **Properties** window.

See Also

Recordset Properties

Recordset Column Name Node

Recordset Column Name Node

Use the ***recordset column name*** node to define the recordset column.

Double-click the ***recordset column name*** node to expand it. No information is displayed in the right pane.

Right-click the ***recordset column name*** node to view the following eight options:

- **Move Up**. Moves a column up in the list.
- **Move Down**. Moves a column down in the list.
- **Cut**. Copies the selected recordset column to the Clipboard and deletes it.
- **Copy**. Copies the selected recordset column to the Clipboard.
- **Paste**. The paste command is disabled because recordset columns do not have child elements.
- **Delete**. Deletes the recordset column.
- **Rename**. Renames the recordset column.
- **Properties**. Displays the **Properties** window.

See Also

Recordset Column Properties

User-Defined Types Node

Use the **User-Defined Types** (UDT) node to define a structure that contains the pieces of data.

Double-click the **User-Defined Types** node to expand it. The right pane displays the following information about the defined UDTs:

- **Name**. The name of each user-defined type.

Right-click the **User-Defined Types** node to view the following seven options:

- **Add User-Defined Type**. Adds a new user-defined type.
- **Paste**. Inserts the UDT from the Clipboard into the current library definition.
- **Properties**. Displays the **Properties** window.

See Also

User-Defined Type Properties

User-Defined Type Name Node

Library Name Node

User-Defined Type Name Node

Use the ***user-defined type name*** node to define the type of data the user-defined type (UDT) is carrying.

Double-click the ***user-defined type name*** node to expand it. The right pane displays the following information about the UDT members:

- **User-Defined Type Member Name**. The name of the user-defined member.
- **Type**. The data type of the user-defined member.
- **Host Data Type**. The COBOL or RPG data type that best describes the user-defined member type.
- **Array Size(s)**. The size and number of the dimensions of the user-defined member, if it is an array.
- **Rows**. The number of recordset rows, if the user-defined member type is a recordset.

Right-click the ***user-defined type name*** node to view the following seven options:

- **Add User-Defined Type Member**. Adds a new integer member.
- **Cut**. Copies the contents of the user-defined type to the Clipboard and deletes it.
- **Copy**. Copies the contents of the user-defined type to the Clipboard.
- **Paste**. Inserts the member from the Clipboard into the user-defined type definition.
- **Delete**. Deletes the current user-defined type.
- **Rename**. Renames the user-defined type.
- **Properties**. Displays the **Properties** window.

See Also

User-Defined Type Properties

User-Defined Type Member Name Node

User-Defined Types Node

User-Defined Type Member Name Node

Use the ***user-defined type member name*** node to view information about the UDT member.

Double-click the ***user-defined type member name*** node to expand it. No information is displayed in the right pane.

Right-click the ***user-defined type member name*** node to view the following eight options:

- **Move Up**. Moves a user-defined type (UDT) member up in the list.
- **Move Down**. Moves a user-defined type member down in the list.
- **Cut**. Copies the selected user-defined type member to the Clipboard and deletes it.
- **Copy**. Copies the selected user-defined type member to the Clipboard.
- **Paste**. The paste menu item is disabled because user-defined type members do not have child elements.
- **Delete**. Deletes the user-defined type member.
- **Rename**. Renames the user-defined type member.
- **Properties**. Displays the **Properties** window.

See Also

User-Defined Type Member Properties

User-Defined Type Name Node

.NET Library Nodes

When you view a .NET library (.dll for client and .tim for server) from within a TI Project, the Visual Studio design environment displays the objects in the library in a tree view in the left pane and list view in the right pane. Double-click the node to expand the node and right-click the node to display a shortcut menu.

The topics in this section describe the functionality of each menu and each command in the navigation tree. This section contains:

- Interface Name Node (.NET)
- Method Name Node (.NET)
- Parameter Name Node (.NET)
- Data Tables Node
- Data Table Name Node
- Data Table Member Name Node
- Structures Node
- Structure Name Node
- Structure Member Name Node

Interface Name Node (.NET)

Use the ***interface name*** node to view the list of all the methods in a component.

Double-click the ***interface name*** node to expand it. The right pane displays the following information about the methods:

- **Method Name**. The method name.
- **Return Type**. The method return type.
- **Host Data Type**. The COBOL or RPG equivalent of the method's return type.
- **Array Sizes**. If the return type is an array, this column will contain the number of dimensions and their sizes. For example, a single dimension of size 10 will be displayed as (10); a 3-dimensions array with sizes 2, 4, and 6 will be displayed as (2, 4, 6).
- **Rows**. The number of rows, if the return type of the array is a data table.
- **Link-to-Program Name**. The name of an executable running under the host environment that will be linked to by this method and passed a COMMAREA. It is valid only for link models.
- **TP Name**. The transaction program (TP) name used by the method to locate a program to be executed. In the case of link models, it identifies the mirror transaction identifier which parses the distributed program link (DPL) header and identifies the link-to-program name.
- **Meta Data**. Indicates whether the host is sent no metadata, only the name of the method, or all metadata.

Right-click the ***interface name*** node to view the following seven options:

- **Add Method**. Adds a new method with no return type.
- **Paste**. Inserts the method from the Clipboard into the current interface definition.
- **Properties**. Displays the **Properties** window.

See Also

Interface Properties

Method Properties

Library Name Node

Method Name Node (.NET)

Method Name Node (.NET)

Use the ***method name*** node to view the list of all the methods parameters.

Double-click the ***method name*** node to expand it. The right pane displays the following information about the parameters:

- **Parameter Name**. The name of the parameter.
- **Type**. The data type of the parameter.
- **Direction**. The direction of the parameter: in only, in and out, or out only.
- **Host Data Type**. The COBOL or RPG data type that best describes the parameter type.
- **Array Size(s)**. The size and number of dimensions of the parameter, if it is an array.
- **Rows**. The number of rows, if the parameter type is a data table.

Right-click the ***method name*** node to display the following seven options:

- **Add Parameter**. Adds a new integer parameter to the method.
- **Cut**. Copies the contents of the method to the Clipboard and marks it as deleted.
- **Copy**. Copies the contents of the method to the Clipboard.
- **Paste**. Inserts the parameter from the Clipboard into the current method definition.
- **Delete**. Deletes the current method.
- **Rename**. Renames the current method.
- **Properties**. Displays the **Properties** window.

See Also

Parameter Name Node (.NET)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Parameter Name Node (.NET)

Use the ***parameter name*** node to change the name of the parameter or view its properties.

Double-click the ***parameter name*** node to expand it. No information is displayed in the right pane.

Right-click the ***parameter name*** node to display the following eight options:

- **Move Up**. Moves a parameter up in the list.
- **Move Down**. Moves a parameter down in the list.
- **Cut**. Copies the contents of the parameter to the Clipboard and deletes it.
- **Copy**. Copies the contents of the parameter to the Clipboard.
- **Delete**. Deletes the current parameter.
- **Rename**. Renames the current parameter.
- **Properties**. Displays the **Properties** window.

See Also

Parameter Properties

Method Name Node (.NET)

Data Tables Node

Use the **Data Tables** node to view a list of all the **Data Tables** in the assembly.

Double-click the **Data Tables** node to expand it. The right pane displays the following information about the data tables:

- **Name**. Name of the individual data tables.

Right-click the **Data Tables** node to view the following seven options:

- **Add Data Table**. Adds a new data table to the assembly.
- **Paste**. Inserts the data table from the Clipboard into the current data table definition.
- **Properties**. Displays the **Properties** window.

See Also

Data Table Name Node

Library Name Node

Data Table Name Node

Use the ***data table name*** node to view a list of the data table column names and their properties.

Double-click the ***data table name*** node to expand it. The right pane displays the following information about the data table columns:

- **Data Table Column Name**. The name of the table column.
- **Type**. The data type of the data table.
- **Host Data Type**. The COBOL or RPG data type that best describes the data table type.

Right-click the ***data table name*** node to display the following seven options:

- **Add Data Table Column**. Adds a new column to the data table.
- **Cut**. Copies the contents of the data table to the Clipboard and deletes it.
- **Copy**. Copies the contents of the data table to the Clipboard.
- **Paste**. Inserts the column from the Clipboard into the current data table definition.
- **Delete**. Deletes the current data table.
- **Rename**. Renames the current data table.
- **Properties**. Displays the **Properties** window.

See Also

Data Table Member Name Node

Data Tables Node

Data Table Member Name Node

Use the ***data table member name*** node to change the name of the data table member or view its properties.

Double-click the ***data table member name*** node to expand it. No information is displayed in the right pane.

Right-click the ***data table member name*** node to display the following six options:

- **Cut**. Copies the contents of the data table to the Clipboard and marks it as deleted.
- **Copy**. Copies the contents of the data table to the Clipboard.
- **Paste**. Inserts the contents of the Clipboard into the current data table column definition.
- **Delete**. Deletes the current data table .
- **Rename**. Renames the current data table .
- **Properties**. Displays the **Properties** window.

See Also

Data Tables Node

Structures Node

Use the **Structures** node to view a list of all the **Structures** in an assembly.

Double-click the **Structures** node to expand it. The right pane displays the following information about the structures:

- **Name**. Name of the individual structures.

Right-click the **Structures** node to display the following seven options:

- **Add Struct**. Adds a new structure to the assembly.
- **Paste**. Inserts the structure from the Clipboard into the current assembly definition.
- **Properties**. Displays the **Properties** window.

See Also

Structure Name Node

Library Name Node

Structure Name Node

Use the ***structure name*** node to view a list of structure member names and their properties.

Double-click the ***structure name*** node to expand it. The right pane displays the following information about the structure members:

- **Structure Member Name**. The name of the structure member.
- **Type**. The data type of the data table.
- **Host Data Type**. The COBOL or RPG data type that best describes the data table type.
- **Array Size(s)**. The size and number of dimensions of the data table, if it is an array.
- **Rows**. The number of rows, if the data table type is a data table.

Right-click the ***structure name*** node to view the following seven options:

- **Add Structure Member**. Adds a new structure member.
- **Cut**. Copies the contents of the structure to the Clipboard and deletes it.
- **Copy**. Copies the contents of the structure to the Clipboard.
- **Paste**. Inserts the member from the Clipboard into the current structure definition.
- **Delete**. Deletes the current structure.
- **Rename**. Renames the current structure.
- **Properties**. Displays the **Properties** window.

See Also

Structure Member Name Node

Structures Node

Structure Member Name Node

Use the ***structure member name*** node to change the name of the structure member or view its properties.

Double-click the ***structure member name*** node to expand it. No information is displayed in the right pane.

Right-click the ***structure member name*** node to display the following six options:

- **Cut**. Copies the contents of the structure member to the Clipboard and deletes it.
- **Copy**. Copies the contents of the structure member to the Clipboard.
- **Delete**. Deletes the current structure member.
- **Rename**. Renames the current structure member.
- **Properties**. Displays the **Properties** window.

See Also

Structures Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Wizards and Dialog Boxes (TI Project)

This section contains:

- New COM Client Library Wizard
- New COM Server Library Wizard
- New .NET Client Library Wizard
- New .NET Server Library Wizard
- Import COBOL Wizard
- Import RPG Wizard
- Name Conflict Dialog Box
- Array Dimension Dialog Box
- Map Remote Environment Class Dialog Box
- Select Convert Prim Dialog Box

New COM Client Library Wizard

The **New COM Client Library Wizard** collects information about the type library information and about the remote environment (RE). The wizard generates an annotated Windows-initiated processing (WIP) COM type library (.tlb) and adds the library to the current TI Project displayed in the Solution Explorer.

This section contains:

- Welcome to the New COM Client Library Wizard Page
- Library Wizard Page (COM Client Wizard)
- Remote Environment Wizard Page 1 (COM Client Wizard)
- Remote Environment Wizard Page 2 (for OS400) (COM Client Wizard)
- Remote Environment Wizard Page 2 (for LU 6.2 Link) (COM Client Wizard)
- Completing the New COM Client Library Wizard Page

Welcome to the New COM Client Library Wizard Page

Use the **Welcome to the New COM Client Library Wizard** page to view the definition of a COM client library and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Library Wizard Page (COM Client Wizard)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Library Wizard Page (COM Client Wizard)

Use the **Library** wizard page to identify the COM client library you are creating.

Use this	To do this
Interface name	Type the name for the interface in the type library. The name of the interface, when combined with the major version number and the library name (ProgID), cannot exceed 39 Unicode characters.
Version	Type the major version information for the type library. The major version number, when combined with the name of the interface and the library name (ProgID), cannot exceed 39 Unicode characters.
Component ProgID	View the program identifier to be associated with the CoClass in the type library. The format is *Library.Interface.MajorVersion*. The ProgID cannot exceed 39 Unicode characters.
Description	Type the description to be associated with the interface. The description can be a maximum of 256 Unicode characters.
Support Visual Basic 6.0 decimal data type	Select this option if you want the component to allow application programs written with Visual Basic 6.0 and reference decimal data types.

See Also

Remote Environment Wizard Page 1 (COM Client Wizard)

Remote Environment Wizard Page 2 (for OS400) (COM Client Wizard)

Remote Environment Wizard Page 2 (for LU 6.2 Link) (COM Client Wizard)

Completing the New COM Client Library Wizard Page

Library Properties

Remote Environment Wizard Page 1 (COM Client Wizard)

Use the **Remote Environment** wizard page to define the remote environment (RE). A remote environment identifies an application execution environment running on a remote host system. The remote environment can have a data communication protocol and a programming model associated with it.

Use this	To do this
Vendor	Select the name of the vendor supplying the remote environment.
Protocol	Select the data communication protocol to be used to connect to the remote environment. The available communication protocols are: • **TCP/IP** (default) • **LU 6.2**
Target environment	Select the application environment running on the remote host system. The available environments are: • **CICS** (default) • **IMS** • **OS400** (TCP only)
Programming model	Select the programming model associated with the remote environment. The available models for the TCP/IP CICS target environment are: • **TRM User Data** (default) • **TRM Link** • **ELM User Data** • **ELM Link** The available models for the LU 6.2 CICS target environment are: • **CICS User Data** • **CICS Link** • The available models for the TCP/IP IMS target environment are: • **IMS Connect** • **Implicit** • **Explicit** • The only available model for the LU 6.2 IMS target environment is **IMS User Data**. • The only available model for the OS400 target environment is **Distributed Program Call**.
Allow 32K in/out	Select this option if you want TI to treat the input DFHCOMMAREA independently from the output DFHCOMMAREA. TI typically combines the input DFHCOMMAREA and the output DFHCOMMAREA area. The combined areas cannot exceed 32 KB of data. When this option is selected, TI treats the input DFHCOMMAREA independently from the output DFHCOMMAREA. Each input and output area uses up to 32 KB of data.

See Also

Library Properties

Completing the New COM Client Library Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Remote Environment Wizard Page 2 (for OS400) (COM Client Wizard)

Use the **Remote Environment** wizard page to define the default date and time separators for the remote environment (RE).

Use this	To do this
Program library	Type the name of the program library.
Date separator	Select the character used to separate the parts of the date. The available separators are: **(none)** (default) **/** **-** **.** **,** **&**
Time separator	Select the character used to separate the parts of time. The available separators are: **(none)** (default) **:** **.** **,** **&**

See Also

Library Properties

Completing the New COM Client Library Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Remote Environment Wizard Page 2 (for LU 6.2 Link) (COM Client Wizard)

Use the **Remote Environment** wizard page to define the default values for the remote environment (RE).

Use this	To do this
Transaction ID	Type the transaction program (TP) name or the link mirror transaction ID of the remote environment. The name or ID can be a maximum of 4 alphabetic characters. The format of the name must conform to the IBM SNA Transaction Program Names convention. The default is **CSMI**.
Source TP name	Type the name of the transaction program used by the method to locate a program to be executed. In the case of link models, the name identifies the mirror transaction identifier, which parses the distributed program link (DPL) header and identifies the link-to-program name. The name can be a maximum of 250 Unicode characters. The default is **MSTX**.

See Also

Library Properties

Completing the New COM Client Library Wizard Page

Completing the New COM Client Library Wizard Page

Use the **Completing the New COM Client Library Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

Use this	To do this
Run this wizard again	Select this option to complete the current modification of the type library and automatically restart the wizard to make new modifications.

See Also

New COM Client Library Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

New COM Server Library Wizard

The **New COM Server Library Wizard** collects information about the type library information and about the host environment (HE). The wizard generates a Transaction Integrator metadata (TIM) file and adds it to the current TI Project displayed in the Solution Explorer.

This section contains:

- Welcome to the New COM Server Library Wizard Page
- Library Wizard Page (COM Server Wizard)
- Host Environment Wizard Page (COM Server Wizard)
- Completing the New COM Server Library Wizard Page

Welcome to the New COM Server Library Wizard Page

Use the **Welcome to the New COM Server Library Wizard** page to view the definition of a COM server library and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Library Wizard Page (COM Server Wizard)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Library Wizard Page (COM Server Wizard)

Use the **Library** wizard page to identify the COM server library you are creating.

Use this	To do this
Interface name	Type the name for the interface in the type library. The name of the interface, when combined with the major version number and the library name (ProgID), cannot exceed 39 Unicode characters.
Version	Type the major version information for the type library. The major version number, when combined with name of the interface and the library name (ProgID), cannot exceed 39 Unicode characters.
Component ProgID	Displays the program identifier to be associated with the CoClass in the type library. The format is *Library.Interface.MajorVersion*. The ProgID cannot exceed 39 Unicode characters.
Description	Type the description to be associated with the interface .The description can be a maximum of 256 Unicode characters.
Support Visual Basic 6.0 decimal data type	Select this option if you want the component to allow application programs written with Visual Basic 6.0 and reference decimal data types.

See Also

Library Properties

Host Environment Wizard Page (COM Server Wizard)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host Environment Wizard Page (COM Server Wizard)

Use the **Host Environment** (HE) wizard page to select the HE that defines the network and hardware characteristics of the non-Windows software platform initiating requests to the Windows platform. The HE consists of the host environment name, host identification, network transport type, data conversion information, default method resolution criteria, and security credential mapping.

Use this	To do this
Host environment	Select the host environment (HE). The available HEs are: • **Transaction Integrator - ConvertPrim for OS390** (default) • **Transaction Integrator - ConvertPrim for AS400**

See Also

Completing the New COM Server Library Wizard Page

Library Properties

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Completing the New COM Server Library Wizard Page

Use the **Completing the New COM Server Library Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

Use this	To do this
Run this wizard again	Select this option to complete the current modification of the type library and automatically restart the wizard to make new modifications.

See Also

New COM Server Library Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

New .NET Client Library Wizard

The **New .NET Client Library Wizard** collects information about the assembly information and about the remote environment (RE). The Wizard generates an annotated .NET assembly and adds the assembly to the current TI Project displayed in the Solution Explorer.

This section contains:

- Welcome to the New .NET Client Library Wizard Page
- Library Wizard Page (.NET Client Wizard)
- Remote Environment Wizard Page 1 (.NET Client Wizard)
- Remote Environment Wizard Page 2 (for OS400) (.NET Client Wizard)
- Remote Environment Wizard Page 2 (for LU 6.2 Link) (.NET Client Wizard)
- Completing the New .NET Client Library Wizard Page

Welcome to the New .NET Client Library Wizard Page

Use the **Welcome to the New .NET Client Library Wizard** page to view the definition of a .NET client library and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Library Wizard Page (.NET Client Wizard)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Library Wizard Page (.NET Client Wizard)

Use the **Library** wizard page to identify the .NET client library you are creating.

Use this	To do this
Interface name	Type the full name for the class in the .NET assembly. The name of the interface, when combined with the major version number and the namespace name, cannot exceed 39 Unicode characters.
Version	Type the version information for the .NET assembly in the form *major.minor*. The major version number, when combined with name of the interface and the namespace name, cannot exceed 39 Unicode characters
Component class name	View the component class name to be associated with the managed class in the .NET assembly. The format is *Namespace.Interface.MajorVersion*. The namespace name, when combined with the major version number and the name of the interface, cannot exceed 39 Unicode characters
Description	Type the description to be associated with the interface. The description can be a maximum of 256 Unicode characters.

See Also

Library Properties

Remote Environment Wizard Page 1 (.NET Client Wizard)

Remote Environment Wizard Page 1 (.NET Client Wizard)

Use the **Remote Environment** wizard page to define the remote environment (RE). An RE identifies an application execution environment running on a remote host system. The RE can have a data communication protocol and a programming model associated with it.

Use this	To do this
Vendor	Select the name of the vendor supplying the remote environment.
Protocol	Select the data communication protocol to be used to connect to the remote environment. The available communication protocols are: • **TCP/IP** (default) • **LU 6.2**
Target environment	Select the application environment running on the remote host system. The available environments are: • **CICS** (default) • **IMS** • **OS400** (TCP only)
Programming model	Select the programming model associated with the remote environment. The available models for the TCP/IP CICS target environment are: • **TRM User Data** (default) • **TRM Link** • **ELM User Data** • **ELM Link** The available models for the LU 6.2 CICS target environment are: • **CICS User Data** • **CICS Link** • The available models for the TCP/IP IMS target environment are: • **IMS Connect** • **Implicit** • **Explicit** • The only available model for the LU 6.2 IMS target environment is **IMS User Data**. The only available model for the OS400 target environment is **Distributed Program Call**.
Allow 32K in/out	Select this option if you want TI to treat the input DFHCOMMAREA independently from the output DFHCOMMAREA. TI typically combines the input DFHCOMMAREA and the output DFHCOMMAREA area. The combined areas cannot exceed 32 KB of data. When this option is selected, TI treats the input DFHCOMMAREA independently from the output DFHCOMMAREA. Each input and output area uses up to 32 KB of data.

See Also

Library Properties

Remote Environment Wizard Page 2 (for OS400) (.NET Client Wizard)

Remote Environment Wizard Page 2 (for LU 6.2 Link) (.NET Client Wizard)

Completing the New .NET Client Library Wizard Page

Remote Environment Wizard Page 2 (for OS400) (.NET Client Wizard)

Use the **Remote Environment** wizard page to define the default values for the remote environment (RE).

Use this	To do this
Program library	Type the name of the program library.
Date separator	Select the character used to separate the parts of the date. The available separators are: **(none)** (default) **/** **-** **.** **,** **&**
Time separator	Select the character used to separate the parts of time. The available separators are: **(none)** (default) **:** **.** **,** **&**

See Also

Library Properties

Completing the New .NET Client Library Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Remote Environment Wizard Page 2 (for LU 6.2 Link) (.NET Client Wizard)

Use the **Remote Environment** wizard page to define the default values for the remote environment (RE).

Use this	To do this
Transaction ID	Type the transaction program (TP) name or the link mirror transaction ID of the remote environment. The name or ID can be a maximum of 4 alphabetic characters. The format of the name must conform to the IBM SNA Transaction Program Names convention. The default is **CSMI**.
Source TP name	Type the name of the transaction program used by the method to locate a program to be executed. In the case of link models, the name identifies the mirror transaction identifier, which parses the distributed program link (DPL) header and identifies the link-to-program name. The name can be a maximum of 4 Unicode characters. The default is **MSTX**.

See Also

Library Properties

Completing the New .NET Client Library Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Completing the New .NET Client Library Wizard Page

Use the **Completing the New .NET Client Library Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

Use this	To do this
Run this wizard again	Select this option to complete the current modification of the type library and automatically restart the wizard to make new modifications.

See Also

New .NET Client Library Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

New .NET Server Library Wizard

The **New .NET Server Library Wizard** collects information about the type library information and about the host environment (HE). The wizard generates a Transaction Integrator metadata (TIM) file and adds it to the current TI Project displayed in the Solution Explorer.

This section contains:

- Welcome to the New .NET Server Library Wizard Page
- Library Wizard Page (.NET Server Wizard)
- Host Environment Wizard Page (.NET Server Wizard)
- Completing the New .NET Server Library Wizard Page

Welcome to the New .NET Server Library Wizard Page

Use the **Welcome to the New .NET Server Library Wizard** page to view the definition of a .NET server library and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Library Wizard Page (.NET Server Wizard)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Library Wizard Page (.NET Server Wizard)

Use the **Library** wizard page to identify the .NET server library you are creating.

Use this	To do this
Interface name	Type the full name for the class in the .NET assembly. The name of the interface, when combined with the major version number and the namespace name, cannot exceed 39 Unicode characters.
Version	Type the version information for the .NET assembly in the form *major.minor*. The major version number, when combined with name of the interface and the namespace name, cannot exceed 39 Unicode characters
Component class name	View the component class name to be associated with the managed class in the .NET assembly. The format is *Namespace.Interface.MajorVersion*. The namespace name, when combined with the major version number and the name of the interface, cannot exceed 39 Unicode characters
Description	Type the description to be associated with the interface. The description can be a maximum of 256 Unicode characters.

See Also

Library Properties

Host Environment Wizard Page (.NET Server Wizard)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host Environment Wizard Page (.NET Server Wizard)

Use the **Host Environment** (HE) wizard page to select the HE that defines the network and hardware characteristics of the non-Windows software platform initiating requests to the Windows platform. The HE consists of the host environment name, host identification, network transport type, data conversion information, default method resolution criteria, and security credential mapping.

Use this	To do this
Host environment	Select the host environment (HE). The available HEs are: • **Transaction Integrator - ConvertPrim for OS390** (default) • **Transaction Integrator - ConvertPrim for AS400**

See Also

Completing the New .NET Server Library Wizard Page

Library Properties

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Completing the New .NET Server Library Wizard Page

Use the **Completing the New .NET Server Library Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

Use this	To do this
Run this wizard again	Select this option to complete the current modification of the type library and automatically restart the wizard to make new modifications.

See Also

New .NET Server Library Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Import COBOL Wizard

This wizard allows you to select a COBOL copy book and use it for designing the component in the designer. This wizard is rather complex, as there are multiple options and paths to follow.

This section contains:

- Welcome to the Import COBOL Wizard Page
- Import COBOL Source File Wizard Page
- Item Options Wizard Page
- DFHCOMMAREA Wizard Page
- DFHCOMMAREA Direction Wizard Page
- Input Area Wizard Page
- Output Area Wizard Page
- Return Value Wizard Page
- Recordsets (COBOL) & UDT Wizard Page
- LL Field Wizard Page
- ZZ Field Wizard Page
- TRANCODE Field Wizard Page
- Recordset Columns Wizard Page
- User-Defined Type Members Wizard Page
- Completing the Import COBOL Wizard Page

Welcome to the Import COBOL Wizard Page

Use the **Welcome to the Import COBOL Wizard** page to view the procedure for importing a COBOL copy book and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Import COBOL Source File Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Import COBOL Source File Wizard Page

Use the **Import COBOL Source File** wizard page to identify the COBOL source file.

Use this	To do this
COBOL copy book	Select the full path to the COBOL copy book to be imported.
COBOL source	View the COBOL source code contained in the file identified in **COBOL copy book**.

See Also

Item Options Wizard Page

Item Options Wizard Page

Use the **Item Options** wizard page to specify the type of component to create. Select and identify the type of component to be created.

Use this	To do this
Type of item	View the group of component types: • **Method** • **Recordset** • **User-defined type**
Select or type the name of the item to import	View the identifying information for the new component.
Name	Select or type the name of the component. The name can be a maximum of 250 Unicode characters.
Use Link programming model	Type the name of an executable program that, running under the host environment (HE), will be linked to by this method and passed a COMMAREA. This option is available only for Link models. The name can be a maximum of 8 Unicode characters. This option is displayed only for host-initiated processing (HIP).
Exclude LL, ZZ, and TRANCODE fields	Select to exclude the LL, ZZ, and TRANCODE fields from the transaction if the host environment is IMS. This option is available only for HIP server components.
Link-to-Program	The name of an executable running under the host environment that will be linked to by this method and passed a COMMAREA. The name can be a maximum of 8 Unicode characters. This option is available only for WIP Link server components.
Source TP Name	The name of the mirror transaction identifier, which parses the distributed program link (DPL) header and identifies the link-to-program name. The name can be a maximum of 4 Unicode characters. This option is available only for WIP Link server components.

See Also

DFHCOMMAREA Wizard Page

DFHCOMMAREA Wizard Page

Use the **DFHCOMMAREA** wizard page to select the COBOL group that represents the DFHCOMMAREA parameters.

Use this	To do this
COBOL group	Select the group or parameter to include.

See Also

DFHCOMMAREA Direction Wizard Page

DFHCOMMAREA Direction Wizard Page

Use the **DFHCOMMAREA Direction** wizard page to view the default direction for the DFHCOMMAREA and to change the direction of a group item. To change the direction, click the icon to the left of the item, and then select the appropriate direction.

Use this	To do this
DFHCOMMAREA	Select the item to change.

See Also

Input Area Wizard Page

Input Area Wizard Page

Use the **Input Area** wizard page to select the input parameters for the new method in a non-link programming model.

Use this	To do this
Input area	Select or clear input parameters.

See Also

Output Area Wizard Page

Output Area Wizard Page

Use the **Output Area** wizard page to select the output parameters for the new method in a non-link programming model.

Use this	To do this
Output area	Select or clear output parameters.

See Also

Return Value Wizard Page

Return Value Wizard Page

Use the **Return Value** wizard page to set the return value for the new non-link method.

Use this	To do this
Return value	Select or clear return value.

See Also

Recordsets (COBOL) & UDT Wizard Page

Recordsets (COBOL) & UDT Wizard Page

Use the **Recordsets & UDT** wizard page to specify whether any of the parameters are represented by recordsets or UDTs. To change a group item, click the icon to the left of the group, and then select the definition.

Use this	To do this
COBOL Group	Select whether the group is defined as a recordset or UDT type. Select **Unset** to clear the definition.

See Also

LL Field Wizard Page

LL Field Wizard Page

Use the **LL Field** wizard page to select the LL fields to exclude from the transaction if the host environment (HE) is IMS.

Use this	To do this
LL field	Select or clear LL fields.

See Also

ZZ Field Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ZZ Field Wizard Page

Use the **ZZ Field** wizard page to select the ZZ fields to exclude from the transaction if the host environment (HE) is IMS.

Use this	To do this
ZZ field	Select or clear ZZ fields.

See Also

TRANCODE Field Wizard Page

TRANCODE Field Wizard Page

Use the **TRANCODE Field** wizard page to select the TRANCODE fields to exclude from the transaction if the host environment (HE) is IMS.

Use this	To do this
TRANCODE field	Select or clear TRANCODE fields.

See Also

Recordset Columns Wizard Page

Recordset Columns Wizard Page

Use the **Recordset Columns** wizard page to select the COBOL structure that represents the recordset columns.

Use this	To do this
COBOL group	Select the COBOL group to include, or clear the check box to exclude the group.

See Also

User-Defined Type Members Wizard Page

User-Defined Type Members Wizard Page

Use the **User-Defined Type Members** wizard page to select the COBOL structure that represents the user-defined type (UDT) members.

Use this	To do this
COBOL group	Select the COBOL group to include, or clear the check box to exclude the group.

See Also

Completing the Import COBOL Wizard Page

Completing the Import COBOL Wizard Page

Use the **Completing the Import COBOL Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

Use this	To do this
Run this wizard again	Select this option to complete the current modification of the type library and automatically restart the wizard to make new modifications.

See Also

Import COBOL Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Import RPG Wizard

The Import RPG Wizard allows you to import the definitions from Report Program Generator (RPG) source code written for use by distributed program call (DPC) applications running on AS/400 computers.

This section contains:

- Welcome to the Import RPG Wizard Page
- Import RPG Source File Wizard Page
- Select Item Wizard Page
- PLIST Direction Wizard Page
- Recordsets and User-Defined Types (RPG) Wizard Page
- Completing the RPG Import Wizard Page

Welcome to the Import RPG Wizard Page

Use the **Welcome to the Import RPG Wizard** page to view the procedure for importing Report Program Generator (RPG) source code and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Import RPG Source File Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Import RPG Source File Wizard Page

Use the **Import RPG Source File** wizard page to identify the file that contains the Report Program Generator (RPG) source statements. After being identified, the RPG source statements are displayed in the edit control. Select the RPG file to import.

Use this	To do this
RPG source file	Select or type the full path to the RPG file to import.
RPG source	View the RPG source code contained in the file identified in **RPG source file**.

See Also

Select Item Wizard Page

Select Item Wizard Page

Use the **Select Item** wizard page to create a new method or rewrite an existing method in your interface. Enter the identifying information for the method.

Use this	To do this
Method name	Select or type the name of the COM or .NET method. The name can be a maximum of 250 Unicode characters. If you are creating a new method, the name of the new method cannot be the same as the name of an existing method.
Program name	Select or type the name of the AS/400 Report Program Generator (RPG) program. The name can be a maximum of 10 Unicode characters.
Library name	Select or type the name of the library on the AS/400 computer from which the named RPG program will be retrieved for execution. The name can be a maximum of 10 Unicode characters.

See Also

PLIST Direction Wizard Page

PLIST Direction Wizard Page

Use the **PLIST Direction** wizard page to select the direction of the PLIST parameters. All parameters are set to In/Out by default. To change the direction of a group item, click the icon to the left of the name, and then select the appropriate direction.

Use this	To do this
PLIST	Click the Report Program Generator (RPG) parameter to change, and then click the new direction.

See Also

Recordsets and User-Defined Types (RPG) Wizard Page

Recordsets and User-Defined Types (RPG) Wizard Page

Use the **Select Recordsets and User-Defined Types** wizard page to specify whether a parameter is represented by recordsets or user-defined types (UDTs). To change a group item, click the icon to the left of the group, and then select the definition.

Use this	To do this
Group	Select whether the group is defined as a recordset or user-defined type. Select **Unset** to clear the definition.

See Also

Completing the RPG Import Wizard Page

Completing the RPG Import Wizard Page

Use the **Completing the RPG Import Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

Use this	To do this
Run this wizard again	Select this option to complete the current modification of the type library and automatically restart the wizard to make new modifications.

See Also

Import RPG Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Name Conflict Dialog Box

Use the **Name Conflict** dialog box to rename what you are copying.

Use this	To do this
New name	Type a new name. The name can be a maximum of 256 Unicode characters. The new name cannot be the same as and existing name.

See Also

Interface Properties

Array Dimension Dialog Box

Use the **Array Dimension** dialog box to define the number of dimensions in an array and the number of elements in each dimension.

Use this	To do this
Number of Dimensions	Type the number of dimensions in the array. The minimum number is 0, and the maximum is 7. The default is **0**.
Dimension/Number of Elements	View the current number of elements defined for each dimension.
Number of Elements	Type the number of elements in the selected dimension. The minimum number is 1, and the maximum number is 16777215. The default is **10**.

See Also

Parameter Properties

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Map Remote Environment Class Dialog Box

Use the **Map Remote Environment Class** dialog box to update the definition of a remote environment (RE) class that is no longer supported or does not conform to Transaction Integrator (TI) requirements.

Use this	To do this
Remote environment class	Type or select the COM type library or .NET assembly class of the remote environment.
Vendor	Select the name of the vendor supplying the remote environment.
Protocol	Select the data communication protocol to be used to connect to the remote environment. The available communication protocols are: • **TCP/IP** (default) • **LU 6.2**
Target environment	Select the application environment running on the remote host system. The available environments are: • **CICS** (default) • **IMS** • **OS400** (TCP only)
Programming model	Select the programming model associated with the remote environment. The available models for the TCP/IP CICS target environment are: • **TRM User Data** (default) • **TRM Link** • **ELM User Data** • **ELM Link** The available models for the LU 6.2 CICS target environment are: • **CICS User Data** • **CICS Link** • The available models for the TCP/IP IMS target environment are: • **IMS Connect** • **Implicit** • **Explicit** • The only available model for the LU 6.2 IMS target environment is **IMS User Data**. The only available model for the OS400 target environment is **Distributed Program Call**.

See Also

Wizards and Dialog Boxes (TI Project)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Select Convert Prim Dialog Box

Use the **Select Convert Prim** dialog box to provide a Covert PrimEx class that is missing from your server library.

Use this	To do this
Convert prim class	Select the conversion class to use with the host environment (HE). The available classes are: • **Transaction Integrator - ConvertPrim for OS390** (default) • **Transaction Integrator - ConvertPrim for AS400**

See Also

Wizards and Dialog Boxes (TI Project)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Properties (TI Project)

This section contains:

- Library Properties
- Interface Properties
- Method Properties
- Parameter Properties
- Recordset Properties
- Recordset Column Properties
- User-Defined Type Properties
- User-Defined Type Member Properties

Library Properties

Use the **Library** properties page to set design and remote environment (RE) properties on the component library or .NET assembly.

Design Properties

Use this	To do this
Component Type	View the type of library component. Possible values are: - **COM Type Library** (default) - **.NET Assembly**
Description	Type a description of the component. The description can be a maximum of 250 Unicode characters.
Help Context ID	Type the Help context ID associated with this method. It is used to connect to the Help topic for this method, and returned when an exception occurs during invocation of this method.
Initiation Type	View the location of the transaction program (TM) making the request. Possible values are: - **Windows-initiated** (default) - **Host-initiated**
Name	Type the name of the component. The name can be a maximum of 250 Unicode characters. The name must be different from any other component name in the same project. The default is **Library(n)**.
Support Visual Basic 6.0 Decimal Type	Select this option to specify whether the component allows application programs written with Visual Basic 6.0 that reference decimal data types. The possible values are: - **True** - **False** (default)
Visual Basic 6.0 Compatible	Select this option to require that the Visual Basic server use the **Implements** keyword within the Visual Basic server script. The server script then creates the Visual Basic interface to the Transaction Integrator metadata (TIM) type library. The possible values are: - **True**. Use the **Implements** keyword. - **False** (default) **Note** This property is the same as the property **Visual Basic Implements Compatible** in Host Integration Server 2000.
Version	Type the version information for the type library or the .NET assembly, expressed in the form of *major.minor*.

Remote Environment Properties

Use this	To do this
Allow 32K In/Out	Select this option if you want TI to treat the input DFHCOMMAREA independently from the output DFHCOMMAREA. TI typically combines the input DFHCOMMAREA and the output DFHCOMMAREA area. The combined areas cannot exceed 32 KB of data. When this option is selected, TI treats the input DFHCOMMAREA independently from the output DFHCOMMAREA. Each input and output area uses up to 32 KB of data. Changing this option affects the currently selected method. Possible values are: - **True** - **False** (default)

Remote Environment Class	Select the programming model associated with the remote environment. The available models for the TCP/IP CICS target environment are: - **TRM User Data** (default) - **TRM Link** - **ELM User Data** - **ELM Link** The available models for the LU 6.2 CICS target environment are: - **CICS User Data** - **CICS Link** - The available models for the TCP/IP IMS target environment are: - **IMS Connect** - **Implicit** - **Explicit** - The only available model for the LU 6.2 IMS target environment is **IMS User Data**. The only available model for the OS400 target environment is **Distributed Program Call**.
Transaction Support	The possible values are: - **Required**. The new TI component is used in applications that execute within COM+ transactions. The component's methods will be called by applications used with mainframe transaction programs that support Sync Level 2 requests. If a transaction is in progress, the application will enlist in the transaction. Otherwise, the application will start a new transaction. - **Required New**. The new TI component is used in applications that execute within COM+ transactions. The component's methods will be called by applications used with mainframe transaction programs that support Sync Level 2 requests. The application will always start a new transaction, regardless of whether an existing transaction is already in progress. - **Supported**. The new TI component is used in applications that might or might not execute within COM+ transactions. The component's methods will be called by applications used with mainframe transaction programs that support both Sync Level 0 (non-transactional) and Sync Level 2 (transactional) requests. In the case of a Sync Level 2 transaction, the calling application will enlist in the transaction if the transaction is already in progress. Otherwise, the application will start a new transaction. - **Not Supported**. The new TI component is used in applications that do not execute within COM+ transactions. The component's methods will be called by applications used with mainframe transaction programs that support only Sync Level 0 requests. IMS transaction programs prior to IMS 6.0 support only Sync Level 0. CICS and IMS 6.0 transaction programs support either Sync Level 0 or Sync Level 2 requests.

> **Warning** The properties of a component are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the component to function incorrectly.

See Also

Library Name Node

Interface Properties

Use the **Interface** properties page to set design properties on the interface.

Design Properties

Use this	To do this
Name	Type the name of the library component. The name can be a maximum of 250 Unicode characters.

> **Warning** The properties of a component are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the component to function incorrectly.

See Also

Interface Name Node (COM)

Interface Name Node (.NET)

Method Properties

Use the **Method** properties page to set array, COBOL, design, host definition, and recordset properties on the method.

Array Properties

Use this	To do this
Array Dimensions	Select the array dimensions for the return value. The default is **(none)**.
Is Array	Select whether the return value is an array. The possible values are: • **True** • **False** (default)
Occurs Depending On	Select to indicate that a numeric data item preceding the table (recordset or array in Automation) indicates the actual number of rows or elements being sent or received. Equivalent to variable-length tables in COBOL. Use the drop-down list to select the numeric data item that specifies this value. For CICS Link, the recordset or array and the associated length specifier must be in/out. The data in the buffer that follows a variable length table immediately follows the last data item in the table regardless of the maximum size specified for the table. Arrays with multiple dimensions can only be used for the outermost loop (COBOL) or rightmost dimension (Microsoft® Visual C++® or Visual Basic). The default is **(none)**.

COBOL Properties

Use this	To do this
Host Data Type	Select the host data type.
Error Handling	Select the return value error handling. The possible values are: • **Truncate**. Select this option to set TI to truncate the value when an error occurs. (default) • **Round**. Select this option to set TI to round the value when an error occurs. • **Error**. Select this option to set TI to return an error when an error occurs.
Filler	Type the return value filler. The default is **0**.

From Host	Type the number of bytes of FILLER that follows this data item in the buffers that are received from the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side. The default is **0**.
To Host	Type the number of bytes of FILLER that follows this data item in buffers that are sent to the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side. The default is **0**.
Scale	Type the return value scale.
Sign Attribute	Select the return value sign attribute. The possible values are: - **Trailing**. For signed DISPLAY data type, indicates that the sign is trailing (default). This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. - **Trailing Separate**. For signed DISPLAY data type, indicates that the sign is separate. This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. - **Leading**. For signed DISPLAY data type, indicates that the sign is leading. This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. - **Leading Separate**. For signed DISPLAY data type, indicates that the sign is separate.
Size	Type the return value size.
SOSI	Select this option to specify whether a double-byte character set data is expected to begin with a shift-out (SO) and end with a shift-in (SI) character. The possible values are: - **True**. The SO and SI characters are removed from the data when it is received from the host application, and the SO and SI characters are added to the data when it is sent to the host application. In the length of the PIC G, it is not necessary to include the two bytes for the SO and SI characters because the TI run-time environment applies them. - **False** (default)
String Delimiting	Select the return value string delimiting. The possible values are: - **Space-padded**. Tells the TI run-time environment that the mainframe representation of the string is delimited by padding the string definition with space characters. For example, if the mainframe's COBOL definition is PIC X(10) but only three characters are in the string, the mainframe expects seven trailing spaces. Therefore, selecting this option tells the TI run-time environment to convert strings being sent to the mainframe to change the string's NULL termination character to the appropriate number of trailing spaces before sending it to the mainframe. For example, if the string is defined on the mainframe as PIC X(10), TI will send a string of *ABC* followed by seven trailing spaces. Selecting this option also tells the TI run-time environment to convert the output string being returned from the mainframe to the TI Automation server by converting the string's trailing spaces to a single null termination character. For more information, see Padding Mainframe Character Strings with Spaces. (default) - **Null-terminated**. Tells the TI run-time environment that the mainframe representation of the string is delimited by a null character (EBCDIC 0x00). Selecting this option tells the TI run-time environment to add a single null character to the end of a string if there is room for the byte before sending a string to the mainframe, and it tells the TI run-time environment to stop at the first null character encountered when receiving a string from the mainframe. Therefore, by selecting this option, you are telling TI to retain trailing spaces in output strings coming from the mainframe because TI will not convert the trailing spaces to a single NULL terminator. For more information, see Padding Mainframe Character Strings with Spaces.

Design Properties

Use this	To do this
Allow 32 K In/Out	Select this option if you want TI to treat the input DFHCOMMAREA independently from the output DFHCOMMAREA. TI typically combines the input DFHCOMMAREA and the output DFHCOMMAREA area. The combined areas cannot exceed 32 KB of data. When this option is selected, TI treats the input DFHCOMMAREA independently from the output DFHCOMMAREA. Each input and output area uses up to 32 KB of data. Changing this option affects the currently selected method. Possible values are: • **True** • **False** (default) **Note** You can use this property as an accessory to "Use Link Programming Model" in the Windows-initiated processing (WIP) CICS programming model and in any host-initiated processing (HIP) programming models. **Note** This property is available only if the **Is Link** property is set to **True**.
Description	Type a description of the method. The description can be a maximum of 250 Unicode characters.
Help Context ID	Type the Help context ID associated with this method. The ID is used to connect to Help for this method, and returned when an exception occurs during invocation of this method. The default is **0**.
Include Context Parameter	Select whether the client object method automatically includes context. The possible values are: • **True**. Visual Basic .NET automatically includes the context as an additional parameter in the argument. If you do not include **COMTIContext** parameter in your method call along with your other parameters, Visual Basic .NET returns the error message **An unhandled exception of type 'System.MissingMemberException' occurred in microsoft.visualbasic.dll** and informs you that the method cannot be called with the number of parameters you have written. If you receive this message, verify that the **Include Context Parameter** is included as a parameter within the list of parameters on the method. • **False**. Visual Basic .NET does not automatically include the context as an additional parameter in the argument. If you set this property to **False** and include **COMTIContext** parameter in your method call along with your other parameters, Visual Basic .NET returns the error message **An unhandled exception of type 'System.MissingMemberException' occurred in microsoft.visualbasic.dll** and informs you that the method cannot be called with the number of parameters you have written. If you receive this message, remove the **COMTIContext** parameter from the method parameter list. The default is **True**.
Initial Buffer Value	Type the initial buffer value. The default is null.
Is Link	Select whether the host object method uses the Link programming model. The possible values for Windows-initiated processing (WIP) are: • **True**. Use the link model. The link programming model can be used only with CICS link protocols. • **False**. Do not use the link model. The default is **False**. The possible values for host-initiated processing (HIP) are: • **Yes**. Use the link model. The link programming model can be used with all protocols. • **No**. Do not use the link model. • **Link using 32K In/Out**. Use the link model and set the From Host and To Host properties. The default is **No**.

Meta Data	Select how metadata is handled. The possible values are: - **(none)**. By default no special data is sent to or received from the host application. Select this option button if you only want to send and receive the data for the method. - **Include Method Information**. The name of this method to be sent to the host along with parameter data. The method name is sent as the first 32 bytes in the buffer. This option is useful if multiple method calls go to the same transaction and you want to differentiate the data from the different calls. - **Include All Information**. All metadata available to be sent and received with your method data. For details of the format of metadata, see description for "Optional Metadata".
Name	Type the name of the method. The name can be a maximum of 250 Unicode characters. The name must be different from any other method name in the same project. The default is **null**.
Position Return Value After	Type the Automation method return value that follows the selected data item when it is received from the host. This option does not affect the Automation side. Use this option when the data item that you want to specify as the Automation return value is not the first data item field in the data declaration that describes the data received from the host.
Preliminary Filler	View the number of bytes of FILLER received from or sent to the host.
From Host	Type the number of bytes of FILLER that follows this data item in the buffers that are received from the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.
To Host	Type the number of bytes of FILLER that follows this data item in the buffers that are sent to the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.
Return Type	Select the return value type. The possible values are: - **Void** - **Boolean** - **Byte** - **Date** - **Currency** - **Decimal** - **Integer** - **Long** - **Double** - **Single** - **String** - **User-defined type** - **Recordset** - **(none)** (default)
Variable Sized Final Field	- Select this option when the last data item is a string to indicate that the size of the string varies. This option is also used to define a datatable or recordset as being either bounded or as including all rows as defined as **Maximum Occurrence** set on the parameter.
From Host	- **True** - **False** (default)
To Host	- **True** - **False** (default)

Host Definition Properties

Use this	To do this
Link-to-Program Name	Type the link-to-program name (CICS LINK/DPL).
Mirror Transaction ID	Type the mirror TRANID that this method uses, if you want to override the mirror TRANID for the remote environment (RE) that this component is associated with. Leaving this box blank causes the mirror TRANID in the remote environment description to be used. The TRANID can be up to four characters in length. Acceptable characters are A-Z a-z 0-9 $ @ # . / _ % & ¢? ! : | = ¬ , ; < >. Transaction names beginning with C are reserved for CICS and should not be used. The % and & characters may cause problems with Resource Access Control Facility (RACF) if transaction security is active.
TP Name	Type a source transaction program (TP) name when the CICS application program must access a DB2 database. The TP name is referenced in a CICS Resource Control Table (RCT) entry, which associates CICS transactions with DB2 plans. Specifies the name of the host transaction program (IMS or CICS) or the link-to program name (CICS LINK/DPL).

Recordsets Properties

Use this	To do this
Include Actual Size	The host program will not include or expect any information that indicates the actual number of rows (recordsets) or elements (arrays) being sent or received. The possible values are: • **True** • **False** (default) **Note** This property is read-only and will always be set to **False** unless it was set to **True** at the time the type library was created with the first version of COM Transaction Integrator.
Maximum Occurrence	Maximum row occurrence. Indicates the maximum number of rows to be sent to or received from the host. Equivalent to the OCCURS n TIMES keyword on a COBOL group item. The default is **1**.
Occurs Depending On	Equivalent to variable-length tables in COBOL. Indicates that a numeric data item preceding the table (recordset or array in Automation) indicates the actual number of rows or elements being sent or received. Use the drop-down list to select which numeric data item specifies this value. For CICS Link, the recordset or array and the associated length specifier must be in/out. The data in the buffer that follows a variable length table immediately follows the last data item in the table regardless of the maximum size specified for the table. For arrays with multiple dimensions, it can only be used for the outermost loop (COBOL) or rightmost dimension (Visual C++ or Visual Basic). Return value recordset occurs depending on. The default is **(none)**.
Unbounded	Indicates the recordset is unbounded. Indicates that any number of rows can be sent to or received from the host. You would select this option when the rows being sent or received are from a database and the maximum number of rows is not known. The possible values are: • **True**. When the last data item is a string, this means that the size of the string varies. • **False**. When the last data item is an array, this means that the number of elements in the array varies. When the last data item is a recordset, this means that the number of rows in the recordset varies. (default)

> **Warning** The properties of a component are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the component to function incorrectly.

See Also

Using Custom TRMs and ELMs with COMTIContext

Method Name Node (COM)

Method Name Node (.NET)

Parameter Properties

Use the **Parameter** properties page to set the array, COBOL design, and recordset properties on a parameter.

Array Properties

Use this	To do this
Array Dimensions	Use this control to indicate how many dimensions (Visual C++ or Visual Basic) or nested OCCURS clauses (COBOL) that the array or table contains.
Is Array	Select this option to indicate whether the parameter is an array. The possible values are: - **True**. Parameter is an array. - **False**. The item is a simple data type including RDA recordset objects. (default).
Occurs Depending On	Select this option to indicate that a numeric data item preceding the table (recordset or array in Automation) indicates the actual number of rows or elements being sent or received. Use the drop-down list to select which numeric data item specifies this value. For CICS Link, the recordset or array and the associated length specifier must be in/out. The data in the buffer that follows a variable length table immediately follows the last data item in the table regardless of the maximum size specified for the table. For arrays with multiple dimensions, it can only be used for the outermost loop (COBOL) or rightmost dimension (Visual C++ or Visual Basic). The RPG language, unlike COBOL, does not directly support **Occurs Depending On**. TI provides a feature that replicates the Occurs Depending On action for the RPG language. A TI Project supports a single level of dimension applied as an Occurs Depending On associated with a array of records in RPG. An index parameter must be defined prior to defining the parameter associated with a datatable or structure for the parameter to show as a **Occurs Depending On** selectable choice.

Host Properties

Use this	To do this
Host Data Type	Specifies the parameter host data type.
Error Handling	Parameter error handling. The possible values are: - **Truncate**. If selected and an error occurs, TI will truncate the value. (default) - **Round**. If selected and an error occurs, TI will round the value. - **Error**. If selected and an error occurs, TI will return an error.

Filler	Indicates the number of bytes of FILLER that follow this data item in the buffers that are sent to or received from the host. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.
FromHost	Indicates the number of bytes of FILLER that follows this data item in the buffers that are received from the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.
ToHost	Indicates the number of bytes of FILLER that follows this data item in the buffers that are sent to the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.
Scale	The parameter scale.
SignAttribute	Parameter sign attribute. The possible values are: - **Trailing**. For signed DISPLAY data type, indicates that the sign is trailing (default). This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. - **Trailing Separate**. For signed DISPLAY data type, indicates that the sign is separate. This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. - **Leading**. For signed DISPLAY data type, indicates that the sign is leading. This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. - **Leading Separate**. For signed DISPLAY data type, indicates that the sign is separate.
Size	Specifies the length of the string.
SOSI	Specifies whether double-byte character set data is expected to begin with a shift-out (SO) and end with a shift-in (SI) character. When this check box is selected, the SO and SI characters are removed from the data when it is received from the host application, and the SO and SI characters are added to the data when it is sent to the host application. In the length of the PIC G, it is not necessary to include the two bytes for the SO and SI characters because the TI run-time environment applies them. The possible values are: - **True** - **False** (default)

String Delimiting	Return value string delimiting. The possible values are: - **Space-Padded**. Tells the TI run-time environment that the mainframe representation of the string is delimited by padding the string definition with space characters. For example, if the mainframe's COBOL definition is PIC X(10) but only three characters are in the string, the mainframe expects seven trailing spaces. Therefore, selecting this option tells the TI run-time environment to convert strings being sent to the mainframe to change the string’s NULL termination character to the appropriate number of trailing spaces before sending it to the mainframe. For example, if the string is defined on the mainframe as PIC X(10), TI will send a string of *ABC* followed by seven trailing spaces. Selecting this option also tells the TI run-time environment to convert the output string being returned from the mainframe to the TI Automation server by converting the string’s trailing spaces to a single null termination character. (default) - **Null-terminated**. Tells the TI run-time environment that the mainframe representation of the string is delimited by a null character (EBCDIC 0x00). Selecting this option tells the TI run-time environment to add a single null character to the end of a string if there is room for the byte before sending a string to the mainframe, and it tells the TI run-time environment to stop at the first null character encountered when receiving a string from the mainframe. Therefore, by selecting this option, you are telling TI to retain trailing spaces in output strings coming from the mainframe because TI will not convert the trailing spaces to a single NULL terminator. For more information, see Padding Mainframe Character Strings with Spaces.

Design Properties

Use this	To do this
Data Type	The possible values are: - **Void** - **Boolean** - **Byte** - **Date** - **Currency** - **Decimal** - **Integer** - **Long** - **Double** - **Single** - **String** - **User-defined type** - **Recordset** - **(none)** (default)
Name	Name of the parameter. The name can be a maximum of 250 Unicode characters.
Parameter Direction	The possible values are: - **In** - **Out** - **In / Out** (default)

Recordsets Properties

Use this	To do this

Include Actual Size	Default option indicating that the host program will not include or expect any information that indicates the actual number of rows (recordsets) or elements (arrays) being sent or received. The possible values are: - **True** - **False** (default)
Maximum Occurrence	Maximum row occurrence. Indicates the maximum number of rows to be sent to or received from the host. Equivalent to the OCCURS n TIMES keyword on a COBOL group item.
Occurs Depending On	Parameter recordset occurs depending on. Equivalent to variable-length tables in COBOL. Indicates that a numeric data item preceding the table (recordset or array in Automation) indicates the actual number of rows or elements being sent or received. Use the drop-down list to select which numeric data item specifies this value. For CICS Link, the recordset or array and the associated length specifier must be in/out. The data in the buffer that follows a variable length table immediately follows the last data item in the table regardless of the maximum size specified for the table. For arrays with multiple dimensions, it can only be used for the outermost loop (COBOL) or rightmost dimension (Visual C++ or Visual Basic).
Unbounded	Indicates the recordset is unbounded. Indicates that any number of rows can be sent to or received from the host. You would select this option when the rows being sent or received are from a database and the maximum number of rows is not known. The possible values are: - **True** - **False** (default)

> **Warning** The properties of a component are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the component to function incorrectly.

See Also

Padding Mainframe Character Strings with Spaces

Parameter Name Node (COM)

Parameter Name Node (.NET)

Recordset Properties

Use the **Recordset** properties page to set design and host definition properties on a recordset.

Design Properties

Use this	To do this
Name	Name of the recordset. The name can be a maximum of 250 Unicode characters.

Host Definition Properties

Use this	To do this
Column Filler	Recordset filler. Indicates for each row of data sent or received, the number of bytes of FILLER that precedes each row. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.
Variable Sized Rows	Recordset variable sized rows. Use this option to indicate that the last data item or group item returned from the host varies from zero to the maximum size specified for the data item. When the last data item is character data, it refers to the number of bytes (TI terminology is "variably sized"). When the last data item is an array, it refers to the number of elements. When the last data item is a recordset, it refers to the number of rows. The last two are called "bounded" in TI terminology. The possible values are: • **(none)** (default) • **Half-word binary (16 bits)**. Indicates that the length specifier for the actual size of a variably sized row will be a half-word binary (16-bit) value. This is the default. • **Full-word binary (32 bits)**. Indicates that the length specifier for the actual size of a variably sized row will be a full word binary (16-bit) value. • **Half Word (16bits) Inclusive**. If the value of the actual size of variably sized rows will include the length specifier (the actual size of the row plus 2 or 4 bytes), select this check box. Verify that this check box is cleared if the value should only specify the actual size of a row itself. • Full Word (32bits) Inclusive.

> **Warning** The properties of a component are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the component to function incorrectly.

See Also

Recordset Column Properties

Recordsets Node

Recordset Name Node

Recordset Column Properties

Use the **Recordset Column** properties page to set COBOL and design properties on a recordset column.

COBOL Properties

Use this	To do this
HostDataType	Specifies the recordset column host data type.
ErrorHandling	Recordset column error handling. The possible values are: - **Truncate**. If selected and an error occurs, TI will truncate the value. (default) - **Round**. If selected and an error occurs, TI will round the value. - **Error**. If selected and an error occurs, TI will return an error.
Filler	Recordset column filler. The default is **0**.
FromHost	Indicates the number of bytes of FILLER that follows this data item in the buffers that are received from the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.
ToHost	Indicates the number of bytes of FILLER that follows this data item in buffers that are sent to the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.
Scale	Recordset column scale.

SignAttribute	Recordset column sign attribute. The possible values are: • **Trailing**. For signed DISPLAY data type, indicates that the sign is trailing (default). This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. For signed DISPLAY data type, indicates that the sign is not separate (default). • **Trailing Separate**. For signed DISPLAY data type, indicates that the sign is separate. This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. • **Leading**. For signed DISPLAY data type, indicates that the sign is leading. This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. For signed DISPLAY data type, indicates that the sign is not separate (default). • **Leading Separate**. For signed DISPLAY data type, indicates that the sign is separate.
Size/Precision	Recordset column size.
SO SI	Specifies whether double-byte character set data is expected to begin with a shift-out (SO) and end with a shift-in (SI) character. When this check box is selected, the SO and SI characters are removed from the data when it is received from the host application, and the SO and SI characters are added to the data when it is sent to the host application. In the length of the PIC G, it is not necessary to include the two bytes for the SO and SI characters because the TI run-time environment applies them. The possible values are: • **True** • **False** (default)
StringDelimiting	Recordset column string delimiting. The possible values are: • **Space-padded**. Tells the TI run-time environment that the mainframe representation of the string is delimited by padding the string definition with space characters. For example, if the mainframe's COBOL definition is PIC X(10) but only three characters are in the string, the mainframe expects seven trailing spaces. Therefore, selecting this option tells the TI run-time environment to convert strings being sent to the mainframe to change the string's NULL termination character to the appropriate number of trailing spaces before sending it to the mainframe. For example, if the string is defined on the mainframe as PIC X(10), TI will send a string of *ABC* followed by seven trailing spaces. Selecting this option also tells the TI run-time environment to convert the output string being returned from the mainframe to the TI Automation server by converting the string's trailing spaces to a single null termination character. For more information, see Padding Mainframe Character Strings with Spaces. • **Null-terminated**. Tells the TI run-time environment that the mainframe representation of the string is delimited by a null character (EBCDIC 0x00). Selecting this option tells the TI run-time environment to add a single null character to the end of a string if there is room for the byte before sending a string to the mainframe, and it tells the TI run-time environment to stop at the first null character encountered when receiving a string from the mainframe. Therefore, by selecting this option, you are telling TI to retain trailing spaces in output strings coming from the mainframe because TI will not convert the trailing spaces to a single NULL terminator. For more information, see Padding Mainframe Character Strings with Spaces.

Design Properties

Use this	To do this

Data Type	The data type of the currently displayed column. Recordset column data type. The possible values are: - **Void** - **Boolean** - **Byte** - **Date** - 3**Currency** - **Decimal** - **Integer** - **Long** - **Double** - **Single** - **String**
Name	Name of the recordset column. The name can be a maximum of 250 Unicode characters.

> **Warning** The properties of a component are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the component to function incorrectly.

See Also

Recordset Column Name Node

User-Defined Type Properties

Use the **User-Defined Type** properties page to set design and host definition properties on user-defined types (UDTs).

Design properties

Use this	To do this
Name	Name of the user-defined type (UDT). The name can be a maximum of 250 Unicode characters.

Host Definition properties

Use this	To do this
Independent UDT	Independent user-defined type. An independent user-defined type (UDT) is a UDT that is not referenced by a method (directly or indirectly). When you use TCP/IP, the client sends the host a transaction request message (TRM) or enhanced listener message (ELM) containing the Transaction Program ID, User ID, Password, and other administrative data to be used by the host. The client sends a TRM or ELM reply containing additional administrative data. The data in the TRM or ELM is independent from the actual program data to be exchanged with the Transaction Program on the host. You can use the independent UDT options and the naming convention of TRMIN..., TRMOUT..., ELMIN..., or ELMOUT... to control the data content and format in the TRM or ELM request and TRM or ELM reply. For TRMs or ELMs destined for the host, the name of the UDT must begin with the characters TRMIN or ELMIN. For TRM or ELM replies from the host, the name of the UDT must begin with the characters TRMOUT or ELMOUT. Examples of valid TRM names are: TRMINMyVeryOwn, ELMINStandard, TRMOUTMyVeryOwn, and ELMOUTStandard. When you begin the UDT with the character TRMIN, TRMOUT, ELMIN, or ELMOUT, Visual Studio automatically formats the first member as an Int or Long and the last members as a String or Array. After an independent UDT has been defined, it can be referenced by the client application and passed to and from the TI runtime (by using the COMTIContext object) as an optional parameter. The possible values are: • **(none)** (default) • **Length Inclusive** • **Length Exclusive**
Member Filler	User-defined type member filler. Type the number of bytes of FILLER that precedes each row of data sent or received. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side. This option is not available if the length specifier option to include or exclude itself is selected.

> **Warning** The properties of a component are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the component to function incorrectly.

See Also

User-Defined Types Node

User-Defined Type Name Node

User-Defined Type Member Properties

Use the **User-Defined Type Member** properties page to set array, COBOL, design, and recordset properties on user-defined type members.

Array Properties

Use this	To do this
Array Dimensions	User-defined type member array dimensions. The default is **(none)**.
Is Array	User-defined type member is an array. The possible values are: • **True** • **False** (default)
Occurs Depending On	User-defined type member array occurs depending on.

Host Properties

Use this	To do this
Host Data Type	User-defined type member host data type.
Error Handling	User-defined type member error handling. The possible values are: • **Truncate**. If selected and an error occurs, TI will truncate the value. (default) • **Round**. If selected and an error occurs, TI will round the value. • **Error**. If selected and an error occurs, TI will return an error.
Filler	User-defined type member filler.
From Host	Indicates the number of bytes of FILLER that follows this data item in the buffers that are received from the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.
To Host	Indicates the number of bytes of FILLER that follows this data item in buffers that are sent to the server. FILLER causes an untranslated gap in the buffer. FILLER is not visible on the Automation side.

Scale	User-defined type member scale.
SignAttribute	User-defined type member sign attribute. The possible values are: - **Trailing**. For signed DISPLAY data type, indicates that the sign is trailing (default). This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. For signed DISPLAY data type, indicates that the sign is not separate (default). - **Trailing Separate**. For signed DISPLAY data type, indicates that the sign is separate. - **Leading**. For signed DISPLAY data type, indicates that the sign is leading. This option indicates to the TI run-time environment how a signed DISPLAY data type is formatted and affects how data from the host is converted to and from the Automation data type. For signed DISPLAY data type, indicates that the sign is not separate (default). - **Leading Separate**. For signed DISPLAY data type, indicates that the sign is separate.
Size	User-defined type member size.
SOSI	Specifies whether double-byte character set data is expected to begin with a shift-out (SO) and end with a shift-in (SI) character. When this check box is selected, the SO and SI characters are removed from the data when it is received from the host application, and the SO and SI characters are added to the data when it is sent to the host application. In the length of the PIC G, it is not necessary to include the two bytes for the SO and SI characters because the TI run-time environment applies them. The possible values are: - **True** - **False** (default)
StringDelimiting	User-defined type member string delimiting. The possible values are: - **Space-padded**. Tells the TI run-time environment that the mainframe representation of the string is delimited by padding the string definition with space characters. For example, if the mainframe's COBOL definition is PIC X(10) but only three characters are in the string, the mainframe expects seven trailing spaces. Therefore, selecting this option tells the TI run-time environment to convert strings being sent to the mainframe to change the string's NULL termination character to the appropriate number of trailing spaces before sending it to the mainframe. For example, if the string is defined on the mainframe as PIC X(10), TI will send a string of *ABC* followed by seven trailing spaces. Selecting this option also tells the TI run-time environment to convert the output string being returned from the mainframe to the TI Automation server by converting the string's trailing spaces to a single null termination character. For more information, see Padding Mainframe Character Strings with Spaces. - **Null-terminated**. Tells the TI run-time environment that the mainframe representation of the string is delimited by a null character (EBCDIC 0x00). Selecting this option tells the TI run-time environment to add a single null character to the end of a string if there is room for the byte before sending a string to the mainframe, and it tells the TI run-time environment to stop at the first null character encountered when receiving a string from the mainframe. Therefore, by selecting this option, you are telling TI to retain trailing spaces in output strings coming from the mainframe because TI will not convert the trailing spaces to a single NULL terminator. For more information, see Padding Mainframe Character Strings with Spaces.

Design Properties

Use this	To do this

Data Type	User-defined type member data type. The data type of the currently displayed user-defined type member. The possible values are: - **Void** - **Boolean** - **Byte** - **Date** - **Currency** - **Decimal** - **Integer** - **Long** - **Double** - **Single** - **String** - **User-defined type** - **Recordset**
Name	Name of the user-defined type member. The name can be a maximum of 250 Unicode characters. The name must be unique from any other user-defined type member name in the same project. The default is **null**.

Recordsets Properties

Use this	To do this
Include Actual Size	Default option indicating that the host program will not include or expect any information that indicates the actual number of rows (recordsets) or elements (arrays) being sent or received. The possible values are: - **True** - **False** (default)
Maximum Occurrence	Maximum row occurrence. Indicates the maximum number of rows to be sent to or received from the host. Equivalent to the OCCURS n TIMES keyword on a COBOL group item.
Occurs Depending On	User-defined type member recordset occurs depending on. Indicates the maximum number of rows to be sent to or received from the host. Equivalent to the OCCURS n TIMES keyword on a COBOL group item. Equivalent to variable-length tables in COBOL. Indicates that a numeric data item preceding the table (recordset or array in Automation) indicates the actual number of rows or elements being sent or received. Use the drop-down list to select which numeric data item specifies this value. For CICS Link, the recordset or array and the associated length specifier must be in/out. The data in the buffer that follows a variable length table immediately follows the last data item in the table regardless of the maximum size specified for the table. For arrays with multiple dimensions, it can only be used for the outermost loop (COBOL) or rightmost dimension (Visual C++ or Visual Basic).

Unbounded	Indicates that any number of rows can be sent to or received from the host. Set to **true** when the rows being sent or received are from a database and the maximum number of rows is not known. The possible values are: - **True** - **False** (default)

Warning The properties of a component are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the component to function incorrectly.

See Also

User-Defined Type Member Name Node

Transaction Integrator Manager Help

Transaction Integrator (TI) Manager provides a graphical user interface for creating, viewing, and managing the host-initiated processing (HIP) and Windows-initiated processing (WIP) environments. The user interface is accessible through the TI Manager management console and appears in tree view, property pages, and wizards. You can display Help topics on the individual user interface controls by clicking **Help** on the TI Manager wizard page or dialog box or by selecting a control or node and pressing the **F1** key. These individual Help topics are included in this section for easier reference and review.

This section contains:

- TI Manager Nodes
- TI Manager Wizards and Dialog Boxes
- TI Manager Properties

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TI Manager Nodes

The Transaction Integrator (TI) Manager console provides a tree view of the primary configuration elements used in host-initiated processing (HIP) and Windows-initiated processing (WIP). HIP enables an IBM mainframe program in CICS, IMS, or MVS to call a COM or .NET object. WIP enables a Windows client application to access an IBM mainframe transaction program in CICS, IMS, or MVS.

Each major element of the process is represented by a node on the tree in the left pane of the management console. Double-clicking the node expands it; right-clicking the node displays a shortcut menu.

This section contains:

- Transaction Integrator (mode) Node
- Host-Initiated Processing Node
- Computers Node
- Computer Node
- Application [status] Node
- Listener [status] Node
- View Node (listener)
- Local Environments Node
- Local Environment Node
- Host Environments Node
- Host Environment Node
- Security Policies Node
- Security Policy Node
- Objects Node (HIP)
- Object Node (HIP)
- View Node (object)
- Windows-Initiated Processing Node
- Remote Environments Node
- Remote Environment Node
- Objects Node (WIP)
- Object Node (WIP)

Transaction Integrator (mode) Node

Use the **Transaction Integrator** (TI) node to view the basic grouping of elements within the host-initiated processing (HIP) environment and the Windows-initiated processing (WIP) environment. You can also use the **Transaction Integrator** (TI) node to control the operating mode of the TI Manager console.

All computers that have TI installed are able to share the same physical SQL Server configuration database, and TI Manager allows you to edit the configuration of any computer registered in that database from any TI-enabled computer. In HIP, an administrator could edit database entries such as the host environments, objects, or views that are shared among computers. In WIP, an administrator can only edit local WIP settings.

The mode shown in parentheses in the node label indicates the mode of console operations: either **Configuration** or **View and operate**. Although multiple system administrators using the TI Manager console can concurrently view, start, or stop any application and listener on any TI-enabled computer registered in the configuration database, only one authorized administrator at a time can create or edit the configuration of the TI database. When the first administrator opens the TI Manager console to view or change the configuration, the console opens in **Configuration** mode by default, the configuration database (MSHIS60_HIP) is locked, and a timer starts. If no configuration changes occur within the time period set on the timer, the console is automatically unlocked and the mode is returned to **View and operate**.

> **Note** The default name of the configuration database is MSHIS60_HIP, but you can change the name using the Microsoft® Host Integration Server 2004 Configuration Wizard.

If another administrator opens their TI Manager console while the first administrator is still making changes or while the first console is still in **Configuration** mode, the second console opens in **View and operate** mode and TI Manager displays a message box indicating the name of the user in **Configuration** mode. The second administrator must wait until either the first administrator manually switches to **View and operate** mode or the timer automatically switches the console mode due to inactivity.

You can edit the configuration database or the local computer only when all the other TI Managers registered in the configuration database are in the **View and operate** mode.

The possible console modes are:

- **Configuration**. The Host Integration Server administrator can create or edit the following items on any TI-enabled computer:
  - Applications
  - Listeners on an application
  - Local environments
  - Host environments
  - Security policies
  - HIP objects
  - Object views

  The Host Integration Server administrator can also create or edit the following items on the local computer:

  - Remote environments
  - WIP objects
- **View and operate**. The administrator can view the following items on any TI-enabled computer:
  - Applications
  - Listeners on an application
  - Local environments
  - Host environments
  - Security policies
  - HIP objects
  - Object views

  The Host Integration Server administrator can also create or edit the following items on the local computer:

  - Remote environments
  - WIP objects

  The administrator can also start, stop, or refresh applications and listeners. When in **View and operate** mode, the commands on the shortcut menu for creating and editing are disabled.

Double-click the **Transaction Integrator** node to expand the node. The right pane displays the following information about the node:

- **Name**. Displays the names of the two major sub-nodes.

Right-click the **Transaction Integrator** node to display the following six options:

- **Operation Mode**. Displays the following list of menu items to control the operating mode of the console:
    - **Create/Edit**. Enables you to create, edit, view, start, stop, and refresh all TI elements on a computer.
    - **Read-only**. Enables you to view, start, stop, and refresh applications and listeners on an application. Also restricts you to viewing local environments, host environments, security policies, objects, and object views.
- **View**. Displays the following menu items:
    - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
    - **Large Icons**. Displays large icons for items in the right pane.
    - **Small Icons**. Displays small icons for items in the right pane.
    - **List**. Displays only the small icons and the names of the nodes in the right pane.
    - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
    - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of nodes as a separate text or Unicode text file.
- **Properties**. Displays the **Transaction Integrator (view and operate) Properties** dialog box and one tabbed property page:
    - **Timeout**. Set or view the maximum number of minutes TI Manager can stay in **Configuration** mode. The number of minutes can be set or changed only on the computer where the configuration database is stored.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

Host-Initiated Processing Node

Computers Node

Computer Node

Application [status] Node

Listener [status] Node

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Host-Initiated Processing Node

Use the **Host-Initiated Processing** node to view the major elements used in host-initiated processing (HIP) environment. The major HIP elements are:

- Computers that have the HIP run-time environment installed. The run-time environment is responsible for accepting incoming requests, instantiating a Microsoft Windows® server object, and returning a reply to the host program that initiated the request.
- Local environments (LEs) that a HIP runtime uses to listen for incoming requests. The LE definitions contain network-transport specific endpoint identification.
- Host environments (HEs) that represent the non-Windows host computers or host environments that deliver requests to a HIP run-time environment. The HE is used by the HIP runtime to define the code page and the data conversion object to be used by the HIP runtime when communicating with the host system identified by the HE.
- Security policies that define how Windows security credentials are established before the server object is invoked.
- Objects that represent the metadata for the server objects that were created through Microsoft Visual Studio®.
- Views define the resolution criteria used by TI when directing the call made from a host environment to a server object. Views restrict access to object methods based on the host environment calling the object and the local environment receiving the call.

Double-click the **Host-Initiated Processing** node to expand the node. The right pane displays the following information about the node:

- **Name**. The name of the major HIP elements.

Right-click the **Host-Initiated Processing** node to display the following five options:

- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of elements as a separate text or Unicode text file.
- **Properties**. Displays the **Host-Initiated Processing Properties** dialog box and one tabbed property page:
  - **Database**. Displays the name of the database.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

Computers Node

Local Environments Node

Host Environments Node

Security Policies Node

Objects Node (HIP)

Computers Node

Use the **Computers** node to view all the computers that have Transaction Integrator (TI) installed on them and are referenced in the same TI Manager configuration database (MSHIS60_HIP).

> **Note** If the computer you are looking for does not appear in this list, the computer might be registered in a different configuration database. After you have installed TI, run the **Microsoft Host Integration Server Configuration Wizard** and configure the new computer to use the same Transaction Integrator configuration database as the other computers. You can select the same configuration database by changing the **Server** and **Database** settings on the **Database Configurations** wizard page.

Double-click the **Computers** node to expand the node. The right pane displays the following information about the node:

- **Computer**. Displays the name of the HIP-enabled computer.

Right-click the **Computers** node to display the following four options:

- **View**. Displays the following menu items:
    - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
    - **Large Icons**. Displays large icons for items in the right pane.
    - **Small Icons**. Displays small icons for items in the right pane.
    - **List**. Displays only the small icons and the names of the nodes in the right pane.
    - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
    - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of computers as a separate text or Unicode text file.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

Computer Node

Computer Node

Use the **Computer** node to view and manage the applications running on the computer that is selected in the left pane. An application represents the execution environment for Windows server objects that are initiated by, or driven from, requests from the host computer.

Double-click the **Computer** node to expand the **Computer** node. The right pane displays the following information about the application:

- **Application**. Displays the name of the application.
- **PID**. Displays the process ID of the HIPService. **0** indicates that HIPService is not running.
- **Thread Count**. Displays the minimum number of worker threads the runtime always has active.
- **Maximum Queue Depth**. Displays the maximum number of requests that are stored in the queue waiting to be processed before new requests are rejected.
- **Comment**. Displays additional information about the application.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

  If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the **Computer** node to display the following five options:

- **New**. Displays the following menu items:
  - **Empty Application**. Launches the **New Application** dialog box, which allows you to define an application that does not have executable objects associated with it.
  - **Configured Application**. Launches the **New Application Deployment Wizard**, which walks you through the steps of creating the application, local environment, host environment, and objects.
- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of applications as a separate text or Unicode text file.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

Application [status] Node

Application [status] Node

Use the ***application* [*status*]** node to start or stop an application or to manage the listeners for an application. An application represents the execution environment for Windows server objects that are initiated by, or driven from, requests from the host computer. An application can host more than one server object and can have more than one listening endpoint associated with it.

The term shown in brackets at the end of the node indicates status of the application:

- **Stopped**. The execution environment and Windows Server 2003 service for the application and its objects are inactive.
- **Incomplete**. The application is missing one or more objects and, therefore, is not available.
- **Starting**. TI Manager is starting the execution environment and Windows Server 2003 service for the application and its objects.
- **Active**. The execution environment for the application is running and the listeners and local environments are active.

Double-click the ***applications* [*status*]** node to expand the node. The right pane displays the following information about the listeners:

- **Listener**. The name of the listener.
- **Type**. The type of network (either TCP/IP or SNA).
- **Listening Address**. For a TCP/IP network, the local host. For an SNA network, the local LU defined in the local environment.
- **Endpoints**. The endpoints used to communicate with the host.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

  If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the **Application** node to view the following 12 options:

- **Tracing**. Launches the ***application* Trace Options** dialog box. You can select one or more of the following categories for tracing and select one or more options within a category:
  - **General**. Provides high-level information about the end-to-end application processing.
  - **Transport**. Provides detailed connection information about the activities on the SNA or TCP network.
  - **Convert**. Provides detailed information about the data conversion between COM and .NET data on the servers and COBOL or Report Program Generator (RPG) data on the host.
  - **Read Lib**. Provides information about the contents of the type library; used to augment the information in the **Convert** trace.
  - **Flow Control Proxy**. Provides detailed information about object instantiation, state transitions, and method invocation.
- **Reload Definitions**. Performs a dynamic refresh of the application listener's endpoints and resolution tables. An application gets a snapshot of the configuration database at start-up. Any subsequent changes to the configuration do not affect the application until the definitions are reloaded. When you select **Reload Definitions**, the application re-reads all configuration information from the configuration database and applies it immediately. All new requests are processed using the updated resolution information. Working requests that were in progress at the time **Reload Definitions** was clicked are not affected by the update. The resolution information remains unchanged until the work request is completely processed.
- **Start**. Starts the host-initiated processing (HIP) environment for the selected application. Any listeners available for auto-start, as defined on the application property page of a listener that is associated with the application, are started when the application is started. After the application is started, **Start** is disabled and **Stop** is enabled.
- **Stop**. Stops the HIP environment for the selected application. All listeners are stopped when the application is stopped. All pending work is halted immediately and all listening activity is terminated immediately. After the application is stopped, **Stop** is disabled and **Start** is enabled.

- **New**. Displays a list of the following menu items:
    - **Listener**. Launches the **Local Environment** dialog box for you to define a new listening point.
- **View**. Displays the following menu items:
    - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
    - **Large Icons**. Displays large icons for items in the right pane.
    - **Small Icons**. Displays small icons for items in the right pane.
    - **List**. Displays only the small icons and the names of the nodes in the right pane.
    - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
    - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Delete**. Deletes the application from the computer. You can delete an application if it is stopped. The deleted item is removed from the specific computer it was defined on and from the configuration database.
- **Rename**. Renames the selected application. The new name is reflected across all elements of the HIP console.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of applications as a separate text or Unicode text file.
- **Properties**. Displays the ***application*** **Properties** dialog box and three tabbed property pages:
    - **General**
    - **Advanced**
    - **.NET assembly path**

  Use the property pages to view or change the properties of the application.

- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

General tab (application properties)

Advanced tab (application properties)

.NET Assembly Path tab (application properties)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Listener [status] Node

Use the ***listener* [*status*]** node to start or stop a listener and to determine what views are associated with the listener.

The term shown in brackets at the end of the node indicates status of the listener:

- **Stopped**. The execution environment and Windows Server 2003 service for the listener and its views are inactive.
- **Incomplete**. The listener is missing one or more views or determinants and, therefore, is not available.
- **Unavailable**. The listener was defined after the application was started.
- **Starting**. TI Manager is starting the execution environment and Windows Server 2003 service for the application and its objects.
- **Active**. The execution environment for the application is running and the listeners and local environments are active.

Double-click the ***listener* [*status*]** node to expand the node. The right pane displays the following information about the listener:

- **View**. The name of the view.
- **LE Name**. The name of the local environment.
- **Method Count**. The number of methods.
- **HE Count**. The number of host environments.
- **Comment**. Additional information about the listener.

Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click on **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

The columns should now be in their original order.

Right-click the ***listener* [*status*]** node to display the following 10 options:

- **Start**. Starts the host-initiated processing (HIP) service listening on all endpoints defined for the local environment. The HIP application is then ready to receive incoming host requests and to execute methods in accordance with the method resolution criteria. After the listener is started, **Start** is disabled and **Stop** is enabled. After the listener is started, **[started]** appears to the right of the local environment name in the left pane.
- **Stop**. Stops the HIP service listening on all endpoints defined for the local environment. The HIP application no longer accepts, rejects, services, or queues incoming host requests. After the listener is stopped, **Stop** is disabled and **Start** is enabled. After the listener is stopped, **[stopped]** appears to the right of the local environment name in the left pane.
- **Pause**. Temporarily suspends the HIP service listening on all endpoints defined for the local environment. The application continues to execute work in progress and work items queued for execution, but it no longer accepts or queues incoming requests. A number of requests are queued internally by the low-level network transport components (for example, for TCP, Windows XP stores up to 5 requests while Microsoft Windows Server™ 2003 stores up to 200 requests by default). After the listener is resumed, the pending requests are delivered to the listener. Depending on the number of the processing queue entries available, some of these requests might be finally rejected by the listener. After the listener is paused, **Pause** is disabled, **Resume** is enabled, and **[paused]** appears to the right of the local environment name in the left pane.
- **Resume**. Starts the HIP service listening again on all endpoints defined for the local environment. The HIP application is then ready to receive incoming host requests and to execute methods as defined by the method resolution criteria. After the listener resumes, **Resume** is disabled, **Pause** is enabled, and **[started]** appears to the right of the local environment name in the left pane.
- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.

  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Delete**. Deletes the application from the computer. You can delete an application if it is stopped. The deleted item is removed from the specific computer it was defined on and from the administrative data store.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of views as a separate text or Unicode text file.
- **Properties**. Displays the ***listener*** **Properties** dialog box and three tabbed property pages:
  - **General**
  - **Endpoints**
  - **Application**

  Note When viewed from this node, the general and endpoint property pages are read-only. If you want to change a general or endpoint property, right-click the specific ***local environment*** **Node** under the **Local Environments Node**, and then left-click **Properties** on the shortcut menu.

- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

View Node (listener)

General tab (listener properties)

Endpoints tab (TCP/IP listener properties)

Endpoints tab (SNA listener properties)

Application tab (listener properties)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

View Node (listener)

Use the ***view*** node to determine what methods and host environments are associated with the view.

Double-click the ***view*** node to expand the node. The right pane displays either the host environments (HE) associated with the object view or the methods on the view, depending on the choice you select on the shortcut menu.

Right-click the ***view*** node to display the following six options:

- **List**. Displays the following menu items:
  - **HE Associations**. The host environments associated with the view on the application.
  - **Methods**. The methods associated with the view.

  A view can have one or more host environments and one or more methods associated with it. To accommodate listing all the properties of a view, this shortcut menu item allows you to select the properties to be visible in the list view.

- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of views as a separate text or Unicode text file.
- **Properties**. Displays the ***view*** **Properties** dialog box and three tabbed property pages:
  - **General**
  - **Host environments**
  - **Methods**

  Note When viewed from this node, the property pages are read-only. If you want to change a property, right-click the ***view*** **Node** under the ***object*** **Node**, and then left-click **Properties** on the shortcut menu. The properties viewed on those pages can be changed.

- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

Host Environment Associations Listing

Methods Listing

General tab (view properties)

Host Environments tab (view properties)

Methods tab (view properties)

View Node (object)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Local Environments Node

Use the **Local Environments** node to manage local environments. A local environment defines how a remote environment contacts the host-initiated processing (HIP) runtime.

Double-click the **Local Environments** node to expand the node. The right pane displays the following information about the local environments:

- **Local Environment**. The name of the local environment.
- **Type**. The type of network used to communicate with the host environment (either TCP/IP or SNA).
- **Transport Class**. The class of the transport object.
- **Endpoint Manager**. The IP address of the local host (for a TCP/IP network); the name of the LU alias (for an SNA network).
- **Endpoints**. The endpoints used to communicate with the host.
- **Comment**. Additional information about the local environment.

    Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

    If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click on **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

    The columns should now be in their original order.

Right-click the **Local Environments** node to view the following five options:

- **New**. Displays the following menu items:
    - **Local environment**. Launches the **New Local Environment Wizard**.
- **View**. Displays the following menu item:
    - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
    - **Large Icons**. Displays large icons for items in the right pane.
    - **Small Icons**. Displays small icons for items in the right pane.
    - **List**. Displays only the small icons and the names of the nodes in the right pane.
    - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
    - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of local environments as a separate text or Unicode text file.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

New Local Environment Wizard

Local Environment Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Local Environment Node

Use the ***local environment*** node to view and manage the endpoints provided by the local environment.

Double-click the ***local environment*** node to expand the node. The right pane displays the following information about the local environment selected in the left pane:

- **Endpoint**. The endpoints used to communicate with the host.

Right-click the ***local environment*** node to display the following five options:

- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of local environments as a separate text or Unicode text file.
- **Properties**. Displays the ***view*** **Properties** dialog box and three tabbed property pages:
  - **General**
  - **Endpoints**
  - **Application**

  Use the property pages to view or change the properties of the local environment.

  Note You can also view the ***local environment*** **Properties** dialog from within the ***application*** node. However, all LE properties are read-only when viewed from an application. The **Application** tab appears on the property page when the dialog box is viewed from an application.

- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

General tab (local environment properties)

Endpoints tab (TCP/IP local environment properties)

Endpoints tab (SNA local environment properties)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host Environments Node

Use the **Host Environments** node to manage host environments. The host environment defines which host environments can contact the HIP runtime.

Double-click the **Host Environments** node to expand the node. The right pane displays the following information about the node:

- **Host Environment**. The names of the host environments.
- **Type**. The type of network used to communicate with the host environment (either TCP/IP or SNA).
- **Data Conversion**. The data conversion routine used.
- **Send Time-out**. The number of seconds the servicing HIP application waits before it terminates the request if the expected data is not received.
- **Receive Time-out**. The number of seconds the servicing HIP application waits before it terminates the receive function if the expected data is not received.
- **Code Page**. The number of the code page used to transform the incoming and outgoing data to a form that can be used by the host application program to represent the character data.
- **Remote Endpoint Manager**. The IP address of the host or the host name registered in the DNS (for a TCP/IP network); the LU name associated with the host system (for an SNA network).
- **Comment**. Additional information about the host environment.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click on **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the **Host Environments** node to view the following five options:

- **New**. Displays the following menu item:
  - **Host environment**. Launches the **New Host Environment Wizard**.
- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of host environments as a separate text or Unicode text file.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

New Host Environment Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host Environment Node

Use the ***Host Environment*** node to manage the properties of a host environment.

Right-click the ***Host Environment*** node to view the following three options:

- **Refresh**. Redraws the screen to show any updates.
- **Properties**. Displays the ***host environment*** **Properties** dialog box and four tabbed property pages:
  - **General**
  - **Network**
  - **Conversion**
  - **Default**

  Use these property pages to view or change the properties of the host environment.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

General tab (host environment properties)

Network tab (host environment properties)

Conversion tab (host environment properties)

Default tab (host environment properties)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Security Policies Node

Use the **Security Policies** node to view and manage security policies. Security policies define how Windows security credentials are established before the server object is run. The security credentials can be based on the user IDs and passwords delivered to HIP by either the client application program or ENTSSO.

Double-click the **Security Policies** node to expand the node. The right pane displays the following information about the node:

- **Security Policy**. The name of the security policy.
- **Credentials Source**. Indicates whether the credentials used are host-based or application-based.
- **Group Application**.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click on **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the **Security Policies** node to display the following five options:

- **New**. Displays the following menu item:
  - **Security Policy**. Launches the **Security Policy Wizard**.
- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of security policies as a separate text or Unicode text file.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

New Security Policy Wizard

Security Policy Node

Security Policy Node

Use the ***security policy*** node to manage the security policy.

Double-click the ***security policy*** node to expand the node. The right pane displays the following information about the security policy selected in the left pane:

- **Affiliate application**. The name of the SSO affiliate application to be queried for access to the Windows credentials needed to execute methods on the server object.

Right-click the ***security policy*** node to display the following five options:

- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of security policies as a separate text or Unicode text file.
- **Properties**. Displays the ***security policy*** **Properties** dialog box and three tabbed property pages:
  - **General**
  - **Credentials Source**
  - **Mapping**

  Use the property pages to view or change the properties of the *security policy*.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

General tab (security policy properties)

Credentials Source tab (security policy properties)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Objects Node (HIP)

Use the **Objects** node to view and manage COM and .NET objects accessible from a host. Objects contain the metadata definitions for the server objects created as TI Projects in Visual Studio .NET 2003.

Double-click the **Objects** node to expand the node. The right pane displays the following information about the node:

- **Object**. The name of the object entry. The default name is the ProgID (for COM) or Namespace.Interface (for .NET), but you can change the name on the *object* context menu.
- **Type**. The type of object.
- **Component**. The programming identifier of the COM object or the interface name of the .Net object.
- **Method Count**. The number of methods on the object.
- **Comment**. Additional information about the object.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click on **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the **Objects** node to display the following five options:

- **New**. Displays the following menu item:
  - **Object**. Launches the **HIP Object Wizard**.
- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of objects as a separate text or Unicode text file.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

Object Wizard (for HIP)

Object Node (HIP)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Object Node (HIP)

Use the ***object*** node to create and manage object views. An object view is a representation of the server object itself. A view can include one or more methods of an object, and not all methods have to be defined in a view. You can define one or more views for an object, which enables you to restrict the methods of an object to specific endpoints and host environment pairs.

Double-click the ***object*** node to expand the node. The right pane displays the following information about the view selected in the left pane:

- **View**. The name of the view.
- **LE Name**. The name of the local environment.
- **Security Policy**. The name of the security policy.
- **Method Count**. The number of methods.
- **HE Count**. The number of host environments.
- **Comment**. Additional information about the view.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the ***object*** node to display the following six options:

- **New**. Displays the following menu item:
  - **View**. Launches the **New Object View Wizard**.
- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of objects as a separate text or Unicode text file.
- **Properties**. Displays the ***object*** **Properties** dialog box and two tabbed property pages:
  - **General**
  - **Methods**

  Use these property pages to view or change the properties of the object.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

General tab (object properties)

Methods tab (object properties)

New Object View Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to

http://go.microsoft.com/fwlink/?linkid=29507.

View Node (object)

Use the ***view*** node to restrict access to object methods based on the host environment calling the object and the local environment receiving the call. You also use the ***view*** node to define the resolution criteria used to direct the call made from a host environment to a server object.

Double-click the ***view*** node to expand the node. The right pane displays either the host environments (HE) associated with the object view or the methods on the object view, depending upon the choice you select on the shortcut menu.

Right-click the ***view*** node to display the following seven options:

- **List**. An object view can have one or more host environments and one or more methods associated with it. To accommodate a list of all the properties of an object view, this shortcut menu item enables you to select which properties are to be viewed in the list view.
  - **HE Associations**. Displays the host environments associated with the object view on the application.
  - **Methods**. Displays the methods associated with the object view.
- **Delete**. Deletes the object view.
- **Rename**. Renames the selected object view. The new name is reflected across all elements of the HIP console
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of views as a separate text or Unicode text file.
- **Properties**. Displays the ***view*** **Properties** dialog box and three tabbed property pages:
  - **General**
  - **Host environments**
  - **Methods**

  Use these property pages to view or change the properties of the object view.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

Host Environment Associations Listing

Methods Listing

General tab (view properties)

Host Environments tab (view properties)

Methods tab (view properties)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host Environment Associations Listing

Use the host environment associations listing to view the host environments associated with the view.

This listing displays the following information about the host environment:

- **Host Environment**. The name of the host environment.
- **Type**. The type of network used to communicate with the host environment (either TCP/IP or SNA).
- **Remote Endpoint Manager**. The IP address of the host or the host name registered in the DNS (for a TCP/IP network); the LU name associated with the host system (for an SNA network).
- **Comment**. Additional information about the host environment.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the host environment name to display the following four options:

- **Delete**. Deletes the host environment association (not the host environment itself). You can delete the host environment association anytime.
- **Refresh**. Redraws the screen to show any updates.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

General tab (host environment properties)

View Node (object)

Methods Listing

Methods Listing

Use the methods listing to view the properties of the methods on the object view.

This listing displays the following information about the method:

- **Method**. The name of the method.
- **Endpoint**. The endpoint used to communicate with the host.
- **Resolution Type**. The type of conflict to be conducted in case of a conflict.
- **Msg Handler**.
- **Resolution String**.
- **Position**. The starting point in the data stream where the TI runtime looks for the data defined in the resolution data field to determine what method is to be executed.
- **Comment**. Additional information about the view.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

    The columns should now be in their original order.

Right-click the method name to view the following two options:

- **Refresh** Redraws the screen to show any updates.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

Host Environment Associations Listing

View Node (object)

Windows-Initiated Processing Node

Use the **Windows-Initiated Processing** node to view the major elements used in Windows-initiated processing (WIP) environment. The major WIP elements are:

- Remote environments
- Objects

Double-click the **Windows-Initiated Processing** node to expand the node. The right pane displays the following information about the node:

- **Name**. The name of the major WIP elements.

Right-click the **Windows-Initiated Processing** node to view the following five options:

- **Tracing**. Launches the **Windows-Initiated Processing Trace Options** dialog box. You can select one or more of the following categories for tracing and select one or more options within a category:
    - **General**. Provides high-level information about the end-to-end global processing.
    - **Transport**. Provides detailed connection information about the activities on the SNA or TCP network.
    - **Convert**. Provides detailed information about the data conversion between COM and .NET data on the servers and COBOL or RPG data on the host.
    - **Read Lib**. Provides information about the contents of the type library; used to augment the information in the **Convert** trace.
    - **Proxy**. Provides detailed information about object instantiation, state transitions, and method invocation.
- **View**. Displays the following menu items:
    - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
    - **Large Icons**. Displays large icons for items in the right pane.
    - **Small Icons**. Displays small icons for items in the right pane.
    - **List**. Displays only the small icons and the names of the nodes in the right pane.
    - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
    - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of elements as a separate text or Unicode text file.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

This section contains:

- Remote Environments Node
- Remote Environment Node
- Objects Node (WIP)
- Object Node (WIP)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Remote Environments Node

Use the **Remote Environments** node to manager remote environments. A remote environment defines the characteristics of the non-Windows host environment that receives requests from Windows-initiated processing (WIP) components.

Double-click the **Remote Environments** node to expand the node. The right pane displays the following information about the node:

- **Remote Environment**. The names of the remote environment.
- **Type**. The type of remote environment.
- **Comment**. Additional information about the remote environment.

Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

The columns should now be in their original order.

Right-click the **Remote Environments** node to display the following five options:

- **New**. Displays the following menu items:
  - **Remote Environment**. Launches the **New Remote Environment Wizard**.
  - **Capture RE**. Launches the **New Remote Environment Wizard** to create a remote environment type that captures responses and saves those responses in a recording file. After being saved, the responses can be played back using the playback remote environment.
  - **Playback RE**. Launches the **New Remote Environment Wizard** to create a remote environment type that plays back responses stored in a recording file.
- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of remote environments as a separate text or Unicode text file.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

New Remote Environment Wizard

Remote Environment Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Remote Environment Node

Use the ***remote environment*** node to view and manage a remote environment.

Double-click the ***remote environment*** node to expand the node. The right pane displays the following information about the remote environment selected in the left pane:

- **Component**. The name of the component.
- **Type**.
- **Comment**. Additional information about the remote environment.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the ***remote environment*** node to display the following nine options:

- **Activate**.
- **Deactivate**.
- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Delete**. Deletes the remote environments selected in the ***remote environments*** node. The deleted item is removed from the ***remote environments*** node and from the administrative data store. If an RE is deleted while it still has objects assigned to it, the objects become unassigned.
- **Rename**. Renames the selected remote environment. The new name is reflected across all the elements of the WIP console.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of remote environments as a separate text or Unicode text file.
- **Properties**. Displays the ***remote environment*** **Properties** dialog box and several tabbed property pages:
  - **General**
  - **TCP/IP**
  - **LU 6.2**
  - **MQ Series**
  - **Target**
  - **Recording**
  - **Locale**
  - **Security**
  - **CICS**
  - **IMS**

  Use these property pages to view or change the properties of the remote environment.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

General tab (remote environment properties)

TCP/IP tab (remote environment properties)

LU 6.2 tab (remote environment properties)

Target tab (remote environment properties)

Recording tab (remote environment properties)

Locale tab (remote environment properties)

Security tab (remote environment properties)

Objects Node (WIP)

Use the **Objects** node to view and manage the objects.

Double-click the **Objects** node to expand the node. The right pane displays the following information about the node:

- **Component**. The name of the component.
- **Type**. The type of component.
- **RE Type**. The type of remote environment.
- **Application Host**. The name of the COM+ application or IIS virtual directory the component is assigned to.
- **Remote Environment**. The name of the remote environment.
- **Comment**. Additional information about the component.

> **Important** If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the **Objects** node to display the following five options:

- **New**. Displays the following menu item:
  - **Object**. Launches the WIP **Object Wizard**.
- **View**. Displays the following menu items:
  - **Add/Remove Columns**. Allows you to choose the properties that are displayed in the list view. You can display each property as a separate column in the right pane.
  - **Large Icons**. Displays large icons for items in the right pane.
  - **Small Icons**. Displays small icons for items in the right pane.
  - **List**. Displays only the small icons and the names of the nodes in the right pane.
  - **Detail**. Displays the small icons and the properties of the nodes in the right pane.
  - **Customize**. Allows you to change the options to show or hide items displayed in the right pane.
- **Refresh**. Redraws the screen to show any updates.
- **Export List**. Allows you to save the list of objects as a separate text or Unicode text file.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

Object Wizard (for WIP)

Object Node (WIP)

Object Node (WIP)

Use the ***object*** node to manage an object.

Double-click the ***object*** node to expand the node. The right pane displays the following information about the node:

- **Method**. The name of the methods on the object.
- **Transaction/Program**.

  Important If you view the list in the right pane of TI Manager and change the order of the columns using the **Add/Remove Columns** command on the shortcut menu, the order of the column headings might not be correct after you close and re-open TI Manager. The next time you open TI Manager, the values in the columns are displayed in the new order you set, but the column headings are in the their default order.

If you observe that the column headings are no longer in the order you set:

1. Right-click the node, point to **View**, and then click **Add/Remove Columns**.
2. On the **Add/Remove Columns** dialog box, click **Restore Defaults**.
3. Click a different node, then click the node you were just working on.

   The columns should now be in their original order.

Right-click the ***object*** node to display the following four options:

- **Delete**. Deletes the selected object.
- **Refresh**. Redraws the screen to show any updates
- **Properties**. Displays the ***object* Properties** dialog box and two tabbed property pages:
  - **General**
  - **Hosting**

  Use these property pages to view or change the properties of the *object*.
- **Help**. Displays a Help topic (this topic) that explains the items that appear in the TI Manager console and the actions you can take.

See Also

General tab (object properties)

Hosting tab (COM object properties)

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TI Manager Wizards and Dialog Boxes

Transaction Integrator (TI) Manager provides 11 wizards and special dialog boxes to help you complete various tasks. The wizards assisting you with host-initiated processing (HIP) are:

- New Application Dialog Box
- Credentials for Service <application name> Dialog Box
- New Application Deployment Wizard
- Define Implementation Characteristics for the .NET Object Wizard Page
- New Local Environment Wizard
- New Host Environment Wizard
- New Security Policy Wizard
- Object Wizard (for HIP)
- New Object View Wizard
- Local Environment Dialog Box
- Reload TIMs Wizard

The wizards to assist you with Windows-initiated processing (WIP) are:

- New Remote Environment Wizard
- Object Wizard (for WIP)

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New Application Dialog Box

Use the **New Application** dialog box to define an application that does not have executable objects associated with it.

Use this	To do this
Computer name	View the name of the computer where the application runs.
Application	Type the name of the application. The name can be a maximum of 25 alpha-numeric characters. The first character in the name must be a letter, and the name cannot contain any embedded spaces.
Comment	Type a comment that provides additional information about the use of the application in the HIP environment. The comment can be a maximum of 259 alpha-numeric characters.

See Also

TI Manager Wizards and Dialog Boxes

Credentials for Service <application name> Dialog Box

Use the **Credentials for Service <application name>** dialog box to identify the security credentials used by the application.

Use this	To do this
User ID	Type the user ID of the security credentials.
Password	Type the password of the security credentials.

See Also

TI Manager Wizards and Dialog Boxes

New Application Deployment Wizard

The **New Application Deployment Wizard** helps you add a new application by guiding you through the definitions of the application, local environment, host environment, and objects. The wizard can be used to define additional local environments, host environments, or objects and link them to existing definitions. You can access the Wizard from the shortcut menu on the ***computer*** node in the TI Manager console tree.

This section contains:

- Welcome to the New Application Deployment Wizard Page
- Create an Application Wizard Page
- Configure a New Local Environment Wizard Page
- Configure Local Environment Endpoints (TCP/IP) Wizard Page
- Configure Local Environment Endpoints (SNA) Wizard Page
- Configure a New Host Environment Wizard Page
- Configure Host Environment Default Method Resolution Wizard Page
- Configure a New Security Policy Wizard Page (in the New Application Deployment Wizard) (1)
- Configure a New Security Policy Wizard Page (in the New Application Deployment Wizard) (2)
- Specify or Locate an Object Wizard Page
- Configure a New Object View Wizard Page
- Configure the New View Wizard Page
- Method Resolution Criteria Dialog Box (in the New Application Deployment Wizard)
- Define Implementation Characteristics for the .NET Object Wizard Page
- Completing the New Application Deployment Wizard Page

Welcome to the New Application Deployment Wizard Page

Use the **Welcome to the New Application Deployment Wizard** page to view the definition of an application deployment and to control whether the welcome page is displayed the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Create an Application Wizard Page

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Create an Application Wizard Page

Use the **Create an Application** wizard page to identify the application to be deployed and provide an additional description. Type the name of the new application.

Use this	To do this
Application	Type the name for the application. The name can be a maximum of 25 alpha-numeric characters. The first character in the name must be a letter, and the name cannot contain any embedded spaces. The name cannot be the same as that of an existing application.
Comment	Type any additional information about the application. The comment can be a maximum of 259 Unicode characters.

See Also

Configure a New Local Environment Wizard Page

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Configure a New Local Environment Wizard Page

Use the **Configure a New Local Environment** wizard page to identify the basic characteristics of the new local environment. Select an existing local environment from the dropdown list or type the name of the new local environment. To define its characteristics, select a specific network type and transport class.

Use this	To do this
Local environment	Type the name for the local environment. The name can be a maximum of 259 alpha-numeric characters. The name cannot be the same as that of an existing local environment.
Network type	Select the type of network used to communicate with the host.
Transport class	Select the class of the transport object. The list changes according to the selected **Network type**.
Endpoint manager	For a TCP/IP network, this is always set to the local host and disabled. For an SNA network, type the name of the LU alias. In either case, the name can be a maximum of 259 Unicode characters.

See Also

Configure Local Environment Endpoints (TCP/IP) Wizard Page

Configure Local Environment Endpoints (SNA) Wizard Page

Configure Local Environment Endpoints (TCP/IP) Wizard Page

Use the **Configure Local Environment Endpoints** (TCP/IP) wizard page to define the endpoints used to communicate with the host. To define the TCP/IP ports or service names for the local environment, type a port number or name, and then click **Add**.

Use this	To do this
Local environment	View the name of the local environment. The name was entered on a previous page of the wizard. To change the name, click **Back**.
New port or service name	Type the port number or service name of the local environment. The port number can be a maximum of 5 numeric characters and must be greater than 0 and less than 32768. The service name can be a maximum of 259 alpha-numeric characters. The format of the name must conform to the WinSock Service Name convention. The port number or name cannot be the same as that of an existing number or name in the **Defined ports and service names**.
Add	Click to validate the port number or service name you typed. If the number or name is valid, it appears in **Defined ports and service names**.
Defined ports and service names	View the existing valid ports and services names for the local environment.
Remove	Click to remove a selected port number or service name from the **Defined ports or service names** available for use in the local environment.

See Also

Configure a New Host Environment Wizard Page

Configure Local Environment Endpoints (SNA) Wizard Page

Use the **Configure Local Environment Endpoints** (SNA) wizard page to define the endpoints used to communicate with the host. Type a transaction program name or mirror transaction ID, and then click **Add**.

Use this	To do this
Local environment	View the name of the local environment. The name was entered on a previous page of the wizard. To change the name, click **Back**.
New transaction program name	Type the transaction program (TP) name or the link mirror transaction ID of the local environment. The name or ID can be a maximum of 64 alphabetic characters. The format of the name must conform to the IBM SNA Transaction Program Names convention. The name or ID cannot be the same as that of an existing name or ID in the **Defined transaction program names**.
Add	Click to validate the transaction program (TP) name or the link mirror transaction ID you typed. If the TP name or the link mirror transaction ID is valid, it appears in **Defined transaction program names**.
Defined transaction program names	View the existing TP names or the link mirror transaction IDs for the local environment.
Remove	Click to remove one or more TP names or link mirror transaction IDs selected from the **Defined transaction program names** available for use in the local environment.

See Also

Configure a New Host Environment Wizard Page

Configure a New Host Environment Wizard Page

Use the **Configure a New Host Environment** wizard page to describe the basic host characteristics that are concerned with data formats. Type the name of the host environment, and then type or select the attributes of the host.

Use this	To do this
Host environment	Type the name for the host environment. The name can be a maximum of 259 alpha-numeric characters. The name cannot be the same as that of an existing host environment. **Caution** If the host environment is located on the same computer as the HIP application, and the client program uses either host name **localhost** or IP address **127.0.0.1** to connect to the HIP application, the host environment should also use **localhost** or **127.0.0.1** instead of the real computer name or IP address. Failure to set the names or IP addresses identical for the host and client prevents the HIP runtime from delivering calls between the two, and causes the application to fail.
Data conversion	Select the data conversion routine used.
Host code page	Select the code page used by the host. Each available code page is listed by its symbolic value.
Network type	Select the type of network used to communicate with the host. The choices are: • TCP/IP (default) • SNA
Remote endpoint manager	The IP address of the host or the host name registered in the DNS (for a TCP/IP network); the LU name associated with the host system (for an SNA network). In either case, the name can be a maximum of 259 alpha-numeric characters.

See Also

Configure Host Environment Default Method Resolution Wizard Page

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Configure Host Environment Default Method Resolution Wizard Page

Use the **Configure Host Environment Default Method Resolution** wizard page to identify the default characteristics of the typical interaction of the applications programs on the host with the application programs on the server. Select the default method resolution criteria for the host.

Use this	To do this
Host environment	View the name of the host environment. The name was entered on a previous page of the wizard. To change the name, click **Back**.
Default method resolution criteria	View the definition of the default behavior for setting up the method resolution criteria for a new object view.
Type	Select the type of resolution to be conducted: **Endpoint:** The endpoint resolution type is the simplest means of resolving a request to a method. A data stream directed to a port always executes a single method on a view. This model is considered “raw sockets,” and represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Endpoint** disables the **Object**, **Input format** and **Output format** boxes and clears their contents. - **Transaction Request Message (TRM):** The TRM resolution type is specific to the IBM CICS Concurrent Server model and the Microsoft variant, MSLink model. It represents a double exchange sequence. The first exchange represents the transaction request; the second exchange represents the request and reply data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Transaction Request Message (TRM)** enables the **Object**, **Input format**, and **Output format** boxes. - **Enhanced Listener Message (ELM)**: - **Data:** Similar to **Endpoint** in that it adds the ability to identify a string in the data stream directed to a port that is used to associate the request with a specific method in the view. This model is considered “raw sockets.” It represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Data** disables the **Object**, **Input format**, and **Output format** boxes and clears their contents. - **Link to Program Name:** Select **Link to Program Name** to resolve all the methods of a new object view using the data information specified when the object view was created. When a new view is created and associated with the HE, the method resolves to the Link Tran ID field in the default HE resolution. Selecting **Link to Program Name** disables the **Object**, **Input format**, and **Output format** boxes and clears their contents.
Object	Select the object. The list of objects is populated from the Help string in the interface definition of objects defined as TRM resolution handlers. Microsoft provides three TRM resolution handlers: - **Microsoft HIS - TRM Handler MS Link** (default) - **Microsoft HIS - TRM Handler MSCCS** - **Microsoft HIS - TRM Handler IBMCCS**
Input format	Select the format of the data stream that represents the TRM sent by the client host application program. The list of TRM input formats is determined by the user-defined type definitions in the MicrosoftTRMDef.tim file. The **Input format** box is blank by default, but three input formats are defined that match the names of the resolution handler **Object**: - **TRMINMSLink** - **TRMINMSCCS** - **TRMINIBMCCS**

Output format	Select the format of the data stream that represents the reply to the TRM that was sent by the host application program. TI formats a data stream that is returned to the host client application program in the form defined by the output TRM. The list of TRM output formats is determined by the UDT definitions in the MicrosoftTRMDef.tim file. The **Output format** box is blank by default, but three output formats are defined that match the names of the resolution handler **Object**: • **MS Link Reply Format** • **IBM Listener Type 1 Reply Format** • **IBM Listener Type 2 Reply Format**
Link Tran ID	View or select an existing TP name or the link mirror transaction ID for the local environment.

See Also

Configure a New Security Policy Wizard Page (in the New Application Deployment Wizard) (1)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

Configure a New Security Policy Wizard Page (in the New Application Deployment Wizard) (1)

Use the first **Confige a New Security Policy** wizard page to identify the security policy and the source of the credentials. Type the name of the security policy, and then select the source for the credentials.

Use this	To do this
Security policy	Type the name for the security policy. The name can be a maximum of 259 Unicode characters (alphabetic, numeric, space, and special). The name cannot be the same as the name of an existing security policy. The name for the new security policy is a required field; you will receive an error message if you click **Next** without providing a name. The name is used to associate the security policy with an object view in other wizard pages and dialog boxes.
Credentials source used to invoke the server	Identify the type or source of credentials that host-initiated processing will associate with the thread when the method on the server object is executed.
Host-initiated Single Sign-on	Select this option to use host user ID and password. This option is automatically disabled if Single Sign-on (SSO) is not installed or not available.
Windows credentials of the HIP application	Select this option to use Windows user ID and password specified on the HIP NT application service. This option is automatically selected if SSO is not installed or not available.

See Also

Configure a New Security Policy Wizard Page (in the New Application Deployment Wizard) (2)

Configure a New Security Policy Wizard Page (in the New Application Deployment Wizard) (2)

Use the second **Configure a New Security Policy** wizard page to identify the source of the host user ID and password and describe how they are translated into Windows-based credentials. This wizard page appears only if **Host-initiated Single Sign-on** (SSO) is selected on the previous **Configure a new security policy** wizard page.

Use this	To do this
Security policy	View the name of the security policy.
Affiliate application	Select the SSO affiliate application to be queried to gain access to the Windows credentials needed to execute methods on the server object. The list displays all the affiliate applications defined in the SSO. The display name of the affiliate application is a concatenation of the affiliate application name and description, separated by a hyphen. The selected application will be added to the security policy. **Note** The dropdown list and **Next** are disabled if SSO is not installed or is not available.
Single Sign-on mapping use	Specify the credentials to be used when mapping to Single Sign-on.
Default credentials	Select this option to enter the user ID and password used if the request from the host does not contain a user ID and password or the user ID and password are set to spaces or nulls. This option enables the **Group application** and **User** boxes.
Group application	The default user group provides the default user ID and password.
User	Type or select the host user name used in the lookup call to SSO. **Note** The dropdown list and Next are disabled if SSO is not installed or is not available.

See Also

Specify or Locate an Object Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Specify or Locate an Object Wizard Page

Use the **Specify or Locate an Object** wizard page to identify objects associated with the application. Select an object from the list, or, to create a new object, type the new object name.

Use this	To do this
Object	Select the name of the object. To create a new object, type the new object name. If you select the Transaction Integrator metadata (TIM) file first, the name is populated with the ProgID or Namespace.Interface defined in the TIM.
Registered TIMs	Type the full path name, including the *.tim extension, to a TIM file, select a recently used file from the list, or click **Browse** and navigate to the file.

See Also

Configure a New Object View Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure a New Object View Wizard Page

Use the **Configure a New Object View** wizard page to identify the object view associated with the application. Select the option to add a new object view or the option to use existing object views.

Use this	To do this
Add a new view	Select this option to create a new object view.
Use existing views associated with the local environment *name*	Select this option to add all object views already associated with the specific local environment. This option is disabled if there are no existing views associated with the local environment.

See Also

Configure the New View Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure the New View Wizard Page

Use the **Configure the New View** wizard page to select the methods that are included in the object view. Type the name of the view. To specify the methods to be included in the view, select the check box by the method name. Double-click the method name to edit it.

Use this	To do this
View	Type the name of the object view. The name can be a maximum of 259 alpha-numeric characters. The name cannot be the same as that of an existing view.
Object methods	View all the methods that are defined in the object. Each row contains a summary of the resolution information for a single method. Rows in the list cannot be deleted. The columns are: • **Include** Select this option to include the method in the object view. • **Method** View the name of the method. Double-click the method name displays the **Method Resolution Criteria** dialog. • **Endpoints** View one of the endpoints defined in the local environment associated with the view. To change the content of this field, double-click on the **Endpoints** field for a specific method. • **Resolution Type** View one of the possible resolution types: ◦ **Endpoint** ◦ **Transaction Request Message (TRM)** ◦ **Enhanced Listener Message (ELM)** ◦ **Data** ◦ **Link to Program** To change the content of this field, double-click the **Resolution Type** field for a specific method. • **Resolution Data** Identifies the data used to select the method to be executed. To change the content of this field, double-click the **Resolution Data** field for a specific method. • **Resolution Position** View the resolution position. If **Data Resolution** is selected, this information is used by the TI runtime to identify the starting point in the data stream in which to look for the data defined in the resolution data field to determine what method is to be executed. To change the content of this field, double-click the **Resolution Position** field for a specific method.

See Also

Method Resolution Criteria Dialog Box (in the New Application Deployment Wizard)

Method Resolution Criteria Dialog Box (in the New Application Deployment Wizard)

Use the **Method Resolution Criteria** dialog to provide detailed information about a specific method on the object view.

Use this	To do this
Method	View the name of the object's method for which the method resolution criteria are being set.
Endpoint	Select the endpoints on the local environment that are available for the type of resolution specified in **Type**. All endpoints in the LE are listed and available for selection. If an endpoint selected for one resolution type is already used with another resolution type then an error message will pop up when you click **Apply**. The error message explains which object and view has this endpoint used with another resolution type.
Method resolution criteria	View a description of the behavior for the IT runtime when it resolves a request to a method. The sequence of data flow events may require the TI to send and receive various amounts of data prior to obtaining the ability to make the connection between the incoming request and the target method.
Type	Select the type of resolution to be conducted: - **Endpoint** The endpoint resolution type is simplest means of resolving a request to a method. A data stream directed to a port always executes a single method on a view. This model is considered "raw sockets," and it represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Endpoint** disables **Object Name**, **Input format** and **Output format** and clears their contents. - **Transaction Request Message (TRM)** The TRM resolution type is specific to the IBM CICS Concurrent Server model and the Microsoft variant MSLink model. It represents a double exchange sequence. The first exchange represents the transaction request, and the second exchange represents the request and reply data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Transaction Request Message (TRM)** enables **Object**, **Input format**, and **Output format**. This option is available only for TCP/IP local environment/host environment pairs. - **Enhanced Listener Message (ELM)**: - **Data** Similar to **Endpoint** in that it adds the flexibility to identify a string in the data stream directed to a port that is used to associate the request with a specific method in the view. This model is considered "raw sockets." It represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Data** disables **Object**, **Input format**, and **Output format** and clears their contents. - **Link to Program Name:** Resolves all the methods of a new object view using the data information specified when the object view was created. When a new view is created and associated with the HE, the method resolves to the Link Tran ID field in the default HE resolution. Selecting **Link to Program Name** disables **Object**, **Input format**, and **Output format** and clears their contents. This option is available only for SNA local environment/host environment pairs. **Note** Only **TRM-MSLink** and **Link to Program Name** are available for Link methods. Methods can be defined as Link in Visual Studio by setting the **Is Link** property to **True**.
Object Name	Select the object. The list of objects is populated from the Help string in the interface definition of objects identified to the resolution handler. Microsoft provides three TRM resolution handlers: - **Microsoft HIS - TRM Handler MS Link** (default) - **Microsoft HIS - TRM Handler MSCCS** - **Microsoft HIS - TRM Handler IBMCCS**

Input format	Select the format of the data stream that represents the TRM sent by the client host application program. The list of TRM input formats is determined by the UDT) definitions in the MicrosoftTRMDef.tim file in the installation TIMLibs directory. The **Input format** box is blank by default, but three input formats are defined that match the names of the resolution handler **Object**: • **MS Link Request Format** • **IBM Listener Type 1 Request Format** • **IBM Listener Type 2 Request Format**
Output format	Select the format of the data stream that represents the reply to the TRM that was sent by the host application program. TI formats a data stream that is returned to the host client application program in the form defined by the output TRM. The list of TRM output formats is determined by the UDT definitions in the MicrosoftTRMDef.tim file. The **Output format** box is blank by default, but three output formats are defined that match the names of the resolution handler **Object**: • **MS Link Reply Format** • **IBM Listener Type 1 Reply Format** • **IBM Listener Type 2 Reply Format**
Link	View the name of the program being linked to.
Program Name	Name of the TP program.
Resolution Data	View a definition of the data used by the IT runtime when it resolves a request to a method.
Data	Type the method resolution criteria for a method on the object view. The criteria can be a maximum of 256 alpha-numeric characters. This control is enabled for resolution types **Transaction Request Message (TRM)** and **Data**. This control is disabled for resolution type **Endpoint**.
Position	Type the resolution position. The position can be a maximum of nine numeric characters. This control is enabled for resolution type **Data** and disabled for resolution types **Transaction Request Message (TRM)** and **Endpoint**.

See Also

Define Implementation Characteristics for the .NET Object Wizard Page

Define Implementation Characteristics for the .NET Object Wizard Page

Use the **Define Implementation Characteristics for the .NET Object** wizard page to identify a .NET assembly implementing the interface defined in the Transaction Integrator metadata (TIM) file.

Use this	To do this
Defer implementation identification	Select this option to identify the implementing assembly later through the object's **Properties** dialog.
Pick assembly	Select this option to identify the implementing assembly now.
Path	Type the full path name, including the .dll extension, to a .NET file, select a recently used file from the list, or click **Browse** and navigate to the file.
Class	Select the class containing the methods to be called by HIP runtime for the request processing. The list displays classes from the selected assembly that implement the interface defined in the .TIM file. The first class is selected in the list by default.

See Also

Completing the New Application Deployment Wizard Page

Completing the New Application Deployment Wizard Page

Use the **Completing the Application Deployment Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

See Also

New Application Deployment Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

New Local Environment Wizard

The **New Local Environment Wizard** helps you define the network transport endpoints for the Windows platform environment. The Wizard collects information about the:

- Local environment name
- Network transport type
- Network transport class
- Endpoint manager
- Endpoint identification.

This section contains:

- Welcome to the New Local Environment Wizard Page
- Configure a New Local Environment Wizard Page
- Configure Local Environment Endpoints (TCP/IP) Wizard Page
- Configure Local Environment Endpoints (SNA) Wizard Page
- Completing the New Local Environment Wizard

Welcome to the New Local Environment Wizard Page

Use the **Welcome to the New Local Environment Wizard** page to view the definition of a local environment and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Configure a New Local Environment Wizard Page

Configure a New Local Environment Wizard Page

Use the **Configure a New Local Environment** wizard page to define the basic characteristics of the new local environment. Type the name of the new local environment. To define its characteristics, select a specific network type and transport class.

Use this	To do this
Local environment	Type the name for the local environment. The name can be a maximum of 259 Unicode characters (alphabetic, numeric, space, and special). The name cannot be the same as that of an existing local environment. The name for the new local environment is a required field, and you will receive an error message if you click **Next** without providing a name.
Network type	Select the type of network used to communicate with the host. The choices are: • TCP/IP (default) • SNA
Transport class	Select the class of the transport object. The list of choices changes according to the selected **Network type**. The default transport class is TCPTransport Class.
Endpoint manager	Select or type the local LU alias to manage the endpoint. **Note** The Endpoint manager edit box is set to localhost and disabled if the Network type is set to TCP/IP.

See Also

Configure Local Environment Endpoints (TCP/IP) Wizard Page

Configure Local Environment Endpoints (SNA) Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure Local Environment Endpoints (TCP/IP) Wizard Page

Use the **Configure Local Environment Endpoints** (TCP/IP) wizard page to define the endpoints used to communicate with the host. To define the TCP/IP ports or service names for the local environment, type a port number or name, and then click **Add**.

Use this	To do this
Local environment	View the name of the local environment. The name was entered on a previous page of the wizard. To change the name, click **Back**.
New port or service name	Type the port number or service name of the local environment. The port number can be a maximum of 5 numeric characters and must be greater than 0 and less than 32768. The service name can be a maximum of 259 alpha-numeric characters. The format of the name must conform to the WinSock Service Name convention. The port number or name cannot be the same as that of an existing number or name in the **Defined ports and service names**.
Add	Click to validate the port number or service name you typed. If the number or name is valid, it appears in **Defined ports and service names**.
Defined ports and service names	View the existing valid ports and services names for the local environment.
Remove	Click to remove a selected port number or service name from the **Defined ports or service names** available for use in the local environment.

See Also

Completing the New Local Environment Wizard

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure Local Environment Endpoints (SNA) Wizard Page

Use the **Configure Local Environment Endpoints** (SNA) wizard page to define the endpoints used to communicate with the host. Type a transaction program name or mirror transaction ID, and then click **Add**.

Use this	To do this
Local environment	View the name of the local environment. The name was entered on a previous page of the wizard. To change the name, click **Back**.
New transaction program name	Type the transaction program (TP) name or the link mirror transaction ID of the local environment. The name or ID can be a maximum of 64 alphabetic characters. The format of the name must conform to the IBM SNA Transaction Program Names convention. The name or ID cannot be the same as that of an existing name or ID in the **Defined transaction program names**.
Add	Click to validate the transaction program (TP) name or the link mirror transaction ID you typed. If the TP name or the link mirror transaction ID is valid, it appears in **Defined transaction program names**.
Defined transaction program names	View the existing TP names or the link mirror transaction IDs for the local environment.
Remove	Click to remove one or more TP names or link mirror transaction IDs selected from the **Defined transaction program names** available for use in the local environment.

See Also

Completing the New Local Environment Wizard

Completing the New Local Environment Wizard

Use the **Completing the New Local Environment Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

See Also

New Local Environment Wizard

New Host Environment Wizard

The **New Host Environment Wizard** helps you define the network and hardware characteristics of the non-Windows host that will be initiating requests to the Windows platform. The Wizard collects information about:

- Host environment name
- Host identification
- Network transport type
- Data conversion information
- Default method resolution

This section contains:

- Welcome to the New Host Environment Wizard
- Configure a New Host Environment Wizard Page
- Configure Host Environment Default Method Resolution Wizard Page
- Completing the New Host Environment Wizard Page

Welcome to the New Host Environment Wizard

Use the **Welcome to the New Host Environment Wizard** page to view the definition of a host environment and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Configure a New Host Environment Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure a New Host Environment Wizard Page

Use the **Configure a New Host Environment** wizard page to identify the data format characteristics of the host. Type the name of the host environment, and then type or select the attributes of the host.

Use this	To do this
Host environment	Type the name for your host environment. The name can be a maximum of 259 Unicode characters (alphabetic, numeric, space, and special). The name cannot be the same as that of an existing host environment. The name for the new host environment is a required field, and you will receive an error message if you click Next without providing a name. **Caution** If the host environment is located on the same computer as the HIP application, and the client program uses either host name **localhost** or IP address **127.0.0.1** to connect to the HIP application, the host environment should also use **localhost** or **127.0.0.1** instead of the real computer name or IP address. Failure to set the names or IP addresses identical for the host and client prevents the HIP runtime from delivering calls between the two, and causes the application to fail.
Data conversion	Select the data conversion routine to be used.
Host code page	Select the code page used by the host. Each available code page is listed by its symbolic value.
Network type	Select the type of network used to communicate with the host. The choices are: • TCP/IP (default) • SNA
Remote endpoint manager	The IP address of the host or the host name registered in the DNS (for a TCP/IP network); the LU name associated with the host system (for an SNA network). In either case, the name can be a maximum of 259 alpha-numeric characters.

See Also

Configure Host Environment Default Method Resolution Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure Host Environment Default Method Resolution Wizard Page

Use the **Configure Host Environment Default Method Resolution** wizard page to identify the default characteristics of the typical interaction between applications programs on the host and the application programs on the server. Type or select the default method resolution criteria for the host.

Use this	To do this
Host environment	View the name of the host environment. The name was entered on a previous page of the wizard. To change the name, click **Back**.
Default method resolution criteria	View a definition of the default behavior for setting up the method resolution criteria for a new object view.
Type	Select the type of resolution to be conducted: • **Endpoint:** The endpoint resolution type is the simplest means of resolving a request to a method. A data stream directed to a port always executes a single method on a view. This model is considered “raw sockets,” and represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Endpoint** disables the **Object**, **Input format**, **Output format**, and **Link Tran ID** boxes and clears their contents. • **Transaction Request Message (TRM):** The TRM resolution type is specific to the TCP/IP transport and to the IBM CICS Concurrent Server model and the Microsoft variant MSLink model. It represents a double exchange sequence. The first exchange represents the transaction request; the second exchange represents the request and reply data. Select **Transaction Request Message (TRM)** to resolve all the methods of a new object view using the resolution handler information in the **Object**, **Input format**, and **Output format** boxes. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting one of the predefined **Transaction Request Objects** disables the **Input format** and **Output format** boxes; it also disables the **Link Tran ID** box and clears its contents. Selecting a custom object enables the **Input format** and **Output format** boxes and sets their initial values to the Microsoft supplied TRM handlers items. • **Enhanced Listener Message (ELM)**: • **Data:** Similar to the **Endpoint** type in that it enables you to identify a string in the data stream directed to a port that is used to associate the request with a specific method in the view. This model is considered “raw sockets.” It represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Data** disables the **Object**, **Input format**, **Output format,** and **Link Tran ID** boxes and clears their contents. • **Link to Program Name:** The Link resolution type is specific to the IBM CICS DPL model. The endpoint name is representative of the TP name that is the CICS mirror transaction ID. Select **Link to Program Name** to resolve all the methods of a new object view using the data information specified when the object view was created. When a new view is created and associated with the HE, the method resolves to the Link Tran ID field in the default HE resolution. Selecting **Link** disables the **Object**, **Input format**, and **Output format** boxes and clears their contents.

Object	Select the object. The list of objects is populated from the Help string in the interface definition of objects identified to the resolution handler. Microsoft provides four TRM resolution handlers: - **Microsoft HIS - TRM Handler MS Link** (default) - **Microsoft HIS - TRM Handler MSCCS** - **Microsoft HIS - TRM Handler IBMCCS** - **Microsoft HIS - Link Handler**
Input format	Select the format for the data stream that represents the TRM sent by the client host application program. The list of TRM input formats is populated from the user-defined type definitions in the MicrosoftTRMDef.tim file. The **Input format** box is disabled for standard TRM handlers and enabled for custom TRM handlers, but three input formats are defined that match the names of the resolution handler **Object**: - **TRMINMSLink** - **TRMINMSCCS** - **TRMINIBMCCS**
Output format	Select the format for the data stream that represents the reply to the TRM that was sent by the host application program. TI formats a data stream to be returned to the host client application program in the form defined by the output TRM. The list of TRM output formats is populated from the UDT definitions in the MicrosoftTRMDef.tim file. The **Output format** box is disabled for standard TRM handlers and enabled for custom TRM handlers, but three output formats are defined that match the names of the resolution handler **Object**: - **TRMOUTMSLink** - **IBM Listener Reply Format (TRMOUTCCS)** - **Link Tran ID:** Select the TP name or Link Mirror Tran ID for the SNA local environment. This control is enabled only when the **Network Type** is set to SNA and the **Resolution Type** is set to Link.
Link Tran ID	View or select an existing TP name or the link mirror transaction ID for the local environment.

See Also

Completing the New Host Environment Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Completing the New Host Environment Wizard Page

Use the **Completing the New Host Environment Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

See Also

New Host Environment Wizard

New Security Policy Wizard

The **New Security Policy Wizard** helps you define how Windows security credentials are established prior to the execution of the server object. The wizard collects information about:

- Security policy name
- Source of credentials
- Requirements for host-supplied credentials
- Single sign-on affiliate applications

This section contains:

- Welcome to the New Security Policy Wizard Page
- Configure a New Security Policy Wizard Page (in the New Security Policy Wizard) (1)
- Configure a New Security Policy Wizard Page (in the New Security Policy Wizard) (2)
- Completing the Security Policy Wizard Page

Welcome to the New Security Policy Wizard Page

Use the **Welcome to the New Security Policy Wizard** page to view the definition of a security policy and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Configure a New Security Policy Wizard Page (in the New Security Policy Wizard) (1)

Configure a New Security Policy Wizard Page (in the New Security Policy Wizard) (1)

Use the first **Configure a New Security Policy** wizard page to identify the security policy and the source of the credentials. Type the name of the security policy, and then select the source for the credentials.

Use this	To do this
Security policy	Type the name for the security policy. The name can be a maximum of 259 Unicode characters (alphabertic, numeric, space, and special). The name cannot be the same as that of an existing security policy. The name for the new security policy is a required field; you will receive an error message if you click **Next** without providing a name. The name is used to associate the security policy with an object view in other wizard pages and dialogs.
Credentials source used to invoke the server	Specify the type or source of credentials that host-initiated processing will associate with the thread when the method on the server object is invoked.
Host-initiated Single Sign-on	Select this option to use host user ID and password. This option is automatically selected if single sign-on (SSO) is not installed or not available.
Windows credentials of the HIP application	Select this option to use Windows credentials that are specified on the HIP NT application service. This option is automatically disabled if single sign-on (SSO) is not installed or not available.

See Also

Configure a New Security Policy Wizard Page (in the New Security Policy Wizard) (2)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure a New Security Policy Wizard Page (in the New Security Policy Wizard) (2)

Use the second **Configure a New Security Policy** wizard page to identify the source of the host user ID and password and determine how they are translated into Windows-based credentials. This wizard page appears only if **Host-initiated Single Sign-on** is selected on the **Configure a new security policy** wizard page.

Select the source of the credentials and the default user, and then select the credential mapping.

Use this	To do this
Security policy	View the name of the security policy.
Affiliate application	Select the single sign-on affiliate application that manages the translation of host user ID and password credentials to Windows credentials.
Single Sign-on mapping use	Specify the credentials to be used when mapping to Single Sign-on.
Default credentials	Select to enter the user ID and password used if the request from the host does not contain a user ID and password or the user ID and password are set to spaces or nulls. When selected, enables the **SSO affiliate application** and **User** boxes. **Note** This option is disabled if **Use HIP application credentials** is selected on the General tab.
Group application	Select the
User	Type the user name or select a previously entered host user name to be used in the lookup call to SSO.

See Also

Completing the Security Policy Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Completing the Security Policy Wizard Page

Use the **Completing the Security Policy Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

See Also

New Security Policy Wizard

Object Wizard (for HIP)

The HIP **Object Wizard** helps you define (or browse for) a Transaction Integrator metadata (.tim) file that is executed by Transaction Integrator after a request is received from a host. The .tim file includes information about:

- The Windows server object interface, methods, and parameters
- Characteristics of the host application program
- Mappings between the host application program and the Windows server object

If the Windows server object is a .NET object, the Wizard also helps you define the assembly and class that implements the interface in the .tim file.

This section contains:

- Welcome to the Object Wizard Page
- Specify or Locate an Object Wizard Page
- Define Implementation Characteristics for the .NET Object Wizard Page
- Completing the Object Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Welcome to the Object Wizard Page

Use the **Welcome to the Object Wizard** page to view the definition of an object and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Specify or Locate an Object Wizard Page

Specify or Locate an Object Wizard Page

Use the **Specify or Locate an Object** wizard page to identify objects associated with the application. Select an object from the list, or to create a new object, type the new object name.

Use this	To do this
Object	Select the name of the object. To create a new object, type the new object name. If you select the TIM first, the name is populated with the ProgID or Namespace.Interface defined in the TIM.
Registered TIMs	Type the full path name, including the *.tim extension, to a TIM file, select a recently used file from the list, or click **Browse** and navigate to the file.

See Also

Define Implementation Characteristics for the .NET Object Wizard Page

Define Implementation Characteristics for the .NET Object Wizard Page

Use the **Define Implementation Characteristics for the .NET Object** wizard page to identify a .NET assembly implementing the interface defined in the Transaction Integrator metadata (TIM) file.

Use this	To do this
Defer implementation identification	Select this option to identify the implementing assembly later through the object's **Properties** dialog.
Pick assembly	Select this option to identify the implementing assembly now.
Path	Type the full path name, including the .dll extension, to a .NET file, select a recently used file from the list, or click **Browse** and navigate to the file.
Class	Select the class containing the methods to be called by HIP runtime for the request processing. The list dislays classes from the selected assembly that implement the interface defined in the .TIM file. The first class is selected in the list by default.

See Also

Completing the Object Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Completing the Object Wizard Page

Use the **Completing the Object Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

See Also

Object Wizard (for HIP)

New Object View Wizard

The **New Object View Wizard** helps you define the network transport endpoints for the Windows platform environment. The Wizard collects information about:

- Local environment name
- Network transport type
- Network transport class
- Endpoint manager
- Endpoint identification

This section contains:

- Welcome to the New Object View Wizard Page
- Configure a New Object View Wizard Page
- Configure the New View Wizard Page
- Completing the New Object View Wizard Page

Welcome to the New Object View Wizard Page

Use the **Welcome to the New Object View Wizard** page to view the definition of an object view and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Configure a New Object View Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure a New Object View Wizard Page

Use the **Configure a New Object View** wizard page to select the methods that are included in the object view. Type the name of the new object view, and then select the local environment that accepts requests on behalf of the view.

Use this	To do this
Object view	Type the name of the object view. The name can be a maximum of 259 alpha-numeric characters. The name cannot be the same as that of an existing view.
Local environment	Select a local environment. The names appearing in the list are those local environments available in the **Local Environments** node. The default is the first local environment that appears in the **Local Environments** node.
Host environment	Select a host environment. The names appearing in the list are those host environments available in the **Host Environments** node. Only those host environments that have a **Network Type** that matches the network type defined in the local environments selected in the **Local environment** box are presented for selection. The default is the first local environment that appears in the **Host Environments** node.
Security policy	Select a security policy to be used for determining user credentials.

See Also

Configure the New View Wizard Page

Configure the New View Wizard Page

Use the **Configure the New View** wizard page to select the methods that are included in the object view. Type the name of the view. To select the methods to be included in the view, select the check box by the method name. Double-click the method name to edit it.

Use this	To do this
View	View the name of the object view. The name of the object view was entered on a previous page of the wizard. To change the name, click **Back**.

Object methods	View all the methods that are defined in the object. Each row in the list contains a summary of the resolution information for a single method. Rows cannot be deleted. The columns are:
	- **Include:** Select this option to include the method in the object view.
	- **Method:** Displays the name of the method. Double-click the method name to display the **Method Resolution Criteria** dialog box.
	- **Endpoint manager:** For a TCP/IP network, select or type the IP address or host name to manage the endpoint. For an SNA network, type the name of the LU alias. In either case, the name can be a maximum of 259 alpha-numeric characters.
	- **Endpoint:** Displays one of the endpoints defined in the local environment associated with the view. To change the content of this field, double-click the **Endpoint** field for a specific method.
	- **Resolution Type:** Displays one of the possible resolution types:
	  - **Endpoint**
	If the local environment has all of its endpoints in use by object views, associated with the same host environment, that specify **Endpoint Resolution**, you will receive an error message.
	If the local environment has all of its endpoints in use by object views, associated with the same host environment, that specify **TRM** or **Data** resolution, no endpoint is available for **Endpoint** resolution and **TRM** or **Data** resolution must be supplied for the other methods.
	If the local environment has one or more endpoints available for endpoint resolution, the first method of the view appears. The first method has its endpoint set to the first endpoint in the local environment that is available for endpoint resolution and the resolution type is set to **Endpoint**. All the remaining methods have the **Endpoint**, **Resolution Type**, **Resolution Data**, and **Resolution Position** boxes cleared.
	  - **Transaction Request Message (TRM)**
	If the local environment currently has all of its endpoints in use by object views, associated with the same host environment, that specify **Endpoint** or **Data** resolution, the list control is not available.
	If an endpoint is available for TRM resolution, **Include** is selected for all methods and their endpoint is set to the first endpoint associated with the endpoint that is available for TRM resolution.
	All methods have resolution type set to **Transaction Request Message (TRM)**; the **Resolution Data** and **Resolution Position** boxes are cleared.
	  - **Enhanced Listener Message (ELM)**
	  - **Data**
	If the local environment currently has all of its endpoints in use by object views, associated with the same host environment that specified **Endpoint** or **TRM** resolution, the list control is not available.
	If an endpoint is available for data resolution, **Include** is selected for all methods and their endpoint is set to the first endpoint associated with the endpoint that is available for data resolution.
	All methods have resolution type set to **Data,** and the **Resolution Data** and **Resolution Position** boxes are cleared.
	  - **Link to Program**
	To change the content of this field, double-click the **Resolution Type** field for a specific method.
	- **Resolution Data** Identifies the data used to select the method to be executed. To change the content of this field, double-click the **Resolution Data** field for a specific method.
	- **Resolution Position** View the resolution position. If **Data Resolution** is selected, this information is used by the TI runtime to identify the starting point in the data stream in which to look for the data defined in the resolution data field to determine what method is to be executed. To change the content of this field, double-click the **Resolution Position** field for a specific method.

See Also

Method Resolution Criteria Dialog Box (in the New Object View Wizard)

Completing the New Object View Wizard Page

Use the **Completing the New Object View Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

See Also

New Object View Wizard

Local Environment Dialog Box

Use the **Local Environment** dialog box to select a local environment that is used as a Listener for the application.

Use this	To do this
Local Environment	Select the local environment.

See Also

TI Manager Wizards and Dialog Boxes

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Reload TIMs Wizard

The **Reload TIMs Wizard** helps you add multiple Transaction Integrator metadata (TIM) files to the object view at one time. The Wizard collects information about:

- The name and location of the .tim file
- The availability of the .tim for reloading

This section contains:

- Welcome to the Reload TIMs Wizard Page
- Specify or Locate Metadata Files to be Reloaded Wizard Page
- Reloading of Metadata Files Wizard Page
- Completing the Reload TIMs Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Welcome to the Reload TIMs Wizard Page

Use the **Welcome to the Reload TIMs** Wizard page to add one or more Transaction Integrator metadata (TIM) files to the object view and to control whether the welcome page is displayed the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Specify or Locate Metadata Files to be Reloaded Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Specify or Locate Metadata Files to be Reloaded Wizard Page

Use the **Specify or Locate Metadata Files to be Reloaded** Wizard page to select the Transaction Integrator metadata (TIM) files to be added.

Use this	To do this
Path	Type the full path name, including the .tim extension, to a TI metadata file, select a recently used file from the list, or click **Browse** and navigate to the file. Only .tim files that are not currently in use by other object views are displayed. The path can be a maximum of 255 Unicode characters, and the name of the .tim file must be unique.

See Also

Reloading of Metadata Files Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Reloading of Metadata Files Wizard Page

Use the **Reloading of Metadata Files** Wizard page to view the Transaction Integrator metadata (TIM) files that will be reloaded. The Wizard analyzes the .tim files selected on the previous page to verify the number of methods, as well as the name and ID of each method.

Use this	To do this
Messages	View the status of each .tim file. If a file is acceptable for reloading, the file name is followed by **OK**. If a file is not acceptable for reloading, the file name if followed by a message indicating the reason for being rejected. **Note** The files given an **OK** are not actually reloaded until you click **Next**.

See Also

Completing the Reload TIMs Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Completing the Reload TIMs Wizard Page

Use the **Completing the Reload TIMs Wizard** page to review the .tims you selected in the previous wizard pages. You can return to an earlier wizard page to select a different .tim by clicking **Back**.

See Also

Reload TIMs Wizard

New Remote Environment Wizard

This section contains:

- Welcome to the New Remote Environment Wizard Page
- Configure a New Remote Environment Wizard Page
- Configure Host Environment and Programming Model Wizard Page
- Configure Endpoint TCP/IP Wizard Page
- Port List Editing Dialog Box
- Configure Endpoint SNA Wizard Page
- Configure Endpoint IMS Connect Wizard Page
- Configure Endpoint Diagnostic Capture Wizard Page
- Configure Endpoint Playback Wizard Page
- Completing the New Remote Environment Wizard Page

Welcome to the New Remote Environment Wizard Page

Use the **Welcome to the New Remote Environment Wizard** page to view the definition of a remote environment and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Configure a New Remote Environment Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure a New Remote Environment Wizard Page

Use the **Configure a New Remote Environment** wizard page to identify the name and location of the remote environment. To define the remote environment, type the name of the remote environment, and then select the network type.

Use this	To do this
Name	Type the name for the remote environment. The name can be a maximum of 256 Unicode characters. The name cannot be the same as that of an existing remote environment. The name for the new remote environment is a required field; you will receive an error message if you click **Next** without providing a name.
Vendor	Select the vendor supplying the remote environment.
Network type	Select the type of network used to communicate with the remote environment. The options are: • **TCP/IP** (default) • **SNA**

See Also

Configure Host Environment and Programming Model Wizard Page

Configure Host Environment and Programming Model Wizard Page

Use the **Configure Host Environment and Programming Model** wizard page to identify information about the target host configuration and show where the host’s programming model is defined.

Use this	To do this
Target host	Select a target host. For the TCP Network type, the available choices are: - **CICS** - **IMS** - **OS400** For the LU 6.2 (SNA) for the network type, the available choices are: - **CICS** - **IMS**

Programming model	Select a programming model. For the TCP network type, the available choices are:
	- For the CICS host
	  - **TCP TRM User Data**
	  - **TCP ELM User Data**
	  - **TCP TRM Link**
	  - **TCP ELM Link**
	- For the IMS host
	  - **IMS Connect**
	  - **IMS Implicit**
	  - **IMS Explicit**
	- For the OS400 host
	  - **Distributed Program Call**
	For the LU 6.2 (SNA) network type, the available choices are:
	- For the CICS host
	  - **CICS LU 6.2 User Data**
	  - **CICS LU 6.2 Link**
	- For the IMS host
	  - **IMS LU 6.2 User Data**

See Also

Configure Endpoint TCP/IP Wizard Page

Configure Endpoint TCP/IP Wizard Page

Use the **Configure Endpoint TCP/IP** wizard page to set the IP address and port number for the host environment.

Use this	To do this
IP/DNS Address	Type the address or select from the drop-down list. The IP address can be defined either by name or numerical address. The address can be a maximum of 256 alphanumeric characters. The drop-down list displays the most recently used IP addresses.
Port list	Select the port number from the drop down list. Click **Edit** to edit the selected port list, or create a new one by selecting <**new port list**> and clicking **Edit**.

See Also

Completing the New Remote Environment Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Port List Editing Dialog Box

The **Port List Editing** dialog box allows you to create new TCP ports or edit existing ports.

To add a port to addition port list, select the port list on the previous panel
press edit.
The Defined ports will serially list the defined ports within the list. Highlight a port within the defined list, press remove to remove the port from the list.
To add a new port to the list, type the port number within the new port text box, press add. The port number will be added to the defined port list. Press OK, the new port will show up within the port list separated by semicolons within the port list.

To create a new port list, from the port list drop down menu, select <new port list>, press edit.

Use this	To do this
New port	Type the number of the new port. The port number can be a maximum of 256 positive numerals separated by semicolons. A port number can be defined with up to 5 positive digits, and more than one port can be defined to an address. The port number cannot be larger than 32767. The port numbers cannot be repeated.
Add	Click to add the new port number to the list of defined ports.
Remove	Click to remove the selected port number from the list.
Defined ports	View the port numbers already defined.

See Also

Completing the New Remote Environment Wizard Page

Configure Endpoint SNA Wizard Page

Use the **Configure SNA Endpoint** wizard page to set the local LU alias, the remote LU alias, and the APPC mode name for the host environment.

Use this	To do this
Local LU alias	Type the local LU alias. The alias can be a maximum of 256 alphanumeric characters. The drop-down list displays all the Local APPC LUs defined to the SNA Manager.
Remote LU alias	Type the remote LU alias. The alias can be a maximum of 256 alphanumeric characters. The drop-down list displays all the remote APPC LUs defined to the SNA Manager.
Mode name	Type the APPC mode used for the connection. You can obtain a list of configured modes from Host Integration Server **SNA Manager**. **Note** To use two-phase commit, the APPC mode must be Sync Level 2 capable.

See Also

Completing the New Remote Environment Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure Endpoint IMS Connect Wizard Page

Use the **Configure Endpoint IMS Connect** wizard page to set the IP address and port number for the host environment and to identify the IBM-defined exit program on the host.

Use this	To do this
IP/DNS Address	Type the address or select from the drop-down list. The address can be a maximum of 256 alphanumeric characters. The drop-down list displays the most recently used IP addresses.
Port list	Type the TCP port number or select from the drop-down list. The number can be a maximum of 256 positive numerals separated by semicolons. The port numbers cannot be repeated. The dropdown list displays the most recently used port numbers.
ITOC information	Select either **HWSIMSO0** or **HWSIMSO1**, the IBM-defined exit associated with IMS connect on the host.
Format to use	View the choice of formats.
HWSIMSO0	Select this option to use the HWSIMSO0 exit program.
HWSIMSO1	Select this option to use the HWSIMSO1 exit program.
IMS system ID	Type the IMS system ID or select from the drop-down list. The ID can be a maximum of 8 alphanumeric characters. The drop-down list displays the most recently used IMS system IDs.
ITOC exit name	Type the ITOC exit name or select from the drop-down list. The name can be a maximum of 8 alphanumeric characters. The drop-down list displays the most recently used ITOC exit names.

See Also

Completing the New Remote Environment Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configure Endpoint Diagnostic Capture Wizard Page

Use the **Configure Diagnostic Capture Endpoint** wizard page to

Use this	To do this
Recording file	Type the name of the recording file or select from the drop-down list. The file name can be a maximum of 256 alphanumeric characters. The drop-down list displays the most recently used recording files.
Use responses created from the test console	Select this option to specify the test console. TI initiates the TI Test console for obtaining responses for components assigned to this remote environment. Responses returned from the TI Test console are stored in the recording file associated with this remote environment. (default)
Use responses from the remote environment	Select this option to specify a remote environment. When the option is selected, the drop-down is enabled and displays all the remote environments that have the same network type, host environment, and programming model as the remote environment being defined.
Name	Type the name of the remote environment or select from the drop-down list. The name can be a maximum of 256 alphanumeric characters.

See Also

Completing the New Remote Environment Wizard Page

Configure Endpoint Playback Wizard Page

Use the **Configure Playback Endpoint** wizard page to

Use this	To do this
Recording file	Type the name of the recording file or select from the drop-down list. The file name can be a maximum of 256 alphanumeric characters. The drop-down list displays the most recently used recording files.

See Also

Completing the New Remote Environment Wizard Page

Completing the New Remote Environment Wizard Page

Use the **Completing the New Remote Environment Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

See Also

New Remote Environment Wizard

Object Wizard (for WIP)

This section contains:

- Welcome to the Object Wizard Page
- Specify or Locate an Object Wizard Page
- Define Environment Characteristics for the COM Object Wizard Page
- Define Environment Characteristics for the .NET Object Wizard Page
- Define Remote Environment Wizard Page
- Completing the Object Wizard Page

Welcome to the Object Wizard Page

Use the **Welcome to the Object Wizard** page to view the definition of a metadata file (.tlb for COM, .dll for .Net) and to control whether the welcome page is displayed again the next time the wizard is used.

Use this	To do this
Do not show this welcome page again.	Select this option if you will be using the wizard more than once and do not want to read the introduction each time the wizard is launched. Each time the wizard is launched, the welcome page will be hidden and the wizard will begin with the second page. To view the welcome page again, click **Back** on the second page of the wizard.

See Also

Specify or Locate an Object Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Specify or Locate an Object Wizard Page

Use the **Specify or Locate an Object** wizard page to specify or initiate a browse operation to locate the Transaction Integrator metadata file that represents the server object. For COM based interfaces, the file extension is .tlb, for .Net the file extension is .dll.

Use this	To do this
Path	Type the full path name to a metadata file. If the file does not end with the .tlb or .dll extension, an error message will appear. You can add more than one object at a time.
Browse	Launches the **Open** dialog box.
Remove	Removes the selected objects from the list.

See Also

Define Environment Characteristics for the COM Object Wizard Page

Define Environment Characteristics for the .NET Object Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Define Environment Characteristics for the COM Object Wizard Page

Use the **Define Environment Characteristics for the COM Object** wizard page to define the COM+ application in which Transaction Integrator should run.

Use this	To do this
COM+ applications	Select a COM application. The contents of this box are populated from enumerating the COM+ applications on the local computer. To appear in this list, the application should have Server Activation type and be editable (that is, **Disable Changes** should not be selected on the application's **Advanced Properties**).

See Also

Define Remote Environment Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Define Environment Characteristics for the .NET Object Wizard Page

Use the **Define Environment Characteristics for the .NET Object** wizard page to define the IIS Virtual Directory in which Transaction Integrator should run.

Use this	To do this
Virtual directories	Select an IIS virtual directory. The list is populated from enumerating the IIS Virtual Directories on the local computer. **Note** If you do not choose an environment, an error appears when you click the **Next** button. If there is no environment available, you must exit this wizard and define the appropriate environment.
Key file for proxy	Select the key (.snk) file that TI Manager uses to sign the proxy in the IIS virtual directory. The list is populated with files used previously.

See Also

Define Remote Environment Wizard Page

Define Remote Environment Wizard Page

Use the **Define Remote Environment** wizard page to select a remote environment (RE) that provides the connection information to the host application. You can select the RE from the list of already defined remote environments that are of the appropriate type (that is, the network, host environment, and programming model of the remote environment must agree with those of the object).

Use this	To do this
Remote environments	Select a remote environment. The contents of this list are populated from an enumeration of the remote environments already defined which match in network type, host environment and programming model.

See Also

Completing the Object Wizard Page

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Completing the Object Wizard Page

Use the **Completing the Object Wizard** page to review the choices and settings you made in the previous wizard pages. You can return to an earlier wizard page to change a setting by clicking **Back**.

See Also

Object Wizard (for WIP)

TI Manager Properties

Transaction Integrator (TI) Manager provides property pages for viewing and setting properties. The property pages include:

Transaction Integrator (Configuration) Properties

- Timeout tab

Application Properties

- General tab (application properties)
- Advanced tab (application properties)
- .NET Assembly Path tab (application properties)

Listener Properties

- General tab (listener properties)
- Endpoints tab (TCP/IP listener properties)
- Endpoints tab (SNA listener properties)
- Application tab (listener properties)

Local Environment Properties

- General tab (local environment properties)
- Endpoints tab (TCP/IP local environment properties)
- Endpoints tab (SNA local environment properties)

Host Environment Properties

- General tab (host environment properties)
- Network tab (host environment properties)
- Conversion tab (host environment properties)
- Default tab (host environment properties)

Security Policy Properties

- General tab (security policy properties)
- Credentials Source tab (security policy properties)

Object Properties

- General tab (object properties)
- Methods tab (object properties)
- .NET Implementation tab (object properties)

Object View Properties

- General tab (view properties)
- Host Environments tab (view properties)
- Methods tab (view properties)
- Method Resolution Criteria Dialog Box (object properties)

Remote Environment Properties

- General tab (remote environment properties)
- TCP/IP tab (remote environment properties)
- LU 6.2 tab (remote environment properties)
- Target tab (remote environment properties)
- Recording tab (remote environment properties)
- Locale tab (remote environment properties)
- Security tab (remote environment properties)

- CICS tab (for LU 6.2 Link properties)
- CICS tab (for TCP/IP properties)
- IMS tab
- SSO tab (security policy properties)

Object Properties

- General tab (object properties)
- Hosting tab (COM object properties)
- Remote Environment tab (object properties)
- Security tab (remote environment properties)

Timeout tab

Use the **Timeout** tab to set the maximum number of minutes the TI Manager console is allowed to be inactive while it is in **Configuration** mode.

Use this	To do this
Write mode timeout	Type the maximum number of minutes the TI Manager console can remain in configuration mode without a keystroke or mouse movement that changes the configuration. At the end of this time, the console returns to **View and operate** mode. The default is **30** minutes.

> **Warning** The properties of the TI Manager console are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the console to function incorrectly.

See Also

Transaction Integrator (mode) Node

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General tab (application properties)

The **General** tab allows you to set the general properties of the application.

Use this	To do this
Application	View the name of the application.
Computer	View the name of the computer running the application.
Process ID	View the process ID of the HIPService. **0** indicates that HIPService is not running.
Worker threads	Type the number of processing threads to be used in the work of the application. The number of threads must be greater than 0 and fewer than 257.
Queued requests	Type the maximum number of requests that can be stored in the queue before new requests are rejected. The number of queued requests must be equal to or greater than the number of worker threads, and must be less than 2049.
Comment	Type additional information about the use of the object view in the HIP environment. The comment can be a maximum of 259 alpha-numeric characters.
Service starts automatically	Select this option to start the HIPService automatically at startup. Clear the check box to require manual start up.

> **Warning** The properties of an application are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the application to function incorrectly.

See Also

Application [status] Node

Advanced tab (application properties)

The **Advanced** tab allows you to set the advanced properties of the application.

Use this	To do this
Minimum active worker threads	Type or select the minimum number of worker threads that the HIP runtime maintains. The number of threads must be greater than 0 and fewer than 193. The number cannot exceed the number of **Worker threads** set on the **General** tab property page. The default is **8** threads.
Cleanup worker threads	The group of properties controlling thread cleanup.
When no requests have been queued for	Type or select the number of seconds the HIP runtime will wait after the last client request has been received before it terminates the threads. The minimum wait is 1 second and the maximum wait is 3600 seconds. The default is **30** seconds.
Start an additional working thread	The group of properties controlling when new threads are started.
When more than *number* requests have been queued	Type or select the number of requests that must be received before additional worker threads are started. The minimum number of requests is 1, and the maximum number of requests is 99,999. The default is **15** requests. The number of requests cannot exceed the **Maximum queued requests** (set on the **General** tab) multiplied by the **During the previous *number* seconds** (set on this tab).
During the previous *number* seconds	Type or select the number of seconds the HIP runtime must wait before starting additional worker threads. The minimum number of seconds is 1, and the maximum number of seconds is 3600. The default is **5** seconds.
Increase context cache size	The group of properties controlling the size of the cache of incoming context requests over a period of time.
When more than *number* contexts have been created	Type or select the number of contexts that must be created before the HIP runtime increases the size of the cache. The request context is needed to pass the parameters of the request from the listener to a worker thread. The initial cache size is equal to the number of worker threads multiplied by 2, which is normally less than the maximum queue length. If the cache is empty, a new context is created but will be destroyed at the end because there is no place in the cache to put it in. Increasing the cache size allows the HIP runtime to save the context for future reuse to eliminate expensive operations of creating and releasing the context. The cache size can grow up to the maximum queue length. The minimum number of contexts is 1, and the maximum number of contexts is 192. The default is **30** contexts.
During the previous *number* seconds	Type or select the number of seconds the HIP runtime must wait before increasing the cache size. The minimum number of seconds is 1, and the maximum number of seconds is 3600. The default is **5** seconds.

Warning The properties of an application are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the application to function incorrectly.

See Also

Application [status] Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

.NET Assembly Path tab (application properties)

The **.NET Assembly Path** tab allows you to set the way the application locates the implementation assemblies.

Use this	To do this
Use GAC	Select this option to search for the assemblies in the Global Assembly Cache.
Path	Type the full path name of the folder that contains implementation assemblies, or select a recently used folder from the list.

> **Warning** The properties of an application are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the application to function incorrectly.

See Also

Application [status] Node

General tab (listener properties)

The **General** tab displays the general properties of the application's local environment. The controls on the **General** tab are read-only.

Use this	To do this
Name	View the name of the local environment. To change the name of the local environment, right-click the **Local Environments** node.
Network type	View the type of network used to communicate with the host.
Transport class	View the class of the transport object.
Comment	View a comment about the local environment. To change an existing comment, right-click the **Local Environments** node.

> **Note** When viewed from the ***listener*** node, the general properties are read-only. If you want to change a general property, right-click the specific ***local environment*** **Node** under the **Local Environments Node**, and then left-click **Properties** on the shortcut menu. The properties on that page are read-write.
>
> **Warning** The properties of an listener are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the application to function incorrectly.

See Also

Listener [status] Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Endpoints tab (TCP/IP listener properties)

The **Endpoints** tab displays the defined endpoints in the local environment definition. The controls on the **Endpoints** tab are read-only. To add or remove endpoints from the local environment, use the **Properties** shortcut menu item on the **Local Environments** node.

Use this	To do this
New port or service name	Not used.
Defined ports or service names	View the valid ports and services names for the local environment.

> **Note** When viewed from the ***listener*** node, the endpoint properties are read-only. If you want to change an endpoint property, right-click the specific ***local environment*** **Node** under the **Local Environments Node**, and then left-click **Properties** on the shortcut menu. The properties on that page are read-write.

> **Warning** The properties of an application are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the application to function incorrectly.

See Also

Listener [status] Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Endpoints tab (SNA listener properties)

The **Endpoints** tab displays the defined endpoints in the local environment definition. The controls on the **Endpoints** tab are read-only. To add or remove endpoints from the local environment, use the **Properties** shortcut menu item on the **Local Environments** node.

Use this	To do this
New transaction program name	View the transaction program (TP) name or the link mirror transaction ID of the local environment.
Add	Not available.
Defined transaction programs names	View the existing TP names or the link mirror transaction IDs for the local environment.
Remove	Not available.

> **Note** When viewed from the ***listener*** node, the endpoint properties are read-only. If you want to change an endpoint property, right-click the specific ***local environment*** **Node** under the **Local Environments Node**, and then left-click **Properties** on the shortcut menu. The properties on that page are read-write.
>
> **Warning** The properties of an listener are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the application to function incorrectly.

See Also

Listener [status] Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Application tab (listener properties)

The **Application** tab displays the local environment properties that are specific to the application. It allows you to specify whether the application will begin listening on the local environment endpoints automatically when the application is started.

Use this	To do this
Begin Listening on the local environment at application startup	When this option is selected, the application will automatically start listening for incoming host requests on each port defined in the local environment.

> **Warning** The properties of an listener are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the application to function incorrectly.

See Also

Listener [status] Node

General tab (local environment properties)

Use the **General** tab to set the general local environment properties, including its name and basic information about its network type.

Use this	To do this
Local environment	Type the name for the local environment. The name can be a maximum of 259 Unicode characters (alphabetic, numeric, space, and special). The name cannot be the same as that of an existing local environment. You can change the name at any time, unless the local environment is an associated listener in an application that is active. The application must be stopped before the LE can be renamed. After the name is changed, the new name will appear in the **Application**, **Local Environments** and **Object** nodes.
Network type	Select the type of network used to communicate with the host. The choices are: • TCP/IP (default) • SNA. **Note** If the local environment is associated with any other configuration entity, you will receive an error when you attempt to apply the change.
Transport class	Select the class of the transport object. This list changes according to the selected **Network type**.
Endpoint manager	Select or type the local LU alias to manage the endpoint. **Note** The **Endpoint manager** edit box is set to **Localhost** and disabled if the **Network type** is set to **TCP/IP**.
Comment	Type any additional information about the local environment. The comment can be a maximum of 259 Unicode characters (alphabetic, numeric, space, and special).

> **Warning** The properties of a local environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the local environment to function incorrectly.

See Also

Local Environments Node

Local Environment Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Endpoints tab (TCP/IP local environment properties)

Use the **Endpoints** tab to view, add, and delete endpoints in the local environment definition.

Use this	To do this
New port or service name	Type the port number or service name for the local environment. The port number can be a maximum of 5 numeric characters and must be greater than 0 and fewer than 32768. The service name can be a maximum of 64 alpha-numeric characters. The format of the name must conform to the WinSock Service Name convention. The port number or name cannot be the same as that of an existing number or name in **Defined ports and service names**.
Add	Click to validate the port number or service name you typed. If the number or name is valid, it then appears in **Defined ports and service names**. If the local environment is referenced by an application, the new port or service name will not be available for use until all the applications that use the local environment are restarted.
Defined ports and service names	View the valid ports and services names for the local environment.
Remove	Click to remove a selected port number or service name from **Defined ports or service names**.

> **Warning** The properties of a local environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the local environment to function incorrectly.

See Also

Local Environments Node

Local Environment Node

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Endpoints tab (SNA local environment properties)

Use the **Endpoints** tab to view, add, and delete endpoints in the local environment definition.

Use this	To do this
New transaction program name	Type the transaction program (TP) name or the link mirror transaction ID of the local environment. The name or ID can be a maximum of 64 alphabetic characters. The format of the name must conform to the IBM SNA Transaction Program Names convention. The name or ID cannot be the same as that of an existing name or ID in the **Defined transaction programs names**.
Add	Click to validate the transaction program (TP) name or the link mirror transaction ID you typed. If the TP name or the link mirror transaction ID is valid, it appears in **Defined transaction program names**.
Defined transaction programs names	View the existing TP names or the link mirror transaction IDs for the local environment.
Remove	Click to remove one or more TP names or link mirror transaction IDs selected from the **Defined transaction programs names** available for use in the local environment.

> **Warning** The properties of a local environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the local environment to function incorrectly.

See Also

Local Environments Node

Local Environment Node

General tab (host environment properties)

The **General** tab defines the basic characteristics of the host environment that will initiate requests to the Windows platform.

Use this	To do this
Host environment	Type the name for your host environment. The name can be a maximum of 259 Unicode characters (alphabetic, numeric, space, and special). The name cannot be the same as that of an existing host environment.
Time-out in seconds	The **Send** and **Receive** time-out values are used by the host-initiated processing (HIP) runtime environment when it communicates with the host environment. The time-out values are used on transport-specific application program interfaces (APIs) to terminate the send and/or receive API functions if the expected data is not received in the specified amount of time.
Send	Type the number of seconds the HIP runtime should wait for an acknowledgement before it times out. The maximum number of seconds is 3,600; the default is **30** seconds.
Receive	Type the number of seconds the host should wait for a response before it times out. The maximum number of seconds is 3,600; the default is **30** seconds.
Comment	Type any additional information about the host environment. The comment can be a maximum of 259 alpha-numeric characters.

> **Warning** The properties of a host environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the host environment to function incorrectly.

See Also

Host Environments Node

Host Environment Node

Network tab (host environment properties)

The **Network** tab defines the network characteristics that the host uses to interact with the Windows environment and to ensure that unauthorized requests are not inadvertently processed.

Use this	To do this
Network type	Select the type of network used to communicate with the host environment. The choices are: • TCP/IP (default) • SNA
Remote endpoint manager	For a TCP/IP network, select or type the IP address of the host or the host name registered in the DNS. For an SNA network, type the LU name associated with the host system. In either case, the name can be a maximum of 259 alpha-numeric characters.

> **Warning** The properties of a host environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the host environment to function incorrectly.

See Also

Host Environments Node

Host Environment Node

Conversion tab (host environment properties)

The **Conversion** tab defines the data type characteristics used by the host that makes requests to the Windows platform. The code page and elemental data conversion object are used by host-initiated processing (HIP) to transform the incoming and outgoing data to a form that can be used by the host application program.

Use this	To do this
Data conversion	Select the data conversion routine to be used.
Host code page	Select the code page used by the host. Each available code page is listed by its symbolic value.

> **Warning** The properties of a host environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the host environment to function incorrectly.

See Also

Host Environments Node

Host Environment Node

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Default tab (host environment properties)

The **Default** tab of the properties page of a specific host environment defines the manner in which the host typically communicates with Transaction Integrator. These defaults are applied during the configuration for an object view.

Use this	To do this
Default method resolution criteria	View the definition of the default behavior for setting up the method resolution criteria for a new object view.
Type	Select the type of resolution to be conducted: **Endpoint**: The endpoint resolution type is the simplest means of resolving a request to a method. A data stream directed to a port always executes a single method on a view. This model is considered "raw sockets," and represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Endpoint** disables the **Object**, **Input format** and **Output format** boxes and clears their contents. • **Transaction Request Message (TRM)**: The TRM resolution type is specific to the IBM CICS Concurrent Server model and the Microsoft variant, MSLink model. It represents a double exchange sequence. The first exchange represents the transaction request; the second exchange represents the request and reply data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Transaction Request Message (TRM)** enables the **Object**, **Input format**, and **Output format** boxes. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting one of the predefined **Transaction Request Objects** disables the **Input format** and **Output format** boxes; it also disables the **Link Tran ID** box and clears its contents. Selecting a custom object enables the **Input format** and **Output format** boxes and sets their initial values to the Microsoft-supplied TRM handler items. • **Data**: Similar to **Endpoint** in that it adds the ability to identify a string in the data stream directed to a port, that is used to associate the request with a specific method in the view. This model is considered "raw sockets." It represents a single synchronous exchange of data. Selecting **Data** disables the **Object**, **Input format**, **Output format,** and **Link Tran ID** boxes and clears their contents. • **Link:** The Link resolution type is specific to the IBM CICS DPL model. The endpoint name is representative of the TP name that is the CICS mirror transaction ID. Select **Link** to resolve all the methods of a new object view using the data information specified when the object view was created. When a new view is created and associated with the HE, the method resolves to the Link Tran ID field in the default HE resolution. Selecting **Link** disables the **Object**, **Input format**, and **Output format** boxes and clears their contents.
Object	Select the object. The list of objects is populated from the Help string in the interface definition of objects identified to the resolution handler. Microsoft provides three TRM resolution handlers: • **Microsoft HIS - TRM Handler MS Link** (default) • **Microsoft HIS - TRM Handler MSCCS** • **Microsoft HIS - TRM Handler IBMCCS** • **Microsoft HIS - Link Handler**

Input format	Select the format for the data stream that represents the TRM sent by the client host application program. The list of TRM input formats is populated from the user-defined type definitions in the MicrosoftTRMDef.tim file. The **Input format** box is disabled for standard TRM handlers and enabled for custom TRM handlers, but three input formats are defined that match the names of the resolution handler **Object**: - **TRMINMSLink** - **TRMINMSCCS** - **TRMINIBMCCS**
Output format	Select the format for the data stream that represents the reply to the TRM that was sent by the host application program. Th formats a data stream to be returned to the host client application program in the form defined by the output TRM. The list of TRM output formats is populated from the UDT definitions in the MicrosoftTRMDef.tim file. The **Output format** box is disabled for standard TRM handlers and enabled for custom TRM handlers, but three output formats are defined that match the names of the resolution handler **Object**: - **TRMOUTMSLink** - **IBM Listener Reply Format (TRMOUTCCS)** - **Link Tran ID:** Select the TP name or Link Mirror Tran ID for the SNA local environment. This control is enabled only when the **Network Type** is set to SNA and the **Resolution Type** is set to Link.

> **Warning** The properties of a host environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the host environment to function incorrectly.

See Also

Host Environments Node

Host Environment Node

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General tab (security policy properties)

The **General** tab of the properties page of a security policy defines the name of the policy and the source of the security credentials.

Use this	To do this
Policy	Type the name for the security policy. The name can be a maximum of 259 Unicode characters (alphabetic, numeric, space, and special). The name cannot be the same as the name of an existing security policy. The name for the new security policy is a required field; you will receive an error message if you click **Next** without providing a name. The name is used to associate the security policy with an object view in other wizard pages and dialog boxes.
Host-initiated Single Sign-on	Select this option to use host user ID and password. This option is automatically disabled if single sign-on (SSO) is not installed or not available.
Windows credentials of the HIP application	Select this option to use Windows user ID and password specified on the HIP NT application service. This option is automatically selected if single sign-on (SSO) is not installed or not available.
Comment	Type additional information about the security policy. The comment can be a maximum of 259 Unicode characters.

> **Warning** The properties of a security policy are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the security policy to function incorrectly.

See Also

Security Policies Node

Security Policy Node

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Credentials Source tab (security policy properties)

The **Credentials Source** tab of the properties page of a security policy defines the source of the host user ID and password and describes how they are translated into Windows-based credentials.

Use this	To do this
Security policy	View the name of the security policy.
Affiliate application	Select the SSO affiliate application to be queried to gain access to the Windows credentials needed to execute methods on the server object. The list displays all the affiliate applications defined in the SSO. The display name of the affiliate application is a concatenation of the affiliate application name and description, separated by a hyphen. The selected application will be added to the security policy. **Note** The dropdown list is disabled if SSO is not installed or is not available.
Single Sign-on mapping use	Specify the credentials to be used when mapping to Single Sign-on.
Default credentials	Select this option to enter the user ID and password used if the request from the host does not contain a user ID and password or the user ID and password are set to spaces or nulls. This option enables the **Group application** and **User** boxes.
Group application	The default user group provides the default user ID and password.
User	Type or select the host user name used in the lookup call to SSO. **Note** The dropdown list is disabled if SSO is not installed or is not available.

> **Warning** The properties of a security policy are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the security policy to function incorrectly.

See Also

Security Policies Node

Security Policy Node

Method Resolution Criteria Dialog Box (in the New Object View Wizard)

Use the **Method Resolution Criteria** dialog to provide detailed information about a specific method on the object view.

Use this	To do this
Method	View the name of the object’s method for which the method resolution criteria are being set.
Endpoint	Select the endpoints on the local environment that are available for the type of resolution specified in **Type**. All endpoints in the LE are listed and available for selection. If an endpoint selected for one resolution type is already used with another resolution type then an error message will pop up when you click **Apply**. The error message explains which object and view has this endpoint used with another resolution type.
Method resolution criteria	View a description of the behavior for the IT runtime when it resolves a request to a method. The sequence of data flow events may require the TI to send and receive various amounts of data prior to obtaining the ability to make the connection between the incoming request and the target method.
Type	Select the type of resolution to be conducted: • **Endpoint** The endpoint resolution type is simplest means of resolving a request to a method. A data stream directed to a port always executes a single method on a view. This model is considered “raw sockets,” and it represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Endpoint** disables **Object Name**, **Input format** and **Output format** and clears their contents. • **Transaction Request Message (TRM)** The TRM resolution type is specific to the IBM CICS Concurrent Server model and the Microsoft variant MSLink model. It represents a double exchange sequence. The first exchange represents the transaction request, and the second exchange represents the request and reply data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Transaction Request Message (TRM)** enables **Object**, **Input format**, and **Output format**. This option is available only for TCP/IP local environment/host environment pairs. • **Enhanced Listener Message (ELM)**: • 3**Data** Similar to **Endpoint** in that it adds the flexibility to identify a string in the data stream directed to a port that is used to associate the request with a specific method in the view. This model is considered “raw sockets.” It represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Data** disables **Object**, **Input format**, and **Output format** and clears their contents. • **Link to Program Name:** Resolves all the methods of a new object view using the data information specified when the object view was created. When a new view is created and associated with the HE, the method resolves to the Link Tran ID field in the default HE resolution. Selecting **Link to Program Name** disables **Object**, **Input format**, and **Output format** and clears their contents. This option is available only for SNA local environment/host environment pairs. **Note** Only **TRM-MSLink** and **Link to Program Name** are available for Link methods. Methods can be defined as Link in Visual Studio by setting the **Is Link** property to **True**.
Object Name	Select the object. The list of objects is populated from the Help string in the interface definition of objects identified to the resolution handler. Microsoft provides three TRM resolution handlers: • **Microsoft HIS - TRM Handler MS Link** (default) • **Microsoft HIS - TRM Handler MSCCS** • **Microsoft HIS - TRM Handler IBMCCS**

Input format	Select the format of the data stream that represents the TRM sent by the client host application program. The list of TRM input formats is determined by the UDT) definitions in the MicrosoftTRMDef.tim file in the installation TIMLibs directory. The **Input format** box is blank by default, but three input formats are defined that match the names of the resolution handler **Object**: • **MS Link Request Format** • **IBM Listener Type 1 Request Format** • **IBM Listener Type 2 Request Format**
Output format	Select the format of the data stream that represents the reply to the TRM that was sent by the host application program. TI formats a data stream that is returned to the host client application program in the form defined by the output TRM. The list of TRM output formats is determined by the UDT definitions in the MicrosoftTRMDef.tim file. The **Output format** box is blank by default, but three output formats are defined that match the names of the resolution handler **Object**: • **MS Link Reply Format** • **IBM Listener Type 1 Reply Format** • **IBM Listener Type 2 Reply Format**
Link	View the name of the program being linked to.
Program Name	Name of the TP program.
Resolution Data	View a definition of the data used by the IT runtime when it resolves a request to a method.
Data	Type the method resolution criteria for a method on the object view. The criteria can be a maximum of 256 alpha-numeric characters. This control is enabled for resolution types **Transaction Request Message (TRM)** and **Data**. This control is disabled for resolution type **Endpoint**.
Position	Type the resolution position. The position can be a maximum of nine numeric characters. This control is enabled for resolution type **Data** and disabled for resolution types **Transaction Request Message (TRM)** and **Endpoint**.

See Also

TI Manager Properties

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General tab (object properties)

Use the **General** tab to view the properties of an object. All properties are read-only, except for the **Object** and **Comment** fields.

Use this	To do this
Object	View the name of the object.
Metadata file	View the name of the Transaction Integrator metadata (.tim) file.
Method count	View the number of methods that are contained in the object definition.
Help string	View the Interface Definition Help String that was part of the object's interface definition.
Comment	Type a comment that provides additional information about the use of the object in host-initiated processing. The comment can be a maximum of 256 alpha-numeric characters.

> **Warning** The properties on an object are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the object to function incorrectly.

See Also

Objects Node (HIP)

Object Node (HIP)

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Methods tab (object properties)

Use the **Methods** tab to view the methods on an object.

Use this	To do this
Method	View the name of the methods defined in the .tim file.

> **Warning** The properties on an object are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the object to function incorrectly.

See Also

Objects Node (HIP)

Object Node (HIP)

.NET Implementation tab (object properties)

Use the **.NET Implementation** tab to view the properties of the .NET assembly implementing the interface defined in the Transaction Integrator metadata (TIM) file.

Use this	To do this
Assembly path	Type the full path name, including the .dll extension, to a .NET file, select a recently used file from the list, or click **Browse** and navigate to the file.
Class	Select the class containing the methods to be called by HIP runtime for the request processing. The list displays classes from the selected assembly that implement the interface defined in the .TIM file. The first class is selected in the list by default.

> **Warning** The properties on an object are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the object to function incorrectly.

See Also

Objects Node (HIP)

Object Node (HIP)

General tab (view properties)

Use the **General** tab to view or change the basic information about the object view.

Use this	To do this
Object view	View the name of the object view.
Local environment	Select a local environment (LE). The LE determines the network type associated with the object view. **Note** If you are changing from one network type to another, be sure to remove all methods from the view before changing the LE. **Warning** Changing the current LE in the view removes the host environments (HEs) associated with the view and all related information. Use the **Host Environments** tab to associate a new HE.
Security policy	Select a security policy to be associated with the view.
Comment	Type a comment that provides additional information about the use of the object view in the HIP environment. The comment can be a maximum of 259 alpha-numeric characters.

> **Note** When viewed from the ***view*** node under the application ***listener*** node, the general properties are read-only. If you want to change a general property, right-click the specific ***view*** **Node** under the ***object*** **Node**, and then left-click **Properties** on the shortcut menu. The properties on that page are read-write.
>
> **Warning** The properties on an object view are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the application to function incorrectly.

See Also

View Node (listener)

View Node (object)

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Host Environments tab (view properties)

Use the **Host Environments** tab to view or change detailed information about the host environments (HEs) associated with the object view.

Use this	To do this
Host environment	Select the host environment to associate with the object view. This list includes all the HEs that have the same network type as the local environment associated with the object view.
Configured host environments	View the HEs already associated with the object view.
Add	Click to add the HE to the object view and move the name to **Configured host environments**.
Remove	Click to remove the selected HE from the object view and from **Configured host environments**. The removed HE is moved to the list in **Host environment**.

> **Note** When viewed from the ***view*** node under the application ***listener*** node, the host environment properties are read-only. If you want to change a host environment property, right-click the specific ***view*** **Node** under the ***object*** **Node**, and then left-click **Properties** on the shortcut menu. The properties on that page are read-write.

> **Warning** The properties on an object view are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the object view to function incorrectly.

See Also

View Node (listener)

View Node (object)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Methods tab (view properties)

Use the **Methods** tab to view or change the methods associated with the object view and the method resolution details. You can use this page to add and remove methods on the object view. Double-click a row in the grid to edit the resolution information.

Use this	To do this

Object methods	View all the methods that are defined in the object. Each row contains a summary of the resolution information for a single method. Rows in the list cannot be deleted. The columns are:
	• **Include** Select to include the method in the object view.
	• **Method** View the name of the method. Double-click the method name to launch the **Method Resolution Criteria** dialog box.
	• **Endpoint** View one of the endpoints defined in the local environment associated with the view. To change the content of this field, double-click on the **Endpoints** field for a specific method.
	• **Resolution Type** Displays one of the possible resolution types:
	    • **Endpoint** The endpoint resolution type is the simplest means of resolving a request to a method. A data stream directed to a port always executes a single method on a view. This model is considered “raw sockets,” and represents a single synchronous exchange of data.
	    • **Transaction Request Message (TRM)** The TRM resolution type is specific to the IBM CICS Concurrent Server model and the Microsoft variant, MSLink model. It represents a double exchange sequence.
	    • **Enhanced Listener Message (ELM)**:
	    • **Data** Similar to **Endpoint** in that it adds the ability to identify a string in the data stream directed to a port that is used to associate the request with a specific method in the view. This model is considered ”raw sockets.” It represents a single synchronous exchange of data.
	    • **Link to Program Name:** Select **Link to Program Name** to resolve all the methods of a new object view using the data information specified when the object view was created.
	To change the content of this field, double-click the **Resolution Type** field for a specific method.
	• **Resolution Data** Identifies the data used to select the method to be executed. To change the content of this field, double-click the **Resolution Data** field for a specific method.
	• **Resolution Position** Displays the resolution position. If **Data Resolution** is selected, this information is used by the TI runtime to identify the starting point in the data stream in which to look for the data defined in the resolution data field to determine which method is to be executed. To change the content of this field, double-click on the **Resolution Position** field for a specific method.

Note When viewed from the ***view*** node under the application ***listener*** node, the method properties are read-only. If you want to change a method property, right-click the specific ***view*** **Node** under the **object Node**, and then left-click **Properties** on the shortcut menu. The properties on that page are read-write.

Warning The properties on an object view are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the object view to function incorrectly.

See Also

View Node (listener)

View Node (object)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Method Resolution Criteria Dialog Box (object properties)

Use the **Method Resolution Criteria** dialog to provide detailed information about a specific method on the object view.

Use this	To do this
Method	View the name of the object's method for which the method resolution criteria are being set.
Endpoint	Select the endpoints on the local environment that are available for the type of resolution specified in **Type**. All endpoints in the LE are listed and available for selection. If an endpoint selected for one resolution type is already used with another resolution type then an error message will pop up when you click **Apply**. The error message explains which object and view has this endpoint used with another resolution type.
Method resolution criteria	View a description of the behavior for the IT runtime when it resolves a request to a method. The sequence of data flow events may require the TI to send and receive various amounts of data prior to obtaining the ability to make the connection between the incoming request and the target method.
Type	Select the type of resolution to be conducted: • **Endpoint** The endpoint resolution type is simplest means of resolving a request to a method. A data stream directed to a port always executes a single method on a view. This model is considered "raw sockets," and it represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Endpoint** disables **Object Name**, **Input format** and **Output format** and clears their contents. • **Transaction Request Message (TRM)** The TRM resolution type is specific to the IBM CICS Concurrent Server model and the Microsoft variant MSLink model. It represents a double exchange sequence. The first exchange represents the transaction request, and the second exchange represents the request and reply data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Transaction Request Message (TRM)** enables **Object**, **Input format**, and **Output format**. This option is available only for TCP/IP local environment/host environment pairs. • **Enhanced Listener Message (ELM)**: • **Data** Similar to **Endpoint** in that it adds the flexibility to identify a string in the data stream directed to a port that is used to associate the request with a specific method in the view. This model is considered "raw sockets." It represents a single synchronous exchange of data. When a new view is created and associated with the HE, the method resolves to the first endpoint defined in the associated local environment. Selecting **Data** disables **Object**, **Input format**, and **Output format** and clears their contents. • **Link to Program Name:** Resolves all the methods of a new object view using the data information specified when the object view was created. When a new view is created and associated with the HE, the method resolves to the Link Tran ID field in the default HE resolution. Selecting **Link to Program Name** disables **Object**, **Input format**, and **Output format** and clears their contents. This option is available only for SNA local environment/host environment pairs. **Note** Only **TRM-MSLink** and **Link to Program Name** are available for Link methods. Methods can be defined as Link in Visual Studio by setting the **Is Link** property to **True**.
Object Name	Select the object. The list of objects is populated from the Help string in the interface definition of objects identified to the resolution handler. Microsoft provides three TRM resolution handlers: • **Microsoft HIS - TRM Handler MS Link** (default) • **Microsoft HIS - TRM Handler MSCCS** • **Microsoft HIS - TRM Handler IBMCCS**

Input format	Select the format of the data stream that represents the TRM sent by the client host application program. The list of TRM input formats is determined by the UDT) definitions in the MicrosoftTRMDef.tim file in the installation TIMLibs directory. The **Input format** box is blank by default, but three input formats are defined that match the names of the resolution handler **Object**: • **MS Link Request Format** • **IBM Listener Type 1 Request Format** • **IBM Listener Type 2 Request Format**
Output format	Select the format of the data stream that represents the reply to the TRM that was sent by the host application program. TI formats a data stream that is returned to the host client application program in the form defined by the output TRM. The list of TRM output formats is determined by the UDT definitions in the MicrosoftTRMDef.tim file. The **Output format** box is blank by default, but three output formats are defined that match the names of the resolution handler **Object**: • **MS Link Reply Format** • **IBM Listener Type 1 Reply Format** • **IBM Listener Type 2 Reply Format**
Link	View the name of the program being linked to.
Program Name	Name of the TP program.
Resolution Data	View a definition of the data used by the IT runtime when it resolves a request to a method.
Data	Type the method resolution criteria for a method on the object view. The criteria can be a maximum of 256 alpha-numeric characters. This control is enabled for resolution types **Transaction Request Message (TRM)** and **Data**. This control is disabled for resolution type **Endpoint**.
Position	Type the resolution position. The position can be a maximum of nine numeric characters. This control is enabled for resolution type **Data** and disabled for resolution types **Transaction Request Message (TRM)** and **Endpoint**.

See Also

View Node (listener)

View Node (object)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

General tab (remote environment properties)

Use the **General** tab to set the basic characteristics of the remote environment.

Use this	To do this
Type	View the type of remote environment, which describes the region on the mainframe with which your application is designed to work
Status	View the current state of the remote environment: - **Active**. The TI run-time environment accepts requests and attempts to communicate with the associated mainframe region. - **Inactive**. The TI run-time environment will not accept requests from client applications and returns an Inactive remote environment error message without attempting to communicate with the associated mainframe region. - **Disabled**.
Identifier	View the GUID for the remote environment. This identifier is useful when reviewing TI messages in the Windows Event Log.
Creator name	View the user ID of the user who created the remote environment.
Date created	View the date the remote environment was created.
Comment	Type or view a comment or description to help identify the new remote environment when its properties are displayed elsewhere in the product. You can enter up to 259 Unicode characters in this field. Useful information includes the name and location of the mainframe, and the name and telephone number of the system administrator.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Remote Environments Node

Remote Environment Node

TCP/IP tab (remote environment properties)

Use the **TCP/IP** tab to define the network characteristics that the Windows environment uses to interact with the host.

Use this	To do this
IP/DNS Address	Type the address or select one from the drop-down list. The address can be a maximum of 256 alphanumeric characters. The drop-down list displays the most recently used IP addresses.
TCP ports list	Type the TCP port number. The number can be a maximum of 256 positive numerals separated by semicolons. The port numbers cannot be repeated. The drop-down list displays the most recently used port numbers.
Time-out if no response within *number* seconds	Type the number of seconds. The send and receive time-out values are used by the WIP runtime environment when it communicates with the host environment. The time-out values are used on transport-specific APIs to terminate the receive API function when no host data or acknowledgement is received in the specified amount of time. The number of seconds can be a maximum of 3600 and a minimum of 0.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Remote Environments Node

Remote Environment Node

CICS tab (for TCP/IP properties)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

LU 6.2 tab (remote environment properties)

Use the **LU 6.2** tab to define the network characteristics that the Windows environment uses to interact with the host.

Use this	To do this
Local LU alias	Select a local LU alias from the drop-down list, or type the alias to be used by this remote environment when contacting the mainframe. Create and configure this local LU alias through SNA Management (SNA Server)/SNA Manager (Host Integration Server) before you use the remote environment. The LU identified by the alias must correspond with a VTAM independent LU on the mainframe. The alias can be a maximum of 256 alphanumeric characters. The drop-down list displays all the local APPC LUs defined to the SNA Manager.
Remote LU alias	Select a remote LU alias from the drop-down list, or type the alias to be used by this remote environment when contacting the mainframe. Create and configure this remote LU alias through SNA Management before you use the remote environment. The partner LU identified by this alias must identify the ACBNAME of the CICS region, the partner LU associated between APPCMVS and IMS to reach IMS. The alias can be a maximum of 256 alphanumeric characters. The drop-down list displays all the remote APPC LUs defined to the SNA Manager.
Mode name	Select a mode name from the drop-down list, or enter the mode name to be used by this remote environment for sessions established with the mainframe. Create and configure this mode name through Host Integration Server SNA Manager before you use the remote environment. Ensure that a compatible mode has been defined on the mainframe. You can also obtain a list of configured modes from Host Integration Server **SNA Manager**. **Note** To use two-phase commit, the APPC mode must be Sync Level 2 capable.
Supports Sync Level 2 protocols	Select this option to enable Sync Level 2 protocols for this remote environment.
Time-out in seconds	View the time-out information used by the WIP runtime environment when it communicates with the host environment. The time-out values are used on transport-specific APIs to terminate the receive API function when no host data or acknowledgement is received in the specified amount of time. When a remote environment is first created, no timeout value is specified. The TI run-time environment will wait indefinitely for the mainframe transaction program to return output parameters and simultaneously block the calling client application until this response is received. This blocking behavior is typical for APPC applications. To avoid indefinite blocking, set a timeout value in the **Receive** box.
Receive	Type the number of seconds. The number of seconds can be a maximum of 3600 and a minimum of 0.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Remote Environments Node

Remote Environment Node

CICS tab (for LU 6.2 Link properties)

Target tab (remote environment properties)

Use the **Target** tab to set the properties for the source of the captured data.

Use this	To do this
Use responses created from the test console	Select this option to specify the test console. TI initiates the TI Test console for obtaining responses for components assigned to this remote environment. Responses returned from the TI Test console are stored in the recording file associated with this remote environment. (default)
Use responses from the following remote environment	Select this option to specify a remote environment. A drop-down list appears containing all the remote environments that have the same network type, host environment, and programming model as the remote environment being defined. Responses returned from the target remote environment are stored in the recording file associated with this remote environment. If you choose this option, you must select a remote environment from the list box.
Remote environment list	Select the name of the remote environment that describes the mainframe from which you want to record responses.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Remote Environments Node

Remote Environment Node

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Recording tab (remote environment properties)

Use the **Recording** tab to set the properties for the file of captured data.

Use this	To do this
Recording selection	View information about the recording file in which the TI run-time environment stores responses for the components assigned to this remote environment.
Name	Type the name of the recording file. The file name can be a maximum of 256 alphanumeric characters. The drop-down list contains the most recently used recording files.
Browse	Launches the **Open File** dialog box for selecting a new or different recording file.
Recording information	View information about the recording.
Type	View the type of remote environment.
Last updated	View the data the remote environment was last updated.
Date created	View the date the remote environment was created.
Creator name	View the user ID of the user who created the remote environment.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Remote Environments Node

Remote Environment Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Locale tab (remote environment properties)

Use the **Locale** tab to define the computer data type characteristics used by the host that makes accepts requests from the Windows platform.

Use this	To do this
Locale	Select the language locale you want to use in selecting the code page used by the TI run-time environment.
Use default code page for the selected locale	Select this option to have TI select the default code page suitable for the specified locale. If you clear this check box, you must explicitly select the code page.
Code page	Select the code page used to transform the incoming and outgoing data to a form that can be used by the host application program.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Remote Environments Node

Remote Environment Node

Security tab (remote environment properties)

Use the **Security** tab to set the security properties of the remote environment for SNA.

Use this	To do this
Enable Single Sign-on	Select this option to require that the TI run-time environment uses Single Sign-on (SSO). Clear this option to allow TI to communicate with the mainframe region without setting user ID and password information.
Affiliate application	Select the SSO affiliate application to be queried for credentials. The list displays all the affiliate applications defined in the SSO. The display name of the affiliate application is a concatenation of the affiliate application name and description, separated by a hyphen.
COM+ Single Sign-on mapping use:	Identifies the source of the host user ID and password. **Important** This setting is for COM+ applications only. If you are using .NET applications, the credentials used by the TI runtime are the same credentials set on the IIS virtual directory where the .NET objects are stored. You can set or change the .NET credentials by using the "identity" element in the file web.config.
User credentials	Select this option to have the TI run-time environment obtain the user ID and password information associated with the user logon in which the client application is executing. **Caution** For the COM server to impersonate the security credentials of the client application, the client application must grant the COM server permission to impersonate it.
COM+ application credentials	Select this option to have the TI run-time environment obtain the user ID and password information as defined for a component's COM+ application. To administer this security information, use Component Services (COM+) in Windows Server 2003. This setting is ignored when a TI component is deployed in a COM+ application which itself is configured as a Library application (instead of a Server application) on the Activation tab of the COM+ application property sheet. A Library application runs using the Windows user credentials of the process that invoked it, and TI attempts to map this name to a corresponding host user name.
Allow application to override selected authentication	Select this option to enable the TI run-time environment to use the application override mechanism for obtaining user ID and password information. The client application must be written to support the TI security override mechanism. Clear this option to base the user ID and password solely on previously selected user or package credentials. This security option can be applied to a TI component deployed in a Library COM+ or ASP.NET application or in a Server COM+ or ASP.NET application. **Note** This option appears only if **Enable Single Sign-on** is selected.
Require client provided security	Select this option to require the client to provide the security credentials, either by using the client context or by making call-back security available. **Note** This option appears only if **Enable Single Sign-on** is cleared.
Use already verified or persistent verification authentication	Select this option to have the TI run-time environment use "Already Verified," "Persistent Verification" or "No authentication," depending on the configuration of the mainframe region. "Already Verified" sends only the user ID and no password. "Persistent Verification" sends a user ID and password on the first transaction from the given user and only the user ID thereafter. "No authentication" neither sends a user ID nor a password. The host configuration controls the actual authentication to be used when this option is enabled. In a CICS region, for example, these settings correspond to the ATTACHSEC options Identify, Persistent, and None, respectively. This security option can be applied to a TI component deployed in a Library application or in a Server application. This security option can be applied to a TI component deployed in a Library COM+ application or in a Server COM+ application.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Impersonating Client Application Security Credentials

Remote Environments Node

Remote Environment Node

Security tab (remote environment properties)

Use the **Security** tab to set the security properties of the remote environment for TCP/IP.

Use this	To do this
Enable Single Sign-on	Select this option to require that the TI run-time environment uses Single Sign-on (SSO). Clear this option to allow TI to communicate with the mainframe region without setting user ID and password information.
Affiliate application	Select the SSO affiliate application to be queried for credentials. The list displays all the affiliate applications defined in the SSO. The display name of the affiliate application is a concatenation of the affiliate application name and description, separated by a hyphen.
COM+ Single Sign-on mapping use:	Identifies the source of the host user ID and password. **Important** This setting is for COM+ applications only. If you are using .NET applications, the credentials used by the TI runtime are the same credentials set on the IIS virtual directory where the .NET objects are stored. You can set or change the .NET credentials by using the Identity tag in the file web.config.
User credentials	Select this option to have the TI run-time environment obtain the user ID and password information associated with the user logon in which the client application is executing. **Note** This setting is ignored when a TI component is deployed in a COM+ application which itself is configured as a Library application (instead of a Server application) on the Activation tab of the COM+ application property sheet. A Library application runs using the Windows user credentials of the process that invoked it, and TI attempts to map this name to a corresponding host user name. **Caution** For the COM server to impersonate the security credentials of the client application, the client application must grant the COM server permission to impersonate it.
COM+ application credentials	Select this option to have the TI run-time environment obtain the user ID and password information as defined for a component's COM+ application. To administer this security information, use Component Services (COM+) in Windows Server 2003. This setting is ignored when a TI component is deployed in a COM+ application which itself is configured as a Library application (instead of a Server application) on the Activation tab of the COM+ application property sheet. A Library application runs using the Windows user credentials of the process that invoked it, and TI attempts to map this name to a corresponding host user name.
Allow application to override selected authentication	Select this option to enable the TI run-time environment to use the application override mechanism for obtaining user ID and password information. The client application must be written to support the TI security override mechanism. Clear this option to base the user ID and password solely on previously selected user or package credentials. This security option can be applied to a TI component deployed in a Library COM+ or ASP.NET application or in a Server COM+ or ASP.NET application. **Note** This option appears only if **Enable Single Sign-on** is selected.
Require client provided security	Select this option to require the client to provide the security credentials, either by using the client context or by making call-back security available. **Note** This option appears only if **Enable Single Sign-on** is cleared.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Impersonating Client Application Security Credentials

Remote Environments Node

Remote Environment Node

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

TCP/IP Tab (remote environment properties)

Use the TCP/IP tab to set the IP address and port number for the host environment.

Use this	To do this
IP/DNS address	Type the address or select from the drop-down list. The address can be a maximum of 256 alphanumeric characters. The drop-down list displays the most recently used IP addresses.
Port list	Type the TCP port number. The number can be a maximum of 256 positive numerals separated by semicolons. The port numbers cannot be repeated. The drop-down list displays the most recently used port numbers.
Time-out in seconds	The **Send** and **Receive** time-out values are used by the TI runtime environment when it communicates with the host environment. The time-out values are used on transport-specific application program interfaces (APIs) to terminate the send and/or receive API functions if no host acknowledgement is received in the specified amount of time.
Receive	Type the number of seconds the host should wait for a response before it times out. The maximum number of seconds is 3,600; the default is **30** seconds.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Remote Environments Node

Remote Environment Node

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CICS tab (for LU 6.2 Link properties)

Use the **CICS** tab to set host-specific CICS properties.

Use this	To do this
Transaction name	Type or select the transaction name on CICS tied to CICS program DFHMIRS.
Allow use of explicit SYNCPOINT commands for non-transactional components	Select this option to allow a CICS transaction program that is accessed as a nontransactional component to call EXEC CICS SYNCPOINT and EXEC CICS SYNCPOINT ROLLBACK commands. Clear this option to make any CICS transactional component that calls SYNCPOINT commands fail with an ADPL CICS ABEND. LU 6.2 Resync services must be configured on the SNA Local LU. Enable Sync Point must be enabled on SNA Remote LU. The Mode Table associated with the call must have sync level 2 enabled. The typelib must have transaction support properly set. The AppInt .Net model doesn't support Transactional nor does AppInt Com over TCP/IP.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

CICS tab (for TCP/IP properties)LU 6.2 tab (remote environment properties)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CICS tab (for TCP/IP properties)

Use the **CICS** tab to set host-specific CICS properties.

Use this	To do this
Use IBM supplied CICS TCP/IP exit routine	When security is enabled, the default TCP/IP header contains the userid followed by the password. Selecting **Use IBM supplied CICS TCP/IP exit routine**, however, overrides the default behavior and causes the TCP/IP header to put the password before the userid.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

TCP/IP tab (remote environment properties)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IMS tab

Use the IMS tab to identify the IBM-defined exit program on the host.

Use this	To do this
ITOC information	View information about the ITOC exit name.
HWSIMSO0	Select this option to use IMS Connect with exit HWSIMSO0.
HWSIMSO1	Select this option to use IMS Connect with exit HWSIMSO1.
IMS system ID	Type the IMS system ID or select from the drop-down list. The ID can be a maximum of 8 alphanumeric characters. The drop-down list displays the most recently used IMS system IDs.
ITOC exit name	Type the ITOC exit name or select from the drop-down list. The name can be a maximum of 8 alphanumeric characters. The drop-down list displays the most recently used ITOC exit names.

> **Warning** The properties of a remote environment are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the remote environment to function incorrectly.

See Also

Remote Environments Node

Remote Environment Node

SSO tab (security policy properties)

Use the SSO tab to set the security properties of the remote environment.

Use this	To do this
SSO affiliate application	Select the SSO affiliate application to be queried for credentials. The list displays all the affiliate applications defined in the SSO. The display name of the affiliate application is a concatenation of the affiliate application name and description, separated by a hyphen.

> **Warning** The properties of a security policy are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the security policy to function incorrectly.

See Also

Security Policies Node

Security Policy Node

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General tab (object properties)

Use the **General** tab to define the basic characteristics of the object that will service requests from the Windows platform.

Use this	To do this
Object	View the ProgID that names the component. This ProgID is created by Visual Studio in Host Integration Server (Designer in SNA Server) using the type library name, the interface name, and the version information given for the component.
Type	View the type of remote environment for which this component is designed. This type is specified in Visual Studio when the component's type library is created. **Note** You cannot change the type of an object.
Description	View the component description entered in Visual Studio when the component's type library was created.
File	View the name of the component library.
CLSID	View the CLSID that uniquely identifies the component.
Comment	Type a comment that provides additional information about the use of the object. The comment can be a maximum of 259 Unicode characters.

> **Warning** The properties on an object are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the object to function incorrectly.

See Also

Objects Node (WIP)

Object Node (WIP)

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Hosting tab (COM object properties)

Use the **Hosting** tab to set the hosting properties of the object.

Use this	To do this
COM+ application	Select a COM application. This list is populated by enumerating the COM+ applications on the local computer.
Virtual directory	Select an IIS virtual directory. This list is populated by enumerating the IIS Virtual Directories on the local computer.

> **Warning** The properties on an object are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the object to function incorrectly.

See Also

Objects Node (WIP)

Object Node (WIP)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Hosting tab (.NET object properties)

The **Hosting** tab allows you to set the hosting properties of the object.

Use this	To do this
.NET assembly	Select a .NET assembly. This list is populated by enumerating the .NET assemblies on the local computer.
Virtual directory	Select an IIS virtual directory. The list is populated from enumerating the IIS Virtual Directories on the local computer.
Key file for proxy	Select the key (.snk) file that TI Manager uses to sign the proxy in the IIS virtual directory. The list is populated with files used previously.

> **Warning** The properties on an object are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the object to function incorrectly.

See Also

Objects Node (WIP)

Object Node (WIP)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Remote Environment tab (object properties)

Use the **Remote Environment** tab to set the remote environment properties of the object.

Use this	To do this
Remote environment	View the name of the remote environment to which this object is assigned. This list is populated by the remote environments already defined and that agree in network type, host environment and programming model. You can select a different remote environment for this object.

> **Warning** The properties on an object are not intended to be set or changed programmatically. Setting or changing the properties programmatically might cause the object to function incorrectly.

See Also

Objects Node (WIP)

Object Node (WIP)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Data Integration Help

Use the topics in this section to navigate through the Data Integration User Interface. Click a topic below for more information.

Data Source Wizard

Data User Interface Elements

Configuring a Data Source

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Data Source Wizard

This Wizard guides you through the configuration process. The Wizard dynamically adapts to both DB2 and VSAM data sources, and displays the appropriate screens.

Welcome Screen

Click **Next** to continue.

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Data Source Screen

Data source platform

Select the appropriate platform from the dropdown list.

Network type

Select either TCP/IP or SNA LU 6.2 (APPC).

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TCP/IP Network Connection Screen

Address or alias

When TCP/IP Connection is selected as the network transport, this field indicates the IP address of the host DB2 server.

Port

When TCP/IP Connection is selected as the network port, this field indicates the TCP/IP port used for communication with the target DB2 DRDA service. The default is **IP port 446**.

Distributed transactions

When this option is checked, two-phase commit (distributed unit of work) is enabled. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the HIS TCP/IP Resync service.

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APPC Network Connection Screen

Local LU alias

When APPC Connection is selected, this field is the name of the local LU alias configured in Microsoft® Host Integration Server 2004.

Remote LU alias

When APPC Connection is selected, this field is the name of the remote LU alias configured in Host Integration Server 2004.

Mode name

When APPC Connection is selected, this field is the APPC mode and must be set to a value that matches the host configuration and SNA Server configuration.

Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bi-directional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security).

The default is typically QPCSUPP.

Distributed transactions

When this option is checked, two-phase commit (distributed unit of work) is enabled. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync service. This option works only with DB2 for OS/390 v5R1 or later.

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DB2 Database Screen

Initial catalog

This field is the first entry in the Database section of the Connection properties.

This OLE DB property is used as the first part of a 3-part fully qualified table name.

In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 installation manual.

In DB2/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, one can be created using the Add option.

In DB2 Universal Database, this property is referred to as DATABASE.

If the provider supports changing the catalog for an initialized data source, the consumer can specify a different catalog name through the DBPROP_CURRENTCATALOG property in the DBPROPSET_DATASOURCE property set after initialization.

This is a required parameter.

This parameter is equivalent to the DBPROP_INIT_CATALOG OLE DB property ID.

Package collection

The name of the DRDA target collection (AS/400 library) where the Microsoft DAT should store and bind DB2 packages. This could be same as the Default Schema.

The DAT will create packages dynamically in the location to which the user points using the Package Collection parameter. By default, the DAT will automatically create one package in the target collection, if one does not exist, at the time the user issues their first SQL statement. The package is created with GRANT EXECUTE authority to a single <AUTH_ID> only, where AUTH_ID is based on the User ID value configured in the data source. The package is created for use by SQL statements issued under the same isolation level based on the Isolation Level value configured in the data source.

A problem can arise in multi-user environments. For example, if a user specifies a Package Collection value that represents a DB2 collection used by multiple users, but this user does not have authority to GRANT execute rights to the packages to other users (for example, PUBLIC), the package is created for use only by this user. This means that other users may be unable to access the required package. The solution is for an administrative user, with package administrative rights (for example, PACKADM authority in DB2 for OS/390), to create a set of packages for use by all users.

Default schema

The name of the Collection where the DAT looks for catalog information. The Default Schema is the "SCHEMA" name for the target collection of tables and views. The DAT uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection.

For DB2, the Default Schema is the target AUTHENTICATION (User ID or "owner").

For DB2/400, the Default Schema is the target COLLECTION name.

For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name.

If the user does not provide a value for Default Schema, the OLE DB Provider uses the USER_ID provided at logon. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. This default is inappropriate in many cases, therefore it is essential that the Default Schema value in the data source be defined.

This parameter is equivalent to the DBPROP_DB2OLEDB_DEFAULTSCH OLE DB property ID.

Default qualifier

The name of the schema (collection/owner) with which to fully qualify unqualified object names. This attribute allows the user to access database objects without fully-qualifying the objects using a collection (schema) qualifier. The DAT sends this value to DB2 using a SET CURRENT SQLID statement, instructing the DBMS to use this value when locating unqualified objects (for example, tables and views) referenced in SQL statements. If you do not set a value for default qualifier, no SET statement is issued by the DAT. This OLE DB property is only valid when connecting to DB2 for MVS (OS/390, z/OS).

Mainframe File System (VSAM) Screen

Host column description file

The fully qualified file name of the Distributed Data Management (DDM) host column description (HCD) file. This parameter can be an UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the system directory where the Host Integration Server 2004 server or client software was installed. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400.

This parameter is equivalent to the DBPROP_SNAOLEDB_HCDPATH OLE DB property ID.

AS/400 File System Screen

Location

The remote database name used for connecting to OS/400 systems. In DB2/400, this property is referred to as RDBNAM.

This parameter is not used when connecting to mainframe systems.

Default library

This parameter indicates the default AS/400 library to be accessed. This parameter is not required for mainframe access and is optional when connecting to AS/400 files.

This parameter is equivalent to the DBPROP_SNAOLEDB_LIBRARY OLE DB property ID.

Host column description file

The fully qualified file name of the Distributed Data Management (DDM) host column description (HCD) file. This parameter can be an UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the system directory where the Host Integration Server 2004 server or client software was installed. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400.

This parameter is equivalent to the DBPROP_SNAOLEDB_HCDPATH OLE DB property ID.

Adding a column

This command displays the Column Dialog box. You can also access this dialog box by selecting a column and clicking **Properties** from the context-sensitive menu.

To add a column

1. In the **Data Source Browser** window, click the **Action** menu.
2. Click **Add Column**. The **Column properties: General tab** appears.
3. Enter the **Name**, **Alias**, and **Comment** (optional). For more information on these properties, click the **Help** button. When you are finished, click **Apply**.
4. Click the **Host tab**. Select the appropriate **Type** and **CCSID**, and enter the **Length**, **Precision**, and **Scale**. For more information on these properties, click the **Help** button. When you are finished, click **Apply**.
5. Click the **Local tab**. Select the **Type** and check **Use qualifier** if appropriate. For more information on these properties, click the **Help** button. When you are finished, click **OK**.

Column properties: General

Name

The name of the column.

Alias

The alias for the column.

Comment

A comment (optional).

Column properties: Host

Type

The host data type, which determines how data is stored on the host.

CCSID

The character code set identifier (CCSID) matching the DB2 data as represented on the remote host computer. The CCSID property is required when processing binary data as character data. Unless the **Process Binary as Character** value is set to true, character data is converted based on the DB2 column CCSID and default ANSI code page.

This parameter defaults to U.S./Canada (37).

This parameter is equivalent to the DBPROP_DB2OLEDB_HOSTCCSID OLE DB property ID.

Length

The length of the data type on the host.**Precision**

The precision (or number of digits in a numeric type), of the data type on the host.

Scale

The scale (or number of decimal digits in a numeric type), of the data type on the host.Column properties: Local

Type

The data type presented (such as DBTYPE_STR). Data conversions take place from the host type to the local type.

Use qualifier

Determines whether or not a qualifier is to be used.

Table properties

Name

Type a name for your table.

Use table for file transfer

Selecting this option allows you to enter additional fields for your table, below.

Field delimiter

Enter the field delimiter for your table.

Record delimiter

Enter the record delimiter for your table.

Text qualifier

Enter the text qualifier for you table.

File creation type

Select Direct, Sequential, or Indexed from the list.

Sort

If you selected a File Creation Type of Indexed, you have the option of sorting in either Ascending or Descending order.

Key position

If you selected a File Creation Type of Indexed, you have the option of specifying a key position.

Key length

If you selected a File Creation Type of Indexed, you have the option of specifying a key length.

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http://go.microsoft.com/fwlink/?linkid=29507.

Options property page

The Data Access Tool configures the following default values at installation.

Files	Location
OLE DB UDL files	C:\My Documents\Host Integration Projects\Data Sources\
ODBC File DSNs	C:\Program Files\Common Files\ODBC\Data Sources
Host column description files	C:\My Documents\Host Integration Projects\Data Descriptions

Click any of the **Browse** buttons to select a new directory.

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DB2 Locale Screen

Host CCSID

The character code set identifier (CCSID) matching the DB2 data as represented on the remote host computer. The CCSID property is required when processing binary data as character data. Unless the **Process Binary as Character** value is set to true, character data is converted based on the DB2 column CCSID and default ANSI code page.

This parameter defaults to U.S./Canada (37).

This parameter is equivalent to the DBPROP_DB2OLEDB_HOSTCCSID OLE DB property ID.

PC code page

This parameter indicates the code page to be used on the personal computer for character code conversion. This parameter is required when processing binary data as character data. Unless the **Process Binary as Character** checkbox is selected (value is set to true), character data is converted based on the default ANSI code page configured in Windows.

This parameter defaults to Latin 1 (1252).

This parameter is equivalent to the DBPROP_DB2OLEDB_PCCODEPAGE OLE DB property ID.

Process binary as character

When this option is checked, it indicates that binary data fields should be processed as characters. This option treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters.

This parameter is equivalent to the DBPROP_DB2OLEDB_BINASCHAR OLE DB property ID.

Mainframe and AS/400 Locale Screen

Host CCSID

The character code set identifier (CCSID) matching the DB2 data as represented on the remote host computer. The CCSID property is required when processing binary data as character data. Unless the **Process Binary as Character** value is set to true, character data is converted based on the DB2 column CCSID and default ANSI code page.

This parameter defaults to U.S./Canada (37).

This parameter is equivalent to the DBPROP_DB2OLEDB_HOSTCCSID OLE DB property ID.

PC code page

This parameter indicates the code page to be used on the personal computer for character code conversion. This parameter is required when processing binary data as character data. Unless the **Process Binary as Character** checkbox is selected (value is set to true), character data is converted based on the default ANSI code page configured in Windows.

This parameter defaults to Latin 1 (1252).

This parameter is equivalent to the DBPROP_DB2OLEDB_PCCODEPAGE OLE DB property ID.

Process binary as character

When this option is checked, it indicates that binary data fields should be processed as characters. This option treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters.

This parameter is equivalent to the DBPROP_DB2OLEDB_BINASCHAR OLE DB property ID.

Security Screen

Interactive sign-on

Authentication to a data source can be done using interactive sign-on or single sign-on. For interactive sign-on, the user name and password must match host credentials.

User name

A valid user name and password are normally required to access data sources on a host. These values are case-sensitive. Do not check the **Single Sign-On** option if a specific user name and password are to be entered.

Password

A valid user name and password are normally required to access data sources on hosts. These values are case-sensitive.

Allow saving password

You have the option of saving the password in the .udl file by clicking this check box. Users and administrators should be warned that this option saves the authentication information (password) in plain text within the .udl file. For security purposes, however, it is strongly recommended that you set these properties manually, instead of using a .udl. Note that if you select this option when using the ODBC Driver for DB2, and then uninstall and reinstall Host Integration Server 2004, the password will be erased.

Single sign-on

Select this checkbox to enable using the Host Integration Security features providing a single-sign-on to access this data source.

When this checkbox is selected, the **User name** and **Password** fields are dimmed and become inaccessible. The user name and password fields are set based on the Windows 2000 logon.

When this checkbox is not selected, the **User name** and **Password** fields must normally contain appropriate values to access data sources on hosts.

Affiliate Application

If you selected Single Sign-On, choose an Affiliate Application from the list. The Enterprise Single Sign-On (SSO) Affiliate applications are logical entities that represent a system or sub-system such as a host, back-end system, or line of business application to which you are connecting using SSO. An affiliate application can represent a back-end system such as a mainframe or UNIX computer. It can also represent an application such as SAP, or a subdivision of the system, such as the "Benefits" or "Pay stub" sub-systems.

DB2 Validation Screen

Use this screen to validate your configuration.

Click **Connect** to perform a test connection.

Click **Packages** to create the DB2 packages required for executing SQL statements.

Click **Sample Query** to retrieve a list of tables in the default database collection.

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Mainframe and AS/400 Validation Screen

Use this screen to validate your configuration.

Click **Mainframe** to test the connection to the mainframe or AS/400 system.

Click **Sample Query** retrieves a list of files in the default library.

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DB2 Saving Information Screen

Use this screen to name and save your configuration.

Data source name

Enter a name of your choice. This name is used when saving the data source configuration to one or more data source types.

OLE DB or Managed group, **ODBC** group

Make the appropriate selection(s) for your data source.

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Mainframe and AS/400 Saving Information Screen

Use this screen to name and save your configuration.

Data source name

Enter a name of your choice. This name is used when saving the data source configuration to one or more data source types.

Universal data link and **Initialization string file**

Make the appropriate selection(s) for your data source.

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Advanced Options Screen

The settings on this screen are optional.

Connection pooling

Selecting this option will cache connections for reuse.

Cache authentication

This parameter determines whether the OLE DB Provider for AS/400 and VSAM caches authentication information, such as a password, in an internal cache. This parameter is not currently supported by the OLE DB Provider for AS/400 and VSAM and defaults to false.

This parameter is equivalent to the DBPROP_CACHE_AUTHINFO OLE DB property ID.

Mode (Read/ReadWrite)

Determines whether the connection is read-only, or if it allows modifications to the database.

Repair host keys

This parameter provides for repair of invalid key offsets received from OS/400 when keys have been defined using the DDS "RENAME" clause. This parameter indicates whether the OLE DB provider should repair any host key values set in the registry.

This parameter defaults to false. This parameter is equivalent to the DBPROP_SNAOLEDB_REPAIRKEY OLE DB property ID.

Read only

Selecting this option prevents a data source from being updated.

Alternate TP Name

This is the transaction program name on a DB2 DRDA application server.

Strict Validation

Select this option if desired.

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Finish Screen

This screen displays a summary and status of your configuration. Click **Finish** to implement your actions.

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Data User Interface Elements

The topics in this section describe the elements in the Data Integration User Interface.

Data Source Browser

The Data Source Browser is the window where you configure and manage your data sources.

The window is divided into three parts: a tree view containing the data sources and data descriptions, a list view containing details of a selected node, and a result view containing the text results of an action (such as a package creation).

The procedures in the following topics describe how to manage data. Many commands are also accessible through a context-sensitive menu which appears when you right-click any section of the Browser window. In addition, the F5 key refreshes the tree view, the Delete key deletes the currently selected item, and the F1 key opens the online Help.

Data Source Folder

This folder contains data sources and groups of data sources.

Data Source Item

Right-clicking a data source allows you to view, edit, test, delete, or rename it.

Data Descriptions Folder

This folder displays the names of all configured data descriptions. Click the individual files to view their properties.

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Data Description File

Right-click a data description to view its properties, or to edit or delete the file.

Data Description Table

A Data description table contains the meta-data describing a file or table on a mainframe, AS/400, or System 36 file system. A table description holds information about the various columns in that table.

Data description tables are stored in “Host Column Description” files and can be found under the “Host Column Descriptions” folder in the DAT browser.

Data Description Column

A Data description column contains the meta-data describing a field or column of a mainframe, AS/400, or System 36 file system table or file. This meta-data includes the column name, its host type, and its local type.

Data description columns are stored in “Host Column Description” files and can be found under the “Host Column Descriptions” folder in the DAT browser.

Table Properties

Displays the properties for the selected table.

Configuring a Data Source

The following sections contain information on configuring a data source.

Configuring a Data Source for OLE DB Provider for AS/400 and VSAM

Configuring a Data Source for OLE DB Provider for DB2

Configuring a Data Source for the ODBC Driver for DB2

Configuring a Data Source for OLE DB Provider for AS/400 and VSAM

You must configure data source information for each AS/400 or mainframe system data source object that is to be accessed using OLE DB Provider for AS/400 and VSAM. The default parameters for OLE DB Provider for AS/400 and VSAM are used only when these parameters are not configured for each data source.

Microsoft Data Link, a core element of Microsoft Data Access Components (MDAC), provides a uniform method for creating file-persistent OLE DB data source object definitions in the form of universal data link (.udl) files. The Data Source Wizard in the new Microsoft Data Access Tool can help to define UDL files. OLE DB consumer applications, such as Data Transformation Services in Microsoft SQL Server can use the UDL files to connect to IBM data sources, such as DB2 and the mainframe file system.

To configure a data source for OLE DB Provider for AS/400 or VSAM

You must create a data link to configure parameters for your OLE DB data source. You can create a new data link by clicking the shortcut in the Host Integration Server 2004 program folder.

The properties of a universal data link file can be edited by opening the file from Windows Explorer.

The **Provider** tab allows you to select the OLE DB provider (the provider name string) to be used in this .udl file from a list of possible OLE DB providers. Choose **Microsoft OLE DB Provider for AS/400 and VSAM**.

The **Connection** tab allows you to configure the basic properties required to connect to a data source. For **OLE DB Provider for AS/400 and VSAM**, the connection properties include the following values:

Property	Description
Data Source	This is an optional parameter that can be used to describe the data source.
Network	This drop-down list allows selecting the type of network connection to be used. The options are **TCP/IP Connection** or **SNA Connection**. If **TCP/IP Connection** is selected, click **More Options**, to open a dialog box for configuring TCP/IP network settings. The parameters you can configure include the IP address of the remote host (or a hostname alias for this computer) and the Network Port (TCP/IP port) used for communication with the host. The default value for the Network Port is 446. The IP address of the host has no default value. If **SNA Connection** is selected (using LU 6.2), click **More Options** to open a dialog box for configuring SNA network settings. The parameters you can configure include: the APPC local LU alias, the APPC remote LU alias, and the APPC mode used for communication with the host. The default value for the APPC mode normally defaults to QPCSUPP. The local and remote LU alias fields do not have default values.
Single sign-on	This option button, also known as a radio button, enables using the Host Integration Security features providing a single sign-on to access this OLE DB data source. When this option button is selected, the **User name** and **Password** fields are dimmed and become inaccessible. The **User name** and **Password** fields are set based on the Windows logon values. When this option button is not selected, the **User name** and **Password** fields normally contain appropriate values to access data sources on hosts.
User name	A valid user name and password are normally required to access data sources on hosts. These values are case-sensitive. The user must click the option button that requires a specific user name and password to be entered.
Password	A valid user name and password are normally required to access data sources on hosts. These values are case-sensitive. The user will need to clear the **Blank password** check box, if it is selected to enter a password. Optionally, the user can choose to save the password in the .udl file by clicking the **Allow saving password** check box. Users and administrators should be warned that this option persists the authentication information in plain text within the .udl file.
Location	The remote database name used for connecting to OS/400 systems. In DB2/400, this property is referred to as RDBNAM. This parameter is not used when connecting to mainframe systems.

Default Library	This parameter indicates the default AS/400 library to be accessed. This parameter is not required for mainframe access and is optional when connecting to AS/400 files. This parameter is equivalent to the DBPROP_SNAOLEDB_LIBRARY OLE DB property ID.
Host Column Description File	The fully qualified file name of the Distributed Data Management (DDM) host column description (HCD) file. This parameter can be an UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the system directory where the Host Integration Server 2004 server or client software was installed. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400. This parameter is equivalent to the DBPROP_SNAOLEDB_HCDPATH OLE DB property ID.

The **Connection** tab also includes a **Test Connection** button that can be used to test the connection parameters. The connection can only be tested after all of the required parameters are entered. When this button is selected, a session will be established to the host computer using OLE DB Provider for AS/400 and VSAM.

The **Advanced** tab exposes OLE DB standard properties. For **OLE DB Provider for AS/400 and VSAM**, the advanced properties include the following values:

Property	Description
Host CCSID	The character code set identifier (CCSID) matching the DB2 data as represented on the remote host computer. The CCSID property is required when processing binary data as character data. Unless the **Process Binary as Character** value is set to true, character data is converted based on the DB2 column CCSID and default ANSI code page. This parameter defaults to U.S./Canada (37). This parameter is equivalent to the SNAOLEDB_HOSTCCSID OLE DB property ID.
PC Code Page	The *PC Code Page* parameter indicates the code page to be used on the personal computer for character code conversion. This parameter is required when processing binary data as character data. Unless the **Process Binary as Character** checkbox is selected (value is set to true), character data is converted based on the default ANSI code page configured in Windows. This parameter defaults to Latin 1 (1252). This parameter is equivalent to the DBPROP_DB2OLEDB_PCCODEPAGE OLE DB property ID.
Read only	When the *Read Only* parameter is checked in the **Advanced** tab, the OLE DB Provider for AS/400 and VSAM creates a read-only data source by setting the *Mode* parameter to Read (DB_MODE_READ). A user has read access to files and cannot do update operations.
Repair Host Keys	This parameter provides for repair of invalid key offsets received from OS/400 when keys have been defined using the DDS "RENAME" clause. This parameter indicates whether the OLE DB provider should repair any host key values set in the registry. This parameter defaults to false. This parameter is equivalent to the DBPROP_SNAOLEDB_REPAIRKEY OLE DB property ID.
Process Binary as Character	When this option is checked (property is set to true), the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This parameter defaults to false. This parameter is equivalent to the SNAOLEDB_BINASCHAR OLE DB property ID.

The **All** tab allows you to configure additional properties used to connect to a data source. Some of the properties in the **All** tab are required. These properties can be edited by selecting a property from the displayed list and selecting **Edit Value**. For Microsoft OLE DB Provider for AS/400 and VSAM, these properties include the following values:

Property	Description
APPC Local LU Alias	The name of the local LU alias configured in the Host Integration Server 2004 computer. This parameter is equivalent to the DBPROP_SNAOLEDB_LOCALLU OLE DB property ID.

APPC Mode Name	When LU 6.2 (SNA) is selected for the Network Transport Library, this field is the APPC mode and must be set to a value that matches the host configuration and Host Integration Server 2004 computer configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bi-directional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This parameter normally defaults to QPCSUPP. This parameter is equivalent to the DBPROP_SNAOLEDB_APPCMODE OLE DB property ID.
APPC Remote LU Alias	When LU 6.2 (SNA) is selected for the Network Transport Library, this field is the name of the remote LU alias configured in the Host Integration Server 2004 computer. This parameter is equivalent to the DBPROP_SNAOLEDB_LOCALLU OLE DB property ID.
Cache Authentication	This parameter determines whether the OLE DB Provider for AS/400 and VSAM caches authentication information, such as a password, in an internal cache. This parameter is not currently supported by the OLE DB Provider for AS/400 and VSAM and defaults to false. This parameter is equivalent to the DBPROP_CACHE_AUTHINFO OLE DB property ID.
Connection Timeout	The amount of time (in seconds) to wait for initialization to complete. This parameter is not currently supported by the OLE DB Provider for AS/400 and VSAM and defaults to 0. This parameter is equivalent to the DBPROP_INIT_TIMEOUT OLE DB property ID.
Data Source	This is an optional parameter that can be used to describe the data source. This parameter is equivalent to the DBPROP_INIT_DATASOURCE OLE DB property ID.
Default Library	This parameter indicates the default AS/400 library to be accessed. This parameter is not required for mainframe access and is optional when connecting to AS/400 files. This parameter is equivalent to the DBPROP_SNAOLEDB_LIBRARY OLE DB property ID.
Encrypt Password	This parameter determines whether special security mechanisms are used to ensure password privacy. This parameter is not currently supported by the OLE DB Provider for AS/400 and VSAM and defaults to false. This parameter is equivalent to the DBPROP_AUTH_ENCRYPT_PASSWORD OLE DB property ID.
Extended Properties	This parameter is a string containing provider-specific, extended connection information. Properties passed through this parameter should be delimited by semicolons and are interpreted by the OLE DB provider's underlying network client. The use of this property implies that the OLE DB consumer knows how this string will be interpreted and used by the OLE DB provider. This parameter should be used only for provider-specific connection information that cannot be explicitly described through the other property parameters. This parameter is equivalent to the DBPROP_INIT_PROVIDERSTRING OLE DB property ID.
Host CCSID	The character code set identifier (CCSID) matching the data as represented on the host. The CCSID property is required when processing binary data as character data. Unless the **Process Binary as Character** value is set, character data is converted based on the host column CCSID and default ANSI code page. This parameter defaults to U.S./Canada (37). This parameter is equivalent to the DBPROP_SNAOLEDB_HOSTCCSID OLE DB property ID.
Host Column Description File	The fully qualified file name of the Distributed Data Management (DDM) host column description (HCD) file. This parameter can be an UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the system directory where the Host Integration Server 2004 Server or Client software was installed. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400. This parameter is equivalent to the DBPROP_SNAOLEDB_HCDPATH OLE DB property ID.

Impersonation Level	This parameter indicates the level of impersonation that the server is allowed to use when impersonating the client computer. This property applies only to network connections other than remote procedure call (RPC) connections; these impersonation levels are similar to those provided by RPC. The values of this property correspond directly to the levels of impersonation that can be specified for authenticated RPC connections, but can be applied to connections other than authenticated RPC. This parameter can be set to one of the following values: Anonymous — The client computer is anonymous to the server. The server process cannot obtain identification information about the client computer and cannot impersonate the client computer. Delegate — The process can impersonate the client's security context while acting on behalf of the client. The server process can also make outgoing calls to other servers while acting on behalf of the client. Identity — The server can obtain the client's identity. The server can impersonate the client computer for access control list (ACL) checking, but cannot access system objects as the client computer. Impersonate — The server process can impersonate the client's security context while acting on behalf of the client computer. This information is obtained when the connection is established, not on every call. This parameter defaults to Impersonate. This parameter is equivalent to the DBPROP_INIT_IMPERSONATION_LEVEL OLE DB property ID.
Integrated Security	This parameter is a string containing the name of the authentication service used by the server to identify the user using the identity provided by an authentication domain. For example, for Microsoft® Windows 2000 Integrated Security, this is Security Support Provider Interface (SSPI). If this parameter is a null pointer, the default authentication service should be used. When this property is used, no other DBPROP_AUTH* properties are needed and, if provided, their values are ignored. This parameter is equivalent to the DBPROP_AUTH_INTEGRATED OLE DB property ID.
Locale Identifier	This parameter specifies the locale to be used. This parameter is not supported by the OLE DB Provider for AS/400 and VSAM and defaults to 437. This parameter is equivalent to the DBPROP_INIT_LCID OLE DB property ID.
Location	This parameter indicates the remote database name used for connecting to OS/400 systems. In DB2/400, this property is referred to as RDBNAM. This parameter is not used when connecting to mainframe systems. This parameter is equivalent to the DBPROP_INIT_LOCATION OLE DB property ID.
Mask Password	This parameter indicates whether the password should be sent to the data source or enumerator in a masked form. This parameter is not supported by the OLE DB Provider for AS/400 and VSAM and defaults to false. This parameter is equivalent to the DBPROP_AUTH_MASK_PASSWORD OLE DB property ID.
Mode	After a connection is established, this parameter represents a bit mask of the access permissions that will be applied to the data file. As implemented by the OLE DB Provider for AS/400 and VSAM, access permissions apply to host file locks and do not apply to record locks. The allowable values include the following: Read, ReadWrite, Share Deny None, Share Deny Read, Share Deny Write, Share Exclusive, and Write. This parameter can be a combination of zero or more of the following: DB_MODE_READ — Read-only. DB_MODE_WRITE — Write-only. DB_MODE_READWRITE — Read/write (DB_MODE_READ | DB_MODE_WRITE). DB_MODE_SHARE_DENY_READ — Prevents others from opening in read mode. DB_MODE_SHARE_DENY_WRITE — Prevents others from opening in write mode. DB_MODE_SHARE_EXCLUSIVE — Prevents others from opening in read/write mode (DB_MODE_SHARE_DENY_READ | DB_MODE_SHARE_DENY_WRITE). DB_MODE_SHARE_DENY_NONE — Neither read nor write access can be denied to others. This parameter is equivalent to the DBPROP_INIT_MODE OLE DB property ID.

Network Address	When TCP/IP has been selected for the Network Transport Library, this parameter is used to locate the target host computer. This parameter indicates the IP address or TCP/IP host name alias associated with the DDM server on the host. The network address is required when connecting through TCP/IP. This parameter is equivalent to the DBPROP_SNAOLEDB_NETADDRESS OLE DB property ID.
Network Port	When TCP/IP has been selected for the Network Transport Library, this parameter is used to locate the target DDM service access port when connecting through TCP/IP. This parameter represents the TCP/IP port used for communication with the DDM service on the host. The default value is TCP/IP port 446. This parameter is equivalent to the DBPROP_SNAOLEDB_NETPORT OLE DB property ID.
Network Transport Library	This parameter, which represents the dynamic-link library used for transport, designates whether the OLE DB provider connects through SNA LU 6.2 or TCP/IP for network communication. The possible values for this parameter are TCPIP or SNA. If TCPIP is selected, then values for Network Address and Network Port are required. TCP/IP connectivity to the mainframe is not supported by the OLE DB Provider for AS/400 and VSAM. If SNA is selected, then values for APPC Local LU Alias, APPC Mode Name, and APPC Remote LU Alias are required. This value defaults to SNA. This parameter is equivalent to the DBPROP_SNAOLEDB_NETTYPE OLE DB property ID.
Password	A valid user name and password are normally required to access data sources on hosts. The password is case-sensitive and is shown as asterisks in this dialog box for security purposes. Optionally, you can choose to save the password in the .udl file by clicking the **Allow saving password** check box. Users and administrators should be warned that this option persists the authentication information in plain text within the .udl file. This parameter is equivalent to the DBPROP_AUTH_PASSWORD OLE DB property ID.
PC Code Page	This parameter indicates the code page used for character code conversion. This property is required when processing binary data as character data. Unless the **Process Binary as Character** value is set, character data is converted based on the default ANSI code page configured in the Windows operating system. If this parameter is set to **Binary** or **65535**, then no character code conversions take place. This parameter defaults to Latin 1 (1252). This parameter is equivalent to the DBPROP_SNAOLEDB_PCCODEPAGE OLE DB property ID.
Persist Security Info	This parameter indicates whether the data source object is allowed to persist sensitive authentication information such as a password along with other authentication information. Optionally, a user can choose to save the password in the .udl file by clicking the **Allow saving password** check box. Users and administrators should be warned that this option persists the authentication information in plain text within the .udl file. This parameter defaults to false. This parameter is equivalent to the DBPROP_AUTH_PERSIST_SENSITIVE_AUTHINFO OLE DB property ID.
Process Binary as Character	This parameter indicates whether to **Process Binary as Character** fields (CCSID of 65535) as character data type fields on a per data source basis. The **Host CCSID** and **PC Code Page** values are required input parameters when this parameter is true. The default for this parameter is false. Do not process binary fields as character fields. This parameter is equivalent to the DBPROP_SNAOLEDB_BINASCHAR OLE DB property ID.

Protection Level	This parameter indicates the level of protection of data sent between client computer and server. The values of this property correspond directly to the levels of protection that can be specified for authenticated RPC connections. This parameter can be set to one of the following values: DB_PROT_LEVEL_NONE — Performs no authentication of data sent to the server. DB_PROT_LEVEL_CONNECT — Authenticates only when the client computer establishes the connection with the server. DB_PROT_LEVEL_CALL — Authenticates the source of the data at the beginning of each request from the client computer to the server. DB_PROT_LEVEL_PKT — Authenticates that all data received is from the client computer. DB_PROT_LEVEL_PKT_INTEGRITY — Authenticates all data received is from the client computer and that it has not been changed in transit. DB_PROT_LEVEL_PKT_PRIVACY — Authenticates all data received is from the client computer, that it has not been changed in transit, and protects the privacy of the data by encrypting it. This parameter is not supported by the OLE DB Provider for AS/400 and VSAM and defaults to the connect level of protection. This parameter is equivalent to the DBPROP_INIT_PROTECTION_LEVEL OLE DB property ID.
Read only	When the *Read Only* parameter is checked in the Advanced tab, the OLE DB Provider for AS/400 and VSAM creates a read-only data source by setting the *Mode* parameter to Read (DB_MODE_READ). A user has read access to files and cannot do update operations.
Repair Host Keys	This parameter provides for repair of invalid key offsets received from OS/400 when keys have been defined using the DDS "RENAME" clause. This parameter indicates whether the OLE DB provider should repair any host key values set in the registry. This parameter defaults to false. This parameter is equivalent to the DBPROP_SNAOLEDB_REPAIRKEY OLE DB property ID.
Strict Validation	This parameter indicates whether strict validation should be used and defaults to false. This parameter is equivalent to the DBPROP_SNAOLEDB_STRICTVAL OLE DB property ID.
User ID	A valid user name is normally required to access data sources on hosts. This value is case-sensitive. This parameter is equivalent to the DBPROP_AUTH_USERID OLE DB property ID.

Configuring a Data Source for OLE DB Provider for DB2

You must configure data source information for each host data source object that is to be accessed using OLE DB Provider for DB2. The default parameters for OLE DB Provider for DB2 are used for the data source only when these parameters are not configured for each Data Source.

Microsoft Data Link, a core element of Microsoft Data Access Components (MDAC), provides a uniform method for creating file-persistent OLE DB data source object definitions in the form of universal data link (.udl) files. The Data Source Wizard in the new Microsoft Data Access Tool can help to define UDL files. OLE DB consumer applications, such as Data Transformation Services in Microsoft SQL Server can use the UDL files to connect to IBM data sources, such as DB2 and the mainframe file system.

You must create a data link to configure parameters for your OLE DB data source. You can create a new data link by clicking the shortcut in the Host Integration Server 2004 program folder.

The properties of a data link file can be edited by opening the file from Windows Explorer.

With the **Provider** tab you can select the OLE DB provider (the provider name string) to be used in this .udl file from a list of possible OLE DB providers. Choose **Microsoft OLE DB Provider for DB2**.

The **Connection** tab enables you to configure the basic properties required to connect to a data source. For the Microsoft OLE DB Provider for DB2, the connection properties include the following values:

Property	Description
Data Source	The data source is an optional parameter that can be used to describe the data source.
Network	This drop-down list box allows selecting the type of network connection to be used. The allowable options are **TCP/IP Connection** or **SNA Connection**. If **TCP/IP Connection** is selected, click **More Options**, to open a dialog box for configuring TCP/IP network settings. The parameters you can configure include the IP address of the DB2 host (or a hostname alias for this computer) and the Network Port (TCP/IP port) used for communication with the host. The default value for the Network Port is 446. The IP address of the host has no default value. If **SNA Connection** is selected (using LU 6.2), click **More Options** to open a dialog box for configuring SNA network settings. The parameters you can configure include: the APPC local LU alias, the APPC remote LU alias, and the APPC mode used for communication with the host. The default value for the APPC mode normally defaults to QPCSUPP. The local and remote LU alias fields do not have default values.
Single sign-on	Select this checkbox to enable using the Host Integration Security features providing a single-sign-on to access this OLE DB data source. When this checkbox is selected, the **User name** and **Password** fields are dimmed and become inaccessible. The user name and password fields are set based on the Windows 2000 logon. When this checkbox is not selected, the **User name** and **Password** fields must normally contain appropriate values to access data sources on hosts.
User name	A valid user name and password are normally required to access data sources on a host. These values are case-sensitive. Users must not check the **Single sign-on** option if a specific user name and password are to be entered.
Password	A valid user name and password are normally required to access data sources on hosts. These values are case-sensitive. The **Blank password** checkbox is only applicable for a Test Connection. To enter a password, the user will need to clear the **Blank password** check box, if it is checked. If **Blank password** is checked, then a Test Connection with a blank password will not cause the OLE DB Provider to prompt for a password. Optionally, users can choose to save the password in the .udl file by clicking the **Allow saving password** check box. Users and administrators should be warned that this option saves the authentication information (password) in plain text within the .udl file.

Initial catalog	This field is the first entry in the Database section of the Connection properties. This OLE DB property is used as the first part of a 3-part fully qualified table name. In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 installation manual. In DB2/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then one can be created using the Add option. In DB2 Universal Database, this property is referred to as DATABASE. If the provider supports changing the catalog for an initialized data source, the consumer can specify a different catalog name through the DBPROP_CURRENTCATALOG property in the DBPROPSET_DATASOURCE property set after initialization. This is a required parameter. This parameter is equivalent to the DBPROP_INIT_CATALOG OLE DB property ID.
Package Collection	The name of the DRDA target collection (AS/400 library) where the Microsoft OLE DB Provider for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft OLE DB Provider for DB2, which is implemented as an IBM DRDA Application Requester, uses packages to issue dynamic and static SQL statements. Package names are not restricted and can be upper case, lower case, or mixed case. The OLE DB Provider will create packages dynamically in the location to which the user points using the Package Collection parameter. By default, the OLE DB Provider will automatically create one package in the target collection, if one does not exist, at the time the user issues their first SQL statement. The package is created with GRANT EXECUTE authority to a single <AUTH_ID> only, where AUTH_ID is based on the User ID value configured in the data source. The package is created for use by SQL statements issued under the same isolation level based on the Isolation Level value configured in the data source. A problem can arise in multi-user environments. For example, if a user specifies a Package Collection value that represents a DB2 collection used by multiple users, but this user does not have authority to GRANT execute rights to the packages to other users (for example, PUBLIC), then the package is created for use only by this user. This means that other users may be unable to access the required package. The solution is for an administrative user, with package administrative rights (for example, PACKADM authority in DB2 for OS/390), to create a set of packages for use by all users. The OLE DB Provider for DB2 ships with a tool program for use by administrators to create packages. The crtpkg.exe tool is a Windows GUI application for use by the administrator to create packages. This tool can be run using a privileged User ID to create packages in collections accessed by multiple users. This tool will create sets of packages and grant EXECUTE privilege to PUBLIC for all (see descriptions under the Default Isolation Level parameter). The packages created are as follows: AUTOCOMMIT package (MSNC001 is only applicable on DB2/400) READ_UNCOMMITTED package (MSUR001) REPEATABLE_READ package, (MSRS001) READ_COMMITTED package, (MSCS001) SERIALIZABLE package (MSRR001). After being created, the packages are listed in the DB2 (mainframe) SYSIBM.SYSPACKAGE, the DB2 for OS/400 QSYS2.SYSPACKAGE, and the DB2 Universal Database (UDB) SYSIBM.SYSPACKAGE catalog tables. This parameter is equivalent to the DBPROP_DB2OLEDB_PACKAGECOL OLE DB property ID.
Default Schema	The name of the Collection where the OLE DB Provider for DB2 looks for catalog information. The Default Schema is the "SCHEMA" name for the target collection of tables and views. The OLE DB Provider uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection. For DB2, the Default Schema is the target AUTHENTICATION (User ID or "owner"). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, the OLE DB Provider uses the USER_ID provided at logon. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. This default is inappropriate in many cases, therefore it is essential that the Default Schema value in the data source be defined. This parameter is equivalent to the DBPROP_DB2OLEDB_DEFAULTSCH OLE DB property ID.

The **Data Source** in OLE DB is similar to a Data Source Name (DSN) in ODBC. The data source information is stored in a Microsoft Data Links file and contains the connection information required for the OLE DB Provider for DB2 to access IBM Data Base 2.

The AS/400 requires that the **User name** and **Password** parameters be in uppercase. When connecting to DB2/400, these parameters must be passed as uppercase strings. When connecting to DB2 on IBM mainframes, the **User name** and **Password** parameters can be in mixed case.

The **Connection** tab also includes a **Test Connection** button that can be used to test the connection parameters. The connection can only be tested after all of the required parameters are entered. When this button is selected, an APPC session or a TCP/IP session will attempt to be established with the host using the OLE DB Provider for DB2.

The **Advanced** tab allows users to select the character code set identifier used by the host, the PC code page used on the client software, and select some specific options when using the OLE DB Provider for DB2.

For the Microsoft OLE DB Provider for DB2, these properties include the following values:

Property	Description
DBMS Platform	The target DB2 platform property value is used to optimize performance of the OLE DB provider when executing operations such as data conversion. The default value is DB2/MVS.
Default Qualifier	The name of the schema (collection/owner) with which to fully qualify unqualified object names. This attribute allows the user to access database objects without fully-qualifying the objects using a collection (schema) qualifier. The OLE DB provider sends this value to DB2 using a SET CURRENT SQLID statement, instructing the DBMS to use this value when locating unqualified objects (for example, tables and views) referenced in SQL statements. If you do not set a value for default qualifier, then no SET statement is issued by the ODBC driver. This OLE DB property is only valid when connecting to DB2 for MVS (OS/390, z/OS).
Host CCSID	The character code set identifier (CCSID) matching the DB2 data as represented on the remote host computer. The CCSID property is required when processing binary data as character data. Unless the Process Binary as Character value is set to true, character data is converted based on the DB2 column CCSID and default ANSI code page. This parameter defaults to U.S./Canada (37). This parameter is equivalent to the DBPROP_DB2OLEDB_HOSTCCSID OLE DB property ID.
PC Code Page	The PC Code Page parameter indicates the code page to be used on the personal computer for character code conversion. This parameter is required when processing binary data as character data. Unless the **Process Binary as Character** checkbox is selected (value is set to true), character data is converted based on the default ANSI code page configured in Windows. This parameter defaults to Latin 1 (1252). This parameter is equivalent to the DBPROP_DB2OLEDB_PCCODEPAGE OLE DB property ID.
Process Binary as Character	When this option is checked (property is set to true), the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This parameter defaults to false. This parameter is equivalent to the DBPROP_DB2OLEDB_BINASCHAR OLE DB property ID.
Distributed transactions	When this option is checked, two-phase commit (distributed unit of work) is enabled. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and one of the HIS Resync services. This parameter is equivalent to the DBPROP_DB2OLEDB_UNITSOFWORK OLE DB property ID.

The **All** tab allows users to configure more detailed and optional properties used to connect to a data source. These properties may be edited by selecting a property from the list displayed and selecting **Edit Value**. For the Microsoft OLE DB Provider for DB2, these properties include the following values:

Property	Description

Alternate TP Name	The remote transaction program name is optional. For example, it is used when configuring an off-line DB2 demo link service connection. This parameter is equivalent to the DBPROP_DB2OLEDB_TPNAME OLE DB property ID.
APPC Local LU Alias	When LU 6.2 (SNA) is selected for the Network Transport Library, this field is the name of the local LU alias configured in the SNA server. This parameter is equivalent to the DBPROP_DB2OLEDB_LOCALLU OLE DB property ID.
APPC Mode Name	When LU 6.2 (SNA) is selected for the Network Transport Library, this field is the APPC mode and must be set to a value that matches the host configuration and SNA Server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bi-directional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This parameter normally defaults to QPCSUPP. This parameter is equivalent to the DBPROP_DB2OLEDB_APPCMODE OLE DB property ID.
APPC Remote LU Alias	When LU 6.2 (SNA) is selected for the Network Transport Library, this field is the name of the remote LU alias configured in the SNA server. This parameter is equivalent to the DBPROP_DB2OLEDB_REMOTELU OLE DB property ID.
Cache Authentication	This parameter determines whether the OLE DB Provider caches authentication information. This parameter defaults to false. This parameter is equivalent to the DBPROP_CACHE_AUTHINFO OLE DB property ID.
Data Source	The data source is an optional parameter that can be used to describe the data source. This parameter does not have a default value.
DBMS Platform	The target DB2 platform property value is used to optimize performance of the OLE DB provider when executing operations such as data conversion.
Default Qualifier	The name of the schema (collection/owner) with which to fully qualify unqualified object names. This attribute allows the user to access database objects without fully-qualifying the objects using a collection (schema) qualifier. The ODBC driver sends this value to DB2 using a SET CURRENT SQLID statement, instructing the DBMS to use this value when locating unqualified objects (for example, tables and views) referenced in SQL statements. If you do not set a value for default qualifier, then no SET statement is issued by the ODBC driver. This ODBC connection attribute is only valid when connecting to DB2 for MVS (OS/390, z/OS).
Default Schema	The name of the Collection where the OLE DB Provider for DB2 looks for catalog information. The Default Schema is the "SCHEMA" name for the target collection of tables and views. The OLE DB Provider uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection. For DB2, the Default Schema is the target AUTHENTICATION (User ID or "owner"). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, then the OLE DB Provider uses the USER_ID provided at logon. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. This default is inappropriate in many cases; therefore it is essential that the Default Schema value in the data source be defined. This parameter is equivalent to the DBPROP_DB2OLEDB_DEFAULTSCH OLE DB property ID.

Extended Properties	This parameter is a string containing provider-specific, extended connection information. The use of this property implies that the OLE DB consumer knows how this string will be interpreted and used by the OLE DB provider. This parameter should be used only for provider-specific connection information that cannot be explicitly described through the other property parameters. This parameter is equivalent to the DBPROP_INIT_PROVIDERSTRING OLE DB property ID.
Host CCSID	The character code set identifier (CCSID) matching the DB2 data as represented on the remote host computer. The CCSID property is required when processing binary data as character data. Unless the Process Binary as Character value is set to true, character data is converted based on the DB2 column CCSID and default ANSI code page. This parameter defaults to U.S./Canada (37). This parameter is equivalent to the DBPROP_DB2OLEDB_HOSTCCSID OLE DB property ID.
Initial Catalog	This OLE DB property is used as the first part of a 3-part fully qualified table name. In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 installation manual. In DB2/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then one can be created using the **Add** option. In DB2 Universal Database, this property is referred to as DATABASE. If the provider supports changing the catalog for an initialized data source, the consumer can specify a different catalog name through the DBPROP_CURRENTCATALOG property in the DBPROPSET_DATASOURCE property set after initialization. This is a required parameter. This parameter is equivalent to the DBPROP_INIT_CATALOG OLE DB property ID.
Integrated Security	This parameter determines whether the OLE DB Provider uses Host Security Integration (single sign-on). When this parameter is set to SSPI, single sign-on is enabled and separate user id and password parameters are not required. The user ID and password parameters are set based on the Windows 2000 logon. When this parameter is null, this single sign-on feature is disabled. This parameter defaults to null (host security integration is disabled) and a user id and password are required. This parameter is equivalent to the DBPROP_AUTH_INTEGRATED OLE DB property ID.
Mode	A Mode parameter is a bit mask specifying access permissions. This bit mask can be a combination of zero or more of the following: DB_MODE_READ—Read-only. DB_MODE_READWRITE—Read/write (DB_MODE_READ | DB_MODE_WRITE). DB_MODE_SHARE_DENY_NONE—Neither read nor write access can be denied to others. DB_MODE_SHARE_DENY_READ—Prevents others from opening in read mode. DB_MODE_SHARE_DENY_WRITE—Prevents others from opening in write mode. DB_MODE_SHARE_EXCLUSIVE—Prevents others from opening in read/write mode (DB_MODE_SHARE_DENY_READ | DB_MODE_SHARE_DENY_WRITE). DB_MODE_WRITE—Write-only. The OLE DB Provider for DB2 supports the following values for mode: Read (DB_MODE_READ) and Read/Write (DB_MODE_READ/WRITE). This parameter defaults to Read/Write. When the Read Only parameter is checked in the **Advanced** tab, the OLE DB Provider for DB2 creates a read-only data source by setting the Mode parameter to Read (DB_MODE_READ). A user has read access to objects such as tables, and cannot do update operations (INSERT, UPDATE, or DELETE, for example). This parameter is equivalent to the DBPROP_INIT_MODE OLE DB property ID.

Network Address	When TCP/IP has been selected for the Network Transport Library, this parameter indicates the IP address of the DB2 host. This parameter is equivalent to the DBPROP_DB2OLEDB_NETADDRESS OLE DB property ID.
Network Port	When TCP/IP has been selected for the Network Transport Library, this parameter is the TCP/IP port used for communication with the DB2 host. The default value is TCP/IP port 446. This parameter is equivalent to the DBPROP_DB2OLEDB_NETPORT OLE DB property ID.
Network Transport Library	The network transport dynamic link library property designates whether the OLE DB Provider for DB2 connects through SNA LU 6.2 or TCP/IP. The possible values for this parameter are TCPIP or SNA. The default value for this parameter is SNA. If the default SNA is selected, then values for APPC Local LU Alias, APPC Mode Name, and APPC Remote LU Alias are required. If TCP/IP is selected, then values for Network Address and Network Port are required. This parameter is equivalent to the DBPROP_DB2OLEDB_NETTYPE OLE DB property ID.
Package Collection	The name of the DRDA target collection (AS/400 library) where the Microsoft OLE DB Provider for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft OLE DB Provider for DB2, which is implemented as an IBM DRDA Application Requester, uses packages to issue dynamic and static SQL statements. Package names can be upper case, lower case, or mixed case. The OLE DB Provider will create packages dynamically in the location to which the user points using the Package Collection parameter. By default, the OLE DB Provider will automatically create one package in the target collection, if one does not exist, at the time the user issues their first SQL statement. The package is created with GRANT EXECUTE authority to a single <AUTH_ID> only, where AUTH_ID is based on the User ID value configured in the data source. The package is created for use by SQL statements issued under the same isolation level based on the Isolation Level value configured in the data source. A problem can arise in multi-user environments. For example, if a user specifies a Package Collection value that represents a DB2 collection used by multiple users, but this user does not have authority to GRANT execute rights to the packages to other users (for example, PUBLIC), the package is created for use only by this user. This means that other users may be unable to access the required package. The solution is for an administrative user, with package administrative rights (for example, PACKADM authority in DB2 for OS/390), to create a set of packages for use by all users. The OLE DB Provider for DB2 ships with a tool program for use by administrators to create packages. The crtpkg.exe tool is a Windows GUI application for use by the administrator to create packages. This tool can be run using a privileged User ID to create packages in collections accessed by multiple users. This tool will create sets of packages and grant EXECUTE privilege to PUBLIC for all (see descriptions under the Default Isolation Level parameter). The packages created are as follows: AUTOCOMMIT package (MSNC001 is only applicable on DB2/400) READ_UNCOMMITTED package (MSUR001) REPEATABLE_READ package, (MSRS001) READ_COMMITTED package, (MSCS001) SERIALIZABLE package (MSRR001). After being created, the packages are listed in the DB2 (mainframe) SYSIBM.SYSPACKAGE, the DB2 for OS/400 QSYS2.SYSPACKAGE, and the DB2 Universal Database (UDB) SYSIBM.SYSPACKAGE catalog tables. This parameter is equivalent to the DBPROP_DB2OLEDB_PACKAGECOL OLE DB property ID.
Password	A valid user name and password are normally required to access data sources on hosts. The password is case-sensitive and is displayed as asterisks in this dialog box for security purposes. This parameter is equivalent to the DBPROP_AUTH_PASSWORD OLE DB property ID.
PC Code Page	The PC Code Page parameter indicates the code page to be used on the personal computer for character code conversion. This parameter is required when processing binary data as character data. Unless the **Process Binary as Character** value is set to true, character data is converted based on the default ANSI code page configured in Windows. This parameter defaults to Latin 1 (1252). This parameter is equivalent to the DBPROP_DB2OLEDB_PCCODEPAGE OLE DB property ID.

Persist Security Info	This parameter indicates whether the data source object is allowed to persist sensitive authentication information, such as a password along with other authentication information. This parameter defaults to false. This parameter is equivalent to the DBPROP_AUTH_PERSIST_SENSITIVE_AUTHINFO OLE DB property ID.
Process Binary as Character	When this property is set to true, the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This parameter defaults to false. This parameter is equivalent to the DBPROP_DB2OLEDB_BINASCHAR OLE DB property ID.
Units of Work	This parameter indicates whether two-phase commit (distributed unit of work) used for transactions is supported for this data source. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync service. The following values for mode are supported by the OLE DB Provider for DB2: RUW (remote unit of work) DUW (distributed unit of work) This parameter defaults to RUW. This parameter is equivalent to the DBPROP_DB2OLEDB_UNITSOFWORK OLE DB property ID.
User ID	A valid User name is normally required to access data sources on hosts. This value is case-sensitive. This parameter is equivalent to the DBPROP_AUTH_USERID OLE DB property ID.

Configuring a Data Source for the ODBC Driver for DB2

1. In Windows, on the taskbar, click **Start**, click **Settings**, and then click **Control Panel**.
2. Double-click the **ODBC** icon to display the **ODBC Data Source Administrator** dialog box.
3. If you are configuring an existing data source, select the data source name and click **Configure** to display the **Microsoft ODBC Driver for DB2 Configuration** dialog box.
4. If you are configuring a new data source click either the **User DSN** tab, the **File DSN** tab, or the **System DSN** tab. Click **Add**, select **Microsoft ODBC Driver for DB2 Driver**, and then click **Finish** to display the **Microsoft ODBC Driver for DB2 Configuration** dialog box.
5. Type the appropriate values in the fields, and then click **Apply**.

The **Microsoft ODBC Driver for DB2 Configuration** dialog box contains the following five tabs:

The **General** tab contains the following fields:

Parameter	Comments
Data Source Name	A blank field for specifying the name of the data source. Enter a string that identifies this ODBC data source. The data source is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file, which is stored in C:\Program Files\Common Files\ODBC\Data Sources.
Description	A blank field to provide a comment describing this ODBC data source. The description is an optional parameter and may be left blank.

The **Connection** tab allows the user to configure the basic attributes required to connect to a data source. For the Microsoft ODBC Driver for DB2, the **Connection** tab has the following fields:

Parameter	Comments
APPC Connection and TCP/IP Connection	An option button (radio button) is used to select the network transport. Valid options are APPC Connection (SNA LU 6.2) or TCP/IP Connection. For the default, APPC Connection, the values for APPC local LU alias, APPC remote LU alias, and APPC Mode Name are required. For TCP/IP Connection, the values for IP address and Network port are required.
APPC local LU alias	When APPC Connection is selected, this field is the name of the local LU alias configured in Host Integration Server 2004.
APPC remote LU alias	When APPC Connection is selected, this field is the name of the remote LU alias configured in Host Integration Server 2004.
APPC mode name	When APPC Connection is selected, this field is the APPC mode and must be set to a value that matches the host configuration and SNA Server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bi-directional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). The default is typically QPCSUPP.
IP address	When TCP/IP Connection is selected as the network transport, this field indicates the IP address of the host DB2 server.
Network port	When TCP/IP Connection is selected as the network port, this field indicates the TCP/IP port used for communication with the target DB2 DRDA service. The default is **IP port 446**.

The **Connection** tab also includes a **Test connection** button that may be used to test the connection parameters. A connection can only be tested after all of the required parameters for the **Connection** tab and other ODBC data source parameters are configured properly. When this button is clicked, a session is established with the remote DB2 system using ODBC Driver for DB2.

The **Security** tab allows the user to configure optional attributes used to restrict connections to a data source. For the Microsoft ODBC Driver for DB2, the **Security** tab has the following fields:

Parameter	Comments
Authentication	An option button (radio button) is used to select the type of authentication. Valid options are **Use this username** or **Use single sign-on**. For the default **Use this username** option, the value for the username is required.
Use this username	When this option is selected, authentication is based on the username entered in the textbox. A valid user name is normally required to access data on DB2. A user name can remain optionally in the DSN. The ODBC Driver for DB2 will prompt the user at run-time to enter a valid password. Additionally, the prompt dialog will enable the user to override the user name that is stored in the DSN.
Use single sign-on	An option button to select whether single sign on or a specific user name should be used. Single sign-on is an optional Host Security feature. Single sign-on enables the administrator to create data source definitions that isolate the logon process from the end user. The user context for single sign-on is the user context associated with the SNA DB2 service.

The AS/400 computer is case-sensitive with regard to user IDs and passwords. When connecting to DB2 for OS/400, user names and passwords must be in uppercase. The AS/400 only accepts a DB2 for OS/400 user ID and password in uppercase. If a DB2 for OS/400 connection fails due to incorrect authentication, the ODBC driver resends the authentication, forcing the user ID and password into uppercase.

When connecting to DB2 on IBM mainframes, user names and passwords can be of mixed case; the mainframe is not case-sensitive. The ODBC driver sends these values in uppercase.

DB2 Universal Database (UDB) is case-sensitive. The user ID is stored in uppercase. The password is stored in mixed case and users must enter the password in the correct case. The ODBC driver sends the password exactly in the case entered by the user. The user ID should contain only the user name, not a combination of the Windows domain name and username.

The **Target Database** tab allows the user to configure required, as well as optional, attributes used to define the target DB2 system. For the ODBC Driver for DB2, the **Target Database** tab has the following fields:

Parameter	Comments
Initial catalog	This parameter is used as the first part of a three-part fully qualified DB2 table name. It is referred to by different names depending on the DB2 platform. In DB2 for OS/390 and DB2 for MVS, this parameter is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 that you need to connect to on these platforms, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 installation manual. In DB2/400 on OS/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then a value can be created using the **Add** option. In DB2 Universal Database, this property is referred to as DATABASE.

Package collection	The name of the DRDA target collection (AS/400 library) where the Microsoft ODBC Driver for DB2 should store and bind DB2 packages. This can be the same as the default schema. The ODBC Driver for DB2, which is implemented as an IBM DRDA Application Requester, uses packages to issue dynamic and static SQL statements. The ODBC driver creates packages dynamically in the location that the user points to using the Package Collection parameter. By default, the ODBC Driver for DB2 automatically creates one package in the target collection, if one does not exist, at the time the user issues their first SQL statement. The package is created with GRANT EXECUTE authority to a single <AUTH_ID> only, where AUTH_ID is based on the user ID value configured in the data source. The package is created for use by SQL statements issued under the same isolation level based on the Isolation Level value configured in the data source. Problems can arise in multi-user environments. For example, if a user specifies a Package Collection value that represents a DB2 collection used by multiple users, but this user does not have authority to GRANT execute rights to the packages to other users (for example, PUBLIC), then the package is created only for use by this user. This means that other users may be unable to access the required package. The solution is for an administrative user, with package administrative rights (for example., PACKADM authority in DB2 for OS/390), to create a set of packages for use by all users. The ODBC Driver for DB2 ships with two utility programs for use by administrators to create packages. The crtpkg.exe tool is a command line utility for the administrator to create packages. The crtpkgw.exe tool is a Windows GUI utility used for the same purpose. Either of these utilities can be run using a privileged user ID to create packages in collections accessed by multiple users. These utilities will create sets of packages and grant EXECUTE privilege to PUBLIC for all (see descriptions under the Default Isolation parameter). The packages created are as follows: AUTOCOMMIT package (MSNC001 is only applicable on DB2/400) READ_UNCOMMITTED package (MSUR001) REPEATABLE_READ package, (MSRS001) READ_COMMITTED package, (MSCS001) SERIALIZABLE package (MSRR001). After being created, the packages are listed in the DB2 (mainframe) SYSIBM.SYSPACKAGE, the DB2 for OS/400 QSYS2.SYSPACKAGE, and the DB2 Universal Database (UDB) SYSIBM.SYSPACKAGE catalog tables.
Default schema	The name of the Collection where the ODBC Driver for DB2 looks for catalog information. The Default schema is the SCHEMA name for the target collection of tables and views. The ODBC driver uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection (for example, ODBC Catalog SQLTables). For DB2, the Default Schema is the target AUTHENTICATION (User ID or owner). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, the ODBC driver uses the USER_ID provided at logon. For DB2/400, the driver uses QSYS2 if no collection is found matching the USER_ID value. This default is inappropriate in many cases so it is essential that the Default Schema value in the data source be defined.
DBMS Platform	The target DB2 platform property value is used to optimize performance of the ODBC driver when executing operations such as data conversion. The default value is DB2/MVS.
Default Qualifier	The name of the schema (collection/owner) with which to fully qualify unqualified object names. This attribute allows the user to access database objects without fully-qualifying the objects using a collection (schema) qualifier. The ODBC driver sends this value to DB2 using a SET CURRENT SQLID statement, instructing the DBMS to use this value when locating unqualified objects (for example, tables and views) referenced in SQL statements. If you do not set a value for default qualifier, then no SET statement is issued by the ODBC driver. This ODBC connection attribute is only valid when connecting to DB2 for MVS (OS/390, z/OS).
Alternate TP Name	The remote transaction program name is optional. For example, it is used when configuring an off-line DB2 demo link service connection.

Distributed transactions	When this option is checked, two-phase commit (distributed unit of work) is enabled. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and one of the HIS Resync services.
Process binary as character	When this option is checked, it indicates that binary data fields should be processed as characters. This option treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. See the **Locale** tab.

The **Locale** tab allows the user to configure the parameters used for character conversion between the client computer and the DB2 server. Two versions of the **Locale** tab are possible depending on which versions of SNA Server client software and ODBC for DB2 Driver client software are installed.

For the ODBC Driver for DB2, the **Locale** tab has the following fields:

Parameter	**Comments**
Host CCSID	The coded character set identifier (CCSID) matching the DB2 data as represented on the remote computer. This property is required when processing binary data as character data. Unless the **Process Binary as Character** value is set, character data is converted based on the DB2 column CCSID and configured ANSI code page. This parameter defaults to U.S./Canada (37).
PC code page	This parameter indicates the personal computer code page to use. It is required when processing binary data as character data. Unless the **Process Binary as Character** value is set, character data is converted based on the default ANSI code page configured in Windows. The default value for this property is Latin 1 (1252).

Click **OK** or **Cancel** when data entry is finished. If you click **OK**, the values specified become the defaults when an application connects to this data source. These default values can be changed at any time using this procedure to reconfigure the data source. An ODBC application can override these defaults by connecting to the data source using a connection string with alternate values.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Network Integration Help

Use the topics in this section to navigate through the Network Integration User Interface.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Print Service Properties

Click **No Event Log for Skipping Transparent Section** to prevent an entry in the Event Log every time print services skips a transparent section found while printing a host print job. Skipping transparent sections can be enabled from the **Advanced** tab of a print session properties page.

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Click **Flush Final FF** causes Host Print services to explicitly form feed the document at the end of a print job. This is not needed for most print jobs and configurations.

Click **Use Proportional Font Change** to prevent overlapping characters in documents containing nonfixed-type fonts printed through Host Print services. Most standard 3270 data streams are designated for fixed-type fonts.

Click **Ignore Characters 3F and Under** to cause the print service to ignore Hexadecimal characters 3F and below. In LU 1 data streams, this option causes hexadecimal characters below 40 to be replaced by spaces.

Click **Delay Print Start** to delay the start of the print job until printable data is received by Host Print services. In a few environments, hosts may poll the Host Print service for activity by sending "empty jobs". In such cases, not selecting this option may cause blank pages to be printed between actual print jobs.

LU 3 Only

Click **Do All FF** to force the printer driver to honor all form feed commands. (In most jobs, this is unnecessary and may lead to unwanted blank pages.)

Click **Always do NL** to insert a new line when the print services determines that the Maximum Print Position has been reached for a particular line of data. Selecting this option will prevent data from printing over an existing line.

Click **No Space After FF** to prevent print services from inserting a space character following a form feed.

Click **Support Embedded Printer Codes** to allow unmarked embedded characters, such as EBCDIC X'27' characters, to pass through print services to the printer.

LU 1 Only

Click **Use Fixed Tabs** to disable normal tab functionality (such as aligning tabs in columns) and interpret each tab as a fixed number of spaces. The number of spaces for a tab stop is based on the size of the first tab in the Set Horizontal Format SCS control code.

APPC

Set the **Activation Retry Limit** to the number of times print services will attempt to activate the APPC conversation following a terminated connection. The default value is –1 (infinite), meaning that attempts to activate the session will continue until it is successful or terminated manually.

Click **Infinite Retry Limit** to force the system to retry printing the job until it is successful.

Set the **Activation Retry Interval** to the number of seconds to wait before trying to print the job again. The default value is 10 seconds.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Print Session Properties

The following tabs are available on the Print Session 3270 Properties sheet:

Print Session Properties: General

Session Name

To print 3270 jobs, you must define the session name, which is a descriptive name to distinguish different printers on the network.

Comment

Optionally, type a comment of 25 characters or less.

Session Activation

Click **Manual** to activate the print session manually, or **Automatic** to activate the print session automatically when the Host Print service is started.

Host Code Page

Click **Language**, and then select a **language code** from the drop-down list.

If your language code does not appear in the drop-down list, click **Custom**, then click on the **File** button. The **Select Custom Page File** dialog box appears. Select your custom code page and click **Open**.

> **Note** The custom page support in Host Print service provides Arabic and Hebrew code page support for left-to-right output only. The Host Print service does not support bi-directional data streams from right to left.

Destination

The default printer should appear in the box. Otherwise, click **Printer** to open the **Print Setup** dialog box. Make your selections and click **OK**.

Click **File** to send your job to a file. Check **Unique** to activate the **Reset** button. This feature allows you to reset the print job sequential numbering scheme (for example, when the number gets too high). Click **Reset**, and then click **Yes** to reset to the printer file extension numbering.

> **Note** You need to select a printer driver to print to a file. Select a valid printer driver, then select File in the Destination box. Otherwise, you get an error message.

Print Session Properties: 3270

LU Name

Choose a **3270 printer LU** for the print session from the **LU Name** drop-down list. The drop-down list shows all of the LUs in an SNA Subdomain. If no 3270 printer LUs appear, you need to define one.

Job Termination When

Set job termination to either When End Bracket Received or When Unbind Received.

Selecting **When End Bracket Received** means the Host Print service will treat receiving the End Bracket notification from the host as an indication that the job is complete. Otherwise, the Print service defaults to spooling the job until the session ends: **When Unbind Received**.

> **Note** If the host application sends print jobs that comprise multiple SNA brackets, set job termination to When End Bracket Received.

Job Timeout

To set a parameter for terminating print jobs, click the **Timeout Job After** box. Click the **Seconds Inactivity** up and down buttons to set the time limit for terminating print jobs. In some cases, an LU 3 print job is sent down from the host over an extended period of time. Selecting a Job Timeout ensures that the portions of the job are regularly form-fed. This option also provides normal timeout functionality for other 3270 print jobs.

Monitor Job

Click **Request Definite Response** if you want to invoke an advanced feature for applications that require a high level of assurance that a job completed. This feature sends a message to the host stating that the print job completed.

> **Note** If you select the Request Definite Response feature, the host job must mark the data as RQD (definite response required).

Print Session Properties: Job Format

Do Not Format Print Job

Do Not Format Print Job allows print jobs that are formatted with host software to bypass the Microsoft® Windows®-based printing format system. The Windows-based Host Print service treats all received data as transparent. All data is passed directly to the printer.

Format Print Job

Print jobs from a host system can be formatted one of two ways:

GDI

The Windows Graphical Device Interface (GDI) is used to format the print job. SCS codes in the data are interpreted and represented, and the GDI automatically supports all the configurable options such as font, margins, duplex, paper-source etc. Transparent sections (for example, containing PCL escape sequences) are just ignored. When such data is discarded, a log is written to the Event Log, containing the first 32 bytes of discarded data. This logging can be globally disabled from the Host Print service properties page.

Selecting this option disables the Ignore **Transparent Sections for PDT Formatting** on the **Advanced** tab.

> **Note** If your print job has a mixture of SCS codes and PCL escapes, then you should use a PDT. The PDT should contain mappings for the SCS code functionality, and the PCL escapes should pass directly to the printer without being mapped.

PDT

A Printer Definition Table (PDT) is used to specify the output format, control codes, and transfer of characters to a printer. When you use a PDT, the Windows based printer driver is not used. The PDT defines all information used to generate the print output. Click the **PDT File** button to select a compiled Printer Definition File.

To create a new PDT, you must first create a Printer Definition File (PDF), and then compile the PDF into a PDT. (If an uncompiled PDF file is selected, the compilation is performed automatically each time the print session is used. This feature has a performance overhead and is available mainly for ease of development). The PDF is a text file that defines macros and session parameters.

The PDT may override changes you make to **Font**, **Margins**, or **Page Setup**, although it is now possible to support these options in the PDT file. If you want to print in a particular font with a PDT, you should alter the startup sequence in the PDT to tell the printer which font you require. When a PDT file is used, Host Print service uses the definitions of NL, CR, FF, and LF from the PDT file to allow it to format the print job correctly.

Click **Printer Language is Hewlett-Packard (HP) PCL** if your PDT contains PCL commands. Limited support for Manager-defined font, margins and paper setup settings is automatically supported for HP (PCL), with full support available for customizing the Printer Definition File.

Font

To make changes to the font, click **Font**. Click the **Font** button. Make your selections in the Windows-based **Font** dialog box, and then click **OK**.

Use Fixed Font Size

Select the **Use Fixed Font Size** to select a user-defined font size. When this box is checked, the Host Print service will use the configured point size regardless of whether the data will fit (it will be clipped to fit the page if it is too large). When this option is selected, the Horizontal and Vertical scaling options on the **Advanced** tab are not available.

Print Session Properties: Page Layout

All these options are automatically available using the Windows GDI. Supporting these options using a PDT file may require extra configuration.

Horizontal Controls

Characters per line

The default is 132 characters per line. Type 80, 158, or another number for characters per line to change the default. The maximum line length is 255 characters.

Click **Override Host Commands** to force the specified settings and ignore host commands.

Vertical Controls

Lines per Page

Select **Lines Per Page** and then set the number of lines to be printed on each page.

Lines Per Inch

Select **Lines Per Inch** and then set either 6 or 8 lines per inch to set the default.

Click **Override Host Commands** to force the specified settings and ignore host commands.

Margin Settings

To change the margins, select **Margins**, and then click **Setup**. The **Page Setup** dialog box appears. Make your changes, and then click **OK**.

Page settings

Settings for Paper Source, Page Size, and Orientation are controlled from the Printer section. Click **Override Host Commands** to force the specified settings and ignore host commands.

Print Session Properties: Advanced

Filter DLL

Click **Filter DLL** to pass the printer data stream to a third-party or user-supplied DLL. Clicking **Filter** activates the **DLL File** button. The **Select Filter DLL** dialog box appears. Make your selection, then click **Open**.

Ignore Transparent Sections for PDT Formatting

Selecting this option will cause those sections of the print data stream that have been marked as transparent to be ignored when using a PDT file to format the data. Note, when using the GDI to format the data, transparent sections are automatically ignored. When such data is discarded, a log is written to the Event Log, containing the first 32 bytes of discarded data. This logging can be globally disabled from the Host Print service properties page.

Do Not Scale Horizontally

Selecting this option will turn off the horizontal scaling feature of the printer driver.

Do Not Scale Vertically

Selecting this option will turn off the vertical scaling feature of the printer driver.

3270 Printing

Transparency is ASCII

Click **Transparency is ASCII** to indicate that transparent data from the host is in ASCII and needs no translation from EBCDIC to ASCII. Selecting **Transparency is ASCII** causes the Windows-based Host Print service to not put the received data through an EBCDIC to ASCII translation table before printing.

Transparency Custom Byte

Transparency Custom Byte indicates the character designated to start a sequence of transparent data (the transparent data may or may not be ASCII). The IBM standard is 0x35, but if the host print job uses another value (for example 0x36, and so on), then this should be specified here.

No Line Formatting

Prevents the SNA Print Service from inserting its own Carriage Return/Line Feed (CR/LF) according to the dimensions specified in the Default Page Width field (also on this property page). As No Line Formatting is a special case, this box is usually not checked. It is a useful option when using physical printers that do their own wrapping or are told to do their own wrapping with an Esc sequence. The Esc sequence that causes a printer to do its own End-of-line wrap on PCL printers is <Esc>&s0C.

Printer Time Out

Default is 10 seconds. This parameter optimizes performance and system resources. If the printer is always available, system resources are consumed. However, if the printer is constantly being "opened" and "closed" with each print job sent, performance suffers. By setting the time out, the printer will remain available for jobs sent close together to improve performance, and yet "close" during non-busy times to free up resources.

Print Session Properties

The following tabs are available on the Print Session 3270 Properties sheet:

Print Session Properties: APPC

Remote APPC LU

Choose **Alias** or **Fully Qualified Name** to select another remote APPC LU.

You must supply either a **Remote APPC LU Alias** or a **Fully Qualified Name** before you can leave this page. If you want to use a **Fully Qualified Name**, you need to select a **Remote APPC LU Alias** first, then select a **Local LU Alias**. Then you must go back and change from the **Remote APPC LU Alias** to the **Remote APPC LU Fully Qualified Name**. If you select **Fully Qualified Name** first, the **Local LU Alias** does not get initialized.

Network Name + LU Name in NETNAME.LUNAME syntax (for example, APPN.NORTHB).

Local LU Alias

Select the local LU alias from the drop-down list.

Mode Name

The default mode name is QPCSUPP. Click the drop-down list arrow to make another selection. The choices are: **#INTERSC**, **BLANK**, **QPCSUPP**, **QSERVER**.

AS/400 Device Name

You must enter the name for the AS/400 printer device, which is a descriptive name that distinguishes different printers on the network.

System Type

Select the type of system you are printing from; either AS/400, System/36, AS/36.

AS/400

Msg Queue Name

Enter the qualified name of the message queue to which operational messages for this device are sent.

Msg Lib Name

Enter the name of the library in which the message queue is located.

System/36, AS/36

APPC Print Session Properties: Security

User ID

Type your **User ID**.

Password

Type your **Password**. Click tab to put the cursor in the **Confirm** password box.

Confirm Password

Type your password again and click **OK**.

Print Session Properties: Job Format

Job

Do Not Format Print Job allows print jobs that are formatted with host software to bypass the Windows-based printing format system. The Windows-based Host Print service treats all received data as transparent. All data is passed directly to the printer.

HPT

Displays the **Host Print Transform Properties** box, where you can designate the printer type and paper sources.

The Host Print Transform feature changes print data on the AS/400 to the ASCII format needed by a PC printer.

Select a manufacturer type and model number. If you cannot find the type and model number in the list you can type them in the box. If you do not know the manufacturer type and model number, see your system administrator or see the help on the AS/400.

> **Important** You must enter an asterisk "*" before the manufacturer type and model number. Make sure there are no spaces between the asterisk, manufacturer type and model number, for example: *HPIIISI, or *IBM3812.

Format Print Job

Print jobs from a host system can be formatted one of two ways:

GDI

The Windows Graphical Device Interface (GDI) is used to format the print job. SCS codes in the data are interpreted and represented, and the GDI automatically supports all the configurable options such as font, margins, duplex, paper-source etc. Transparent sections (for example, containing PCL escape sequences) are just ignored. When such data is discarded, a log is written to the Event Log, containing the first 32 bytes of discarded data. This logging can be globally disabled from the Host Print service properties page.

Selecting this option disables the Ignore **Transparent Sections for PDT Formatting** on the **Advanced** tab.

> **Note** If your print job has a mixture of SCS codes and PCL escapes, then you should use a PDT. The PDT should contain mappings for the SCS code functionality, and the PCL escapes should pass directly to the printer without being mapped.

PDT

A Printer Definition Table (PDT) is used to specify the output format, control codes, and transfer of characters to a printer. When you use a PDT, the Windows based printer driver is not used. The PDT defines all information used to generate the print output. Click the **PDT File** button to select a compiled Printer Definition File.

To create a new PDT, you must first create a Printer Definition File (PDF), and then compile the PDF into a PDT. (If an uncompiled PDF file is selected, the compilation is performed automatically each time the print session is used. This feature has a performance overhead and is available mainly for ease of development). The PDF is a text file that defines macros and session parameters.

The PDT may override changes you make to **Font**, **Margins**, or **Page Setup**, although it is now possible to support these options in the PDT file. If you want to print in a particular font with a PDT, you should alter the startup sequence in the PDT to tell the printer which font you require. When a PDT file is used, Host Print service uses the definitions of NL, CR, FF, and LF from the PDT file to allow it to format the print job correctly.

Click **Printer Language is Hewlett-Packard (HP) PCL** if your PDT contains PCL commands. Limited support for Manager defined font, margins and paper setup settings is automatically supported for HP (PCL), with full support available for customizing the Printer Definition File.

Font

To make changes to the font, click **Font**. Click the **Font** button. Make your selections in the Windows-based **Font** dialog box, and then click **OK**.

Use Fixed Font Size

Select the **Use Fixed Font Size** to select a user defined font size. When this box is checked, the Host Print service will use the configured point size regardless of whether the data will fit (it will be clipped to fit the page if it is too large). When this option is selected, the Horizontal and Vertical scaling options on the **Advanced** tab are not available.

APPC Print Session Properties: Advanced

Filter DLL

Click **Filter DLL** to pass the printer data stream to a third-party or user-supplied DLL. Clicking **Filter** activates the **DLL File** button. The **Select Filter DLL** dialog box appears. Make your selection, then click **Open**.

Ignore Transparent Sections for PDT Formatting

Selecting this option will cause those sections of the print data stream that have been marked as Transparent to be ignored when using a PDT file to format the data. Note, when using the GDI to format the data, Transparent sections are automatically ignored. When such data is discarded, a log is written to the Event Log, containing the first 32 bytes of discarded data. This logging can be globally disabled from the Host Print service properties page.

Do Not Scale Horizontally

Selecting this option will turn off the horizontal scaling feature of the printer driver.

Do Not Scale Vertically

Selecting this option will turn off the vertical scaling feature of the printer driver.

Print LU Properties: General

LU Number

Enter the LU Number.

LU Name

Enter the LU Name.

Connection

The connection for this LU is shown. The connection cannot be changed here.

Pool

If the LU has already been assigned to a pool, the pool name appears here.

Comment

Optionally, enter a comment of not more than 25 characters.

Use Compression

Selecting this option will compress the data stream and reduce the local area network traffic.

User Workstation Secured

Selecting this option allows only this workstation to access the Host LU.

TN3270 Properties: Settings

Idle Timeout

> Specify time limits. If the session is inactive for this length of time, then TN3270 service disconnects the client computer.

Init Status Delay

> Specify time limits. This is the delay between the time when TN3270 service connects to a host session and the time the TN3270 service starts updating the client computer screen. There are often a large number of startup messages when the TN3270 service first connects to a host session, and this option gives the user the opportunity not to receive them all.

Message Close Delay

> Specify time limits. When TN3270 service forces a client computer to disconnect (for example, when the Microsoft® Host Integration Server 2004 session to the host has been lost), it sends the client computer an error message to be displayed on the screen. This value specifies the time between sending the message to the client computer and closing the socket with the client computer (which causes some client computers to clear the screen, and so erase the message).

Refresh Cycle Time

> Specify time limits. This is the delay between updates of the status on the display.

Default RU Sizes - Inbound and **Outbound**

> This controls the RU size (SNA message size) used by the TN3270 service for logon messages to and from the host. The minimum value for inbound or outbound RU size is 256 bytes. If the host application sends large logon screens, these values should be increased.

Certificate CN

The common name of the certificate used if TLS/SSL is enabled.

Print Service Properties

Click **No Event Log for Skipping Transparent Section** to prevent an entry in the Event Log every time print services skips a transparent section found while printing a host print job. Skipping transparent sections can be enabled from the **Advanced** tab of a print session properties page.

3270

Click **Flush Final FF** causes Host Print services to explicitly form feed the document at the end of a print job. This is not needed for most print jobs and configurations.

Click **Use Proportional Font Change** to prevent overlapping characters in documents containing nonfixed-type fonts printed through Host Print services. Most standard 3270 data streams are designated for fixed-type fonts.

Click **Ignore Characters 3F and Under** to cause the print service to ignore Hexadecimal characters 3F and below. In LU 1 data streams, this option causes hexadecimal characters below 40 to be replaced by spaces.

Click **Delay Print Start** to delay the start of the print job until printable data is received by Host Print services. In a few environments, hosts may poll the Host Print service for activity by sending "empty jobs". In such cases, not selecting this option may cause blank pages to be printed between actual print jobs.

LU 3 Only

Click **Do All FF** to force the printer driver to honor all form feed commands. (In most jobs, this is unnecessary and may lead to unwanted blank pages.)

Click **Always do NL** to insert a new line when the print services determines that the Maximum Print Position has been reached for a particular line of data. Selecting this option will prevent data from printing over an existing line.

Click **No Space After FF** to prevent print services from inserting a space character following a form feed.

Click **Support Embedded Printer Codes** to allow unmarked embedded characters, such as EBCDIC X'27' characters, to pass through print services to the printer.

LU 1 Only

Click **Use Fixed Tabs** to disable normal tab functionality (such as aligning tabs in columns) and interpret each tab as a fixed number of spaces. The number of spaces for a tab stop is based on the size of the first tab in the Set Horizontal Format SCS control code.

APPC

Set the **Activation Retry Limit** to the number of times print services will attempt to activate the APPC conversation following a terminated connection. The default value is –1 (infinite), meaning that attempts to activate the session will continue until it is successful or terminated manually.

Click **Infinite Retry Limit** to force the system to retry printing the job until it is successful.

Set the **Activation Retry Interval** to the number of seconds to wait before trying to print the job again. The default value is 10 seconds.

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Configuring an IP-DLC Connection

As with other connections, configuration requires setting parameters on the Connection properties dialog. It is recommended that you read this section before beginning the configuration process, so you can gather all the necessary information before you start.

To configure an IP-DLC connection

1. If you have just created a new IP-DLC link service connection, the **Connection** properties dialog will automatically appear. If it does not, or if you are configuring an already-existing IP-DLC link service connection, right-click the IP-DLC link service connection in the results pane of the MCC snap-in, and click **Properties**.
2. Fill in the required parameters according to the tables below.

General Page

The **General** page is similar to that used for other connections in Microsoft® Host Integration Server.

Property	**Comments**
Name	Name of the connection.
Link service	This list displays all currently configured IP-DLC link services.
Comment	Descriptive comment (optional).
Activation	Specifies conditions under which connection is activated.
On server startup	Connection is activated on server startup.
On demand	Connection is activated on demand.
By administrator	Connection can only be activated by system administrator.
Allowed direction	Specifies the connection directions. For more information, see the note under Peer system later in this table.
Outgoing calls	Connection is outgoing.
Incoming calls	Connection is incoming.

Both directions	Connection can be both incoming and outgoing.
Remote end	Specifies which system is the remote end.
Host system	Selecting this option signifies that the connection will be used for Dependent LU Server (DLUS) traffic and may have dependent LUs. You cannot associate independent APPC LUs with an IP-DLC connection remote end type of host system.
Peer system	Selecting this option signifies that the connection will be used for independent APPC LU sessions. You cannot associate dependent 3270 LUs with an IP-DLC connection remote end type of peer system. Because peer system IP-DLC connections do not support DLUS traffic, selecting this option will disable all controls on the **Address** page and the IP-DLC page (shown later in this topic). Only one peer connection can be associated with an IP-DLC link service. Note: Selecting Peer system automatically sets Activation to **On Server Startup** and Allowed direction to **Both**.

Address Page

Use this page to configure DLUS properties for the connection. The DLUS on the mainframe system operates in conjunction with the Dependent LU Requestor (DLUR) on the local Host Integration Server computer. Together they route dependent (for example, 3270) sessions across the APPN network using the IP-DLC link service.

If you selected the Remote end as Peer system on the **General** page, all controls on this page will be disabled.

Property	Comments
Primary DLUS	Fill in these required fields for the primary server with the appropriate names.
Network name	Maximum of eight characters of SNA type A string, representing the APPN network in which to locate the primary DLUS.
Backup DLUS	Fill in these fields for the backup server with the appropriate names. These fields are optional.
Preferred route	Optionally, enter the IP address, host name, or fully qualified name for the NNS as routing server through which to connect to the DLUS. Using a separate NNS may improve host performance by offloading the DLUS host computer from operating as an NNS directory server. The IP-DLC link service will attempt to establish the connection to the DLUS using the preferred route address.

System Identification Page

The **System Identification** page is similar to that used for other connections in Host Integration Server.

If you selected the Remote end as Peer system on the **General** page, all controls on this page will be disabled.

Property	Comments
Local node name	Specify information for the local server.
Node ID	Required. Enter a hexadecimal value to uniquely identify the physical unit (PU) for the host connection. This value must match an existing remote LEN-style PU definition. Default value is 05D FFFFF. The node ID value must match the value configured on the host DLUS computer.

Link compression	Optional. Choose a setting from the list. Default value is **None**.
Remote node name	Specify information for the remote DLUS.
Node ID	Required. Enter a hexadecimal value to uniquely identify the physical unit (PU) for the host connection. This value must match an existing remote LEN-style PU definition for the DLUS. There is no default value.

IP-DLC Page

Use this page to optionally set parameters specific to the IP-DLC connection.

If you selected the Remote end as Peer system on the **General** page, all controls on this page will be disabled.

Property	**Comments**
Connection retry limits	Optionally, use these controls to specify retry limits for activating a connection.
None	Specifies no retries.
Limited	Specifies the number of retries, from 1 through 65534. Default value is 8.
Delay after retry	Specifies the wait period after a retry, from 1 through 327670 seconds. Value must be a multiple of five. Default value is 10 seconds.
DLUR retry limits	Optional. Use these controls to specify retry action in case the DLUR connection fails. Default setting is Infinite.
Infinite	Specifies an infinite number of retries.
None	Specifies no retries.
Limited	Specifies the number of retries, from 1 through 65534. Default value is 8.
Delay after retry	Specifies the wait period after each retry, from 1 through 65535 seconds. Default value is 10 seconds.

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Configuring an IP-DLC Link Service

As with other link services, configuration requires setting parameters on the **Link Service Properties** dialog box. It is recommended that you read this section before beginning the configuration process, so you can gather all the necessary information before you start.

To configure an IP-DLC link service

1. If you have just created a new IP-DLC link service, the **IP-DLC Link Service Properties** dialog box will automatically appear. To reconfigure an existing IP-DLC link service, right-click the IP-DLC link service in the scope pane of the MCC snap-in, click **Properties**, and then click the **Configure** button to load the IP-DLC Link Service Properties dialog box.
2. Fill in the required parameters according to the following table.
3. Click **OK** to persist the settings to the configuration file and registry. The **Insert Link Service** dialog box appears.
4. Click **Complete Configuration of the IP-DLC Link Service**.

Property	Comments
Service name	Displays the name of the link service being configured. For a new link service, the name is predefined as SNAIP#, where # is the ordinal number of the link service.
Service title	Enter a user-friendly text description of up to 128 characters. This name will be displayed in the Service Control Manager. The default value is IP-DLC Link Service #N, where N is the ordinal number of the link service.
Primary network node server (NNS)	Enter the IP address, host name, or fully qualified name of the primary network node server. There is no default value.
Backup network node server	Optionally, enter the IP address, host name, or fully qualified name of the backup network node server. There is no default value.
Local address	This set of parameters assigns the link service to a particular IP address on the local computer. Every link service must be associated with a local IP address or logical connection, and neither the IP address nor the logical connection can be used by another IP-DLC link service on the local computer.
Adapter address	Selecting this option button forces the link service to use the default IP address associated with the network adapter specified in the adjacent list. (The alternative is to associate with a static IP address.) The list displays all available network adapters currently configured. Physical adapters are listed first, followed by virtual adapters (that is, WAN Mini-ports).
Static IP address	Selecting this option button forces the link service to use the IP address specified in the adjacent list. The list displays all static IP addresses defined to the local computer. Enter the IP address, host name, or fully qualified name for the IP-DLC link service.
Local APPN node	This set of parameters configures the network identification of the APPN branch network node implemented by the IP-DLC link service. Note: No other IP-DLC link service within the APPN network can use both the same network name and control point name as this one. Individual names may be reused, but the pair may not.
Network name	Enter the APPN network name for the IP-DLC link service operating as a local APPN node across which the IP-DLC link service will communicate. This value must be text with a maximum of eight characters and comply with the APPN naming convention. There is no default value.
Control point name	Enter the APPN control point name for the IP-DLC link service operating as a local APPN node. This value must be text with a maximum of eight characters and comply with the APPN naming convention. There is no default value. The control point name must be unique for this computer on the APPN network.
Node ID	In the first box, enter any valid 3-digit hexadecimal number except the reserved numbers of 000 and FFF. In the second box, enter any valid hexadecimal number except the reserved number 00000. There is no default value.
Associated LEN node	Select an SNA service operating as an APPN LEN node to associate with this IP-DLC link service. Default value is the first SNA service on the local computer.

Downstream pool

Enter a **Name** and **Comment** for the pool.

LUA pool

Enter a **Name** and **Comment** for the pool.

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Installation Help

Use the topics in this section to navigate through the Data Integration User Interface.

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Welcome Screen

Be sure to read the Welcome Screen as it contains important information.

Setup cannot install system files or update shared files if the files are in use. Before continuing, close all open applications.

> **Important** Stopping existing SNA Server or Microsoft® Host Integration Server 2004 services will immediately disconnect users from the Host computer and terminates all sessions.

Viewing the Welcome Screen

- Click **Cancel** if you would like to quit setup.

  -or-

  Click **Next** to continue setup.

  Note You can click **Cancel** at any screen to quit the Setup program. If you need to make changes to information you have entered in a previous screen, you can click the **Back** button.

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License Agreement Screen

Read the End-User License Agreement to become familiar with the terms of the Host Integration Server 2004 license.

> **Note** You must accept the License Agreement to complete the server installation.

To accept the End-User License Agreement

1. Select **I accept the License Agreement**.
2. Click **Next**.

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User Information Screen

Enter the Full Name and Organization information.

The Full Name is mandatory and the Organization is optional.

To enter the user information

1. Enter the **Full Name** and **Organization** information.
2. Click **Next**.

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Select Features Screen

From the **Select Features** dialog box, you can select from several options.

- **Browse** allows you to select the location where Host Integration Server will be installed.
- **Disk Cost** displays the disk space requirements for installed components.
- **Reset** sets all features back to the default setting of all components getting installed.
- **Make Features Unavailable** removes features from your current installation option.

To accept features

1. Either accept all of the Host Integration Server features or make options that you do not want to install unavailable.
2. Click **Next** to continue.

Folder Installation Location

For new installations, Setup displays the current location where Host Integration Server 2004 software will be installed. The default location is **C:\Program Files\Host Integration Server**.

For upgrades, the existing folder where the Host Integration Server 2004 or a previous version of SNA Server is installed will be displayed.

Current folder location

1. To change the current folder location where Host Integration Server 2004 will be installed, click **Browse**.
2. You will be prompted to enter the new folder name. Click **OK**.

Checking Disk Cost

To view the disk cost for installed components, click **Disk Cost** on the **Select Features** dialog box.

This dialog box shows the current disk volumes with the disk size, amount of available space, the amount of space required for selected components, and the difference available.

To check disk cost

1. View the Disk Cost information.
2. Click **OK** to close the **Disk Cost** dialog box.

Resetting Install Features

You can reset the selected features back to the original settings by clicking **Reset** on the Select Features dialog box.

To reset the install features

1. Click **Reset** to verify that you want Setup to reset all features to be installed.

All features that were marked as unavailable will now be available to Setup.

Installing Applications Only

It is possible to install applications only, such as Transaction Integrator or Data Integration. Before doing so, you will need to know whether your host application was designed for use with SNA protocols or TCP/IP sockets. To find this information, see your system administrator.

The three custom installation options are as follows:

- **Full Gateway Installation:** (Default) Check both **SNA Application Support** and **SNA Service**. This will install the SNA Service on the local machine. Select this option if your host application is designed for use with SNA protocols such as DLC, IP-DLC, APPC, or LU 6.2.
- **Application Only Installation:** Clear all checkboxes and then select either **Data Integration** or **Application Integration** as appropriate. This will install the selected application(s) on the local machine, but will not install the SNA Service. Select this option if your host application is designed for use with TCP/IP sockets, and not SNA protocols.
- **Nodeless Installation:** Select **SNA Application Support** and also select either **Data Integration** or **Application**

Integration as appropriate. This will install the Host Integration Server 2004 Administrator Client on the local computer. Select this option if your host application is designed for use with SNA protocols such as DLC, IP-DLC, APPC, or LU 6.2, and you are accessing the host through another computer with Host Integration Server installed.

Make Features Unavailable

To make a Host Integration Server 2004 feature unavailable, click the feature icon. One of the two menu options will appear, depending on the item you are selecting. If you make all of the features under **SNA Application Support** unavailable to Setup, the basic SNA Service (SNABASE.EXE) will still be installed. If you make the parent item, SNA Service unavailable, all services under SNA Service will be unavailable to Setup.

The choices for Setup include:

- Will be installed on local hard disk
- Entire feature will be installed on local hard disk
- Entire feature will be unavailable

Note You will see a red "X" when a feature is marked unavailable.

To make a feature unavailable

1. Click the Host Integration Server 2004 feature that you want to make unavailable.
2. Select the **Install** option.

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Services Account Screen

Setup installs a number of services that must be able to log on to the Windows 2000 domain. This requires Setup to create a domain user account and to assign the account the privileges that the services require to operate properly.

You must provide a domain and user name (domain/user) along with the password for the account. If the account does not exist, Setup will create it.

Services Account Configuration screen

1. Type the domain and user name (domain/user).
2. Type and confirm the password.
3. Click **Next**.

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Begin Installation Screen

All required information for the installation process to start has been entered.

Setup will copy all required files and make all configurations to your system.

> **Note** If you need to make any changes to information you have entered, click **Back** and make the appropriate changes.

To start the installation and configuration process

1. Click **Next** to start the Setup process.
2. 3Setup will now copy all required files to your hard disk.

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Finish Installation Screen

To finish the installation and configuration process

1. If you installed components that require SNA support, the Configuration Wizard will start when you click **Finish**.
2. After Setup is completed, click **Finish** to complete the installation process.

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Configuration Wizard Welcome Screen

The Configuration Wizard screens require several pieces of information to properly install the server.

After the Configuration Wizard starts, read the **Welcome** screen, and then click **Next**.

Database Configurations Page

Use the **Database Configurations** page to specify the SQL Server installation where the Single Sign-On (SSO), DB2, and Transaction Integrator (TI) configuration databases reside. In the case of TI, this will also be the location where the .tim files are stored.

To select or change the server or database

1. Under **Name**, select the name of the database, and then click **Edit**.
2. On the **Database Properties** page, select the server and database, and then click **OK**.

Use this	To do this
Server	Select the SQL Server installation that contains the database.
Database	Select the database to be used to store the configuration settings.

3. Click **Next** to apply these settings.

   Security To prevent an attacker from spoofing their identity or tampering with the data in the HIP database:

   1. In **SQL Server**, select a local SQL Server

   2. Under **Connect using:**, select **Windows integrated security**.

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Windows Service Configurations Screen

Review your Windows Services in the grid. To make a change, select a Windows Service and then click **Edit**.

Click **Next** to apply these settings.

Click **Back** to make further changes.

Click **Cancel** to close the wizard without implementing changes.

Security To prevent an attacker from spoofing their identity or tampering with the data in the HIP database:

1. Select **Host Integration Server Service Account**, and then click **Edit**.
2. On the **Host Integration Server Service Account Properties** page, type the user name and password of a valid Windows privileged account, and then click **OK**.

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Select Server Grouping Screen

The Server Configuration screen requires several pieces of information to properly install the server.

If you are unsure of this information, contact your system administrator.

Subdomain

A single Windows 2000 domain can contain one or more SNA subdomains. All the computers in an SNA subdomain must belong to the same Windows 2000 Server domain.

Setup requires you to provide the name of the SNA subdomain in which the server will operate.

> **Note** If you select the Backup Server Role, you will be required to type the Primary Server name when selecting the subdomain.

To input the subdomain name

1. Enter the SNA subdomain name.
2. Enter the **Primary Server** name if this is a Backup server.

Server Role

After choosing the features to install, you must specify the appropriate role for the server in the SNA subdomain: primary or backup.

A subdomain must have only one, primary server. Multiple backup servers are permitted.

To select server role

1. Click **Primary Server** if the system is to be a primary server.

   -or-

2. Click **Backup Server** if the system is to be a backup server, and enter the primary server. If you click Backup Server and leave the primary server box blank, the Configuration Wizard will attempt to locate the primary server in the subdomain. If the primary server is found it will then appear in this box. If not, the box will be left blank and you can enter the name manually.

Active Directory Support

Active Directory (AD) is the directory service for Windows 2000 Server. It stores information about objects on the network and makes this information easy for administrators and users to find and use. AD directory service uses a structured data store as the basis for a logical, hierarchical organization of directory information.

Security is integrated with Active Directory through logon authentication and access control to objects in the directory. With a single network logon, administrators can manage directory data and organization throughout their network, and authorized network users can access resources anywhere on the network. Policy-based administration eases the management of even the most complex network.

If Active Directory is detected, you will be able to select the **Support Active Directory Clients** check box. If Active Directory is not detected, the option will be dimmed.

If you select the Support Active Directory Clients, you will be required to type the relative path to the Organizational Unit.

Active Directory Support

1. Select the **Support Active Directory Clients** check box.
2. Type the **Active directory domain name**.
3. Type the name of the **Organizational unit**.
4. Click **Next** after you have completed the Server Grouping information.

Resource Location Mechanism Screen

To locate server computers, select one of the following:

Click **Locate servers by subdomain** and then enter a valid subdomain in the box.

Click **Locate servers by server name**, enter a server name, and then click **Add** or **Remove** to manage the list of server names.

Click **Locate servers using Active Directory organizational unit**, and then click **Add** or **Remove** to manage the list of organizational units.

Click Advanced for additional locating options.

Click **Next** to apply these settings.

Click **Back** to make further changes.

Click **Cancel** to close the wizard without implementing changes.

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Network Protocols Screen

The **Protocols** dialog box allows you to choose the protocols that Host Integration Server 2004 will support.

You can select one or more of the protocols detected on the server.

Protocols not detected on the server will be dimmed and cannot be selected.

Choose the correct Client/Server Protocols information

1. Select the **Client/Server Protocols** information for your installation.
2. Click **Next** after you have completed the **Client/Server Protocols** information.
3. Click **Finish** to complete the **Configuration Wizard**.

TCP/IP

Transmission Control Protocol/Internet Protocol (TCP/IP) is the recommended protocol for most installations.

- Check this option (default if detected) to support Telnet clients or to allow client computer access to the Internet.
- Clear this option and select another supported protocol if you do not want to support the TCP/IP protocol.

Microsoft Networking (Named Pipes)

Microsoft Networking (Named Pipes) is a standard feature in Microsoft Windows 2000. For efficiency reasons, it is recommended that you use this only if no other protocols are installed.

- Check this option to support client computers that will use Microsoft Networking.

Novell NetWare (IPX/SPX)

If the Netware protocol is installed and selected you will be required to type all required Netware information. If Novell Directory Services is selected, you will be required to type the Tree Name and Context Name.

- Check this option to support Novell NetWare clients.

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DB2 Distributed Transaction Service Screen

In the **Resync port** box, enter a valid Windows port.

In the **Partner DB2 resource manager network address** box, enter a valid IP address, and then click **Add**. The name will be added to the **Configured partner DB2 resource managers** box.

In the **Maximum connections** box, enter a number from 1-100.

In the **Worker threads** box, enter a number from 1-16.

Click **Next** to apply these settings.

Click **Back** to make further changes.

Click **Cancel** to close the wizard without implementing changes.

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Summary Screen

Expand the view to review your configuration choices.

Click **Save** to capture the configuration XML.

Click **Next** to apply these settings.

Click **Back** to make further changes.

- Click **Cancel** to close the wizard without implementing changes.

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Completing the Wizard Screen

All the required information for the Configuration Wizard has been entered.

Setup will complete configuration settings to your system.

To finish the Configuration Wizard

Click **Back** to re-enter any **Configuration Wizard** information, or click **Finish** to complete the **Configuration Wizard** process.

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Configuration Options Screen

Some of the features you have installed require SQL Server. Would you like to configure these databases at this time?

Transaction Integrator and DB2 Distrubuted Transactions over IP both require a SQL Server database to run.

Select **Yes** to create and configure these databases within the Configuration Wizard.

Select **No** to perform this step later.

Do you want to create a new SSO System or Join an existing SSO System? Creating a new SSO system will create the credential database and make this computer the master secret server.

Select **Create** from the drop-down list if this is the first SSO server you configure in your SSO system. This will also create and configure the SSO Credential database. You must backup the secret on this secret server after configuration is completed. You can backup the secret using the SSO command line utility, ssoconfig.exe, located at \Program Files\Common Files\Enterprise Single Sign-On\.

You should configure the master secret server as a stand-alone server. You must be an SSO administrator while performing this configuration task.

Select **Join** from the drop-down list for subsequent SSO Servers in the SSO system. These servers are the processing servers and administration servers**.**

Note that if you are installing the Enterprise Single Sign-On feature and you already have Microsoft BizTalk Server 2004 deployed on your machine, you must complete the following three steps before installation:

- Back up the SSODB to a secure location
- Back up the Master Secret Key on the Master Secret Server
- Update the Master Secret Server

  For detailed procedures on these actions, see the Host Integration Server 2004 Readme file on your product CD.

  It is not necessary to update the SSO Servers (non-Master Secret Servers) from your BizTalk Server 2004 installation, or any new SSO Servers installed with Host Integration Server 2004.

Do you want to reuse the existing configuration? If not, do you want to create a new SSO System or Join an existing SSO System. Creating a new SSO system will create the credential database and make this computer the master secret server.

Select **Reuse** if you need to re-use existing data. This can be done on a Master Secret Server or on a Processing SSO Server. If you do this on the master secret server, you must restore the secret that you backed up on this secret server after configuration is completed. You can restore the secret using SSO command line utility, ssoconfig.exe.

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Windows Accounts Screen

Windows Accounts

This screen lists the Group accounts used by features in the product.

The HIS Administrators group must be a local group. Members will have rights to perform administrative functions. If this group does not exist, it will be created and the logged on user will be added.

The HIS Runtime group must be a local group. It will contain the service accounts used by the product. This group will be created if it does not exist.

The domain group is created automatically if you specify a domain group during configuration for the SSO Administrators and SSO Affiliate Administrators groups.

Windows Service Configuration

The Host Integration Server Service Account specified will be used for all the services installed by the product. It is recommended that this be a low privilege account with no local administrator rights.

Configuration Options (Client deployment) Screen

The Host Integration Server Client has the following three deployment options. (If you do not have local administrator rights, the wizard will bypass this screen and proceed with a **Just me** configuration.)

Selecting **Just me** configures SNABASE.exe to run as an application (as opposed to a Windows Service), saving configuration changes to the HKEY_CURRENT_USER registry. The settings will only apply to the user who is currently logged on.

Selecting **Everyone** configures SNABASE.exe to run as an application (as opposed to a Windows Service), saving configuration changes to the HKEY_LOCAL_MACHINE registry, under the SOFTWARE key. These settings will apply to all users, overriding any settings in HKEY_USERS.

Selecting **Windows Service** causes SNABASE.exe to run as a Windows Service (as opposed to an application), saving configuration changes to the HKEY_LOCAL_MACHINE registry, under the SYSTEM key. These settings will apply to all users.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Link Service Adapter

Link service allows Host Integration Server 2004 to communicate with host, peer, or downstream computers over token ring and Ethernet Local Area Networks.

Configure a DLC 802.2 Link Service

A DLC 802.2 link service allows Host Integration Server 2004 to communicate with host, peer, or downstream computers over token ring and Ethernet Local Area Networks.

Title

The default title is DLC 802.2 Link Service #1. To change the default title, delete the title and enter a new title for this link service. You can use up to 40 characters for the title.

Adapter

Select the adapter card you are using for this service.

Local Service Access Point (SAP)

Enter the local SAP. This number must be a multiple of 4, ranging from 4 through 252. In most cases, the SAP for Host Integration Server 2004 is 4.

Select **Use Fixed SAP** to use a fixed SAP address.

Select **Allow Link Service to be Distributed** to allow this service to be distributed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Demo SDLC Link Service

Configure a demonstration SDLC link service. This service uses a script file to simulate an SDLC link service.

Title

The default title is Demo SDLC Link Service #1. To change the default title, delete the title and enter a new title for this link service. You can use up to 40 characters for the title.

Script File

Select a demonstration script file from the drop-down list.

Select Allow Link Service to be Distributed to allow this service to be distributed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Distributed Link Service Properties

Service Title

The default title is Distributed Link Service #1. To change the default title, delete the title and enter a new title for this link service. You can use up to 40 characters for the title.

Link Type

Select the type of link service represented by this Distributed Link Service from the drop-down list.

Primary Remote Link Services:

Enter the name of the remote link service used by this service.

Alternate Remote Link Services

Enter the name of an alternate remote link service used by this service.

Select **Compression used** if data compression is to be used on this link service.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

APPC Mode Properties

The following tabs are available on the APPC Mode Properties Sheet:

- General
- Limits
- Characteristics
- Partners
- Compression

APPC Mode Properties: General

Mode Name

Enter a Mode Name.

Comment

Optionally, type a comment of not more than 25 characters.

APPC Mode Properties: Limits

Parallel Session Limit

Specify the maximum number of sessions allowed with this mode. To allow only a single session, specify 1. To allow parallel sessions, specify a value greater than 1. If the local APPC LU to be used with this mode is dependent, specify 1; dependent local APPC LUs cannot have parallel sessions. One of the key mode properties is the **Parallel Session Limit**. This limit determines whether an LU-LU pair can carry on only one interaction at a time (a parallel session limit of 1), or multiple concurrent interactions (a parallel session limit greater than 1). If parallel sessions are to be allowed with an LU-LU pair, the local LU must be independent, and the remote LU in the pair must support parallel sessions.

If the LU-LU pair can carry on multiple parallel sessions, other mode properties, such as minimum contention winner limit, determine to what extent each LU can initiate interactions.

Minimum Contention Winner Limit

Specify the Minimum Contention Winner Limit. The sum of the Minimum Contention Winner Limit and the Partner Min Contention Winner Limit must be less than or equal to the Parallel Session Limit.

Partner Min Contention Winner Limit

Specify the Partner Min Contention Winner Limit. The sum of the Partner Min Contention Winner Limit and the Minimum Contention Winner Limit must be less than or equal to the Parallel Session Limit.

Automatic Activation Limit

Specify the number of contention winner sessions to be activated for the local LU whenever the connection for this mode is started. In a local contention winner session, the local LU can initiate conversations without permission from the partner LU.

This does not apply for single-system APPC (communication between two local LUs on the same system).

APPC Mode Properties: Characteristics

Pacing Send Count

Specify the maximum number of frames for the local LU to send without an SNA pacing response from the partner LU. If you specify 0, the local LU can send an unlimited number of frames without receiving a response; in this case, the partner LU can negotiate and set a limit on the count.

Pacing Receive Count

Specify the maximum number of frames for the local LU to receive from the partner LU before the local LU sends an SNA pacing response. If you specify 0, the local LU can receive an unlimited number of frames without sending a response.

Max Send RU Size

Specify the maximum size for RUs sent by the TP(s) on the local system.

It is not necessary to set a minimum send RU size, which is 256 on Host Integration Server 2004.

Max Receive RU Size

Specify the maximum size for RUs received from the TP(s) on the remote system.

It is not necessary to set a minimum receive RU size, which is 256 on Host Integration Server 2004.

High-Priority Mode

Select to give preference to communication with this mode over communication with a low-priority mode.

APPC Mode Properties: Partners

This tab allows you to **Add** or **Remove** APPC LU partnerships from the Host Integration Server 2004 configuration file. The mode name appears in the title. The list box shows the **Server**, **Local LU Alias**, **Remote LU Alias**, **Connection**, and which LUs are partnered with the APPC mode in the title.

Remove

Click **Remove** to delete APPC LU partnerships from the Host Integration Server 2004 configuration file.

Add

1. Click **Add** to add APPC LU partnerships from the Host Integration Server 2004 configuration file. The **Add Partnerships** dialog box appears.
2. Select a **Server name** from the subdomain by clicking the DOWN arrow in the drop down list.
3. After the server is selected, a list box showing **Local LU**s and a list box showing **Partner LU** and **Connection** are filled. Make selections from each list to establish partnerships.
4. Click **Apply** to add pairs to the **APPC Mode Properties: Partners** page while keeping the **Add Partnerships** dialog active.
5. When you finish selecting partnerships, click **OK** on the **Add Partnerships** dialog to return to the **APPC Mode Properties: Partners** page.
6. Click **OK** on the **APPC Mode Properties: Partners** page to commit the changes to the Host Integration Server 2004 configuration file.

   Note You can select multiple modes for partnerships using the same LUs. Press the SHIFT key and the CTRL key and click to select non-contiguous modes.

   Note The Host Integration Server 2004 configuration file is updated dynamically. There is no need to stop and restart SNA service.

APPC Mode Properties: Compression

Maximum Send Compression

Select the maximum compression desired from the drop down list. The valid values are: **None**, **Run Length Encoding (RLE)**, and **LZ9**. These options offer progressively better compression, but at a progressively higher CPU usage.

Maximum Receive Compression

Select the maximum compression desired from the drop down list. The valid values are: **None**, **Run Length Encoding (RLE)**, and **LZ9**. As with Maximum Send Compression, these options offer progressively better compression, but at a progressively higher CPU usage cost.

Allow LZ and RLE Compression

If LZ9 is used, this option controls whether data is compressed using RLE before being further compressed using LZ9.

Endpoint Only Compression

This option controls whether intermediate nodes may use compression if one of the endpoints does not support or otherwise does not use compression.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

3270 LU Properties: General

LU Number

Enter the LU Number for LUs on 802.2, SDLC, or X.25.

Enter an appropriate LU Number.

LU Name

Type the LU Name.

Connection

The connection for this LU is shown. The connection cannot be changed from this dialog box.

Pool

If the LU has already been assigned to a pool, the pool name appears here.

Comment

Optionally, enter a comment of not more than 25 characters.

Use Compression

Select this option to enable 3270 LU data stream compression. This option must also be set in the host VTAM configuration for the LU.

User Workstation Secured

Select this option to enable a higher level of security. When the option is selected the user can only acquire an LU if:

- the user's User Record is assigned to this LU, and
- the user's workstation has been defined with a Workstation Definition.

3270 Display LU Properties: Associated Printer LU

Display LU

Shows the display LU name if you have already created a display LU; otherwise, this will be filled in when you complete the configuration of this display LU.

Associated Printer LU

Click the DOWN arrow to display the list of available printer LUs on this connection. Choose a printer LU to associate with this display LU. If you have not created any printer LUs on this connection, you must do so before they will appear in the list.

3270 LU Properties: LUA

The following tabs are available on the 3270 LUA Properties Sheet:

- LUA General
- TN3270
- IP Address List

3270 LU Properties: LUA General Tab

LU Number

Enter the LU Number for LUs on 802.2, SDLC, or X.25.

Enter an appropriate LU Number.

LU Name

Type the LU Name.

Connection

The connection for this LU is shown. The connection cannot be changed from this dialog box.

Pool

If the LU has already been assigned to a pool, the pool name appears here.

Comment

Optionally, enter a comment of not more than 25 characters.

Use Compression

Select this option to enable 3270 LU data stream compression. This option must also be set in the host VTAM configuration for the LU.

User Workstation Secured

Select this option to enable a higher level of security. When the option is selected the user can only acquire an LU if:

- the user's User Record is assigned to this LU, and
- the user's workstation has been defined with a Workstation Definition.

High Priority Mode

Select this option to increase the priority for this LU.

> **Note** Two additional property pages appear when the LU is assigned to a TN3270. These are the TN3270 property page and the IP Address List page.

3270 LU Properties: TN3270 Tab

Type

Select from the list the display or printer type.

Generic Display

This is the default pool type. The display LU or pool will be assigned to a client computer that either does not specify a particular LU or Pool, or that requests this LU or Pool by name.

Specific Display

The LU or pool configured as specific will only be assigned to client systems that request this LU or pool, and not to clients making generic requests.

Generic Printer

The printer LU or pool will be assigned to a client computer that either does not specify a particular LU or pool, or that requests this LU or pool by name. When this option is checked, the **terminal name** will default to IBM-3287-1.

Specific Printer

The printer LU or pool configured as specific will only be assigned to client computers that request this LU or pool, and not to client computers making generic requests. When this option is checked, the **terminal name** will default to IBM-3287-1.

Associated Printer

Printer LUs can be marked as associated instead of generic or specific. To associate a printer LU with a terminal LU, select this option and choose the **Associated LU** from the drop-down list box. When this option is checked, the **terminal name** will default to IBM-3287-1.

Sessions

This is the number of TN3270 sessions allowed for the selected LU or pool. The number of TN3270 sessions must not exceed the number of LUs listed under Host Integration Server 2004 Resource Information.

If you reduce the TN3270 Sessions limit to 0 (zero) TN3270 service will not assign the LU or pool.

Associated Printer

When the **Type** option **Associated Printer** is selected, choose an **Associated Printer** from the drop-down list. In this case, the printer LU is partnered with one terminal LU. A client computer accesses that printer LU by sending in an "associate" request and giving the name of the terminal LU with which the printer LU is partnered.

Terminal types

TN3270 service will default to IBM Terminal Model 2. To add a different terminal model to this LU, click the corresponding number (**2**, **3**, **4**, or **5**) to the left of the list of terminal names. After a Terminal Model is selected, Terminal Names are automatically assigned. You can remove selection of individual terminal names that do not apply to your network configuration by clearing the checkbox opposite the name, or you can clear all terminal names by clicking **Clear**.

> **Note** The terminal name strings selected must be compatible with the host logmode entry for the LU. For printer LUs, the **Terminal Name** will default to IBM-3287-1.

Port

Select **Default port** to use the port number configured with the service (on the Service Properties page), or select a port from the list. The list displays all of the defined TN3270 ports along with their Security setting (High, Medium, Low, None, or Unsecured).

> **Note** TN services listen on multiple ports simultaneously. You can set a default number for the TN service and override this number on a per session basis, allowing a single client computer to connect to multiple host computers.

> **Note** TN3270 client systems can only access LUs that are configured as generic terminal LUs. TN3270 client systems can access generic, specific, and associated LUs.

> **Note** Configuration changes are apparent only to users who establish a connection after the configuration changes are saved. Users who were connected at the time the configuration changes were made will not be affected.

3270 LU Properties: IP Address List

You can associate this LUA to a specific IP address or server name.

Add Address

Click to specify the **IP Address** and **Subnet Mask** of the client workstation to which you are granting access.

IP Address

Click an entry in the **IP Address** column to edit the IP address for a client workstation.

Subnet Mask

Click an entry in the **Subnet Mask** column to edit the subnet mask for a client workstation.

Add Name

Click to add a workstation name to the **IP Address** list box. The workstation name identifies that a client workstation whose address resolves to that name can connect to the service.

Remove

Click to remove an entry that is currently highlighted in the **IP Address** list box.

Clear All

Click to remove all entries in the **IP Address** list box. The service will then be configured to allow access from any client workstation.

> **Note** The IP address must be changed from the default value of 0.0.0.0 if you want to assign a specific IP address. If you try to add the default IP address with the default subnet mask value, you will receive a message indicating an Invalid IP Address/Subnet Mask.
>
> The IP address of an incoming connection is compared to each of the available LUs or pools in turn. Each resource has an associated list of IP address patterns and subnet masks. The IP address from the incoming connection is masked (by bit and by the resource's subnet mask), then compared to the resource's IP address pattern masked by the resource's subnet mask. If the result is equal, the connection is allocated to this resource.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

3270 LU Properties: Down Stream

LU Number

Enter the LU Number for LUs on 802.2, SDLC, or X.25.

Enter an appropriate LU Number.

LU Name

Type the LU Name.

Connection

The connection for this LU is shown. The connection cannot be changed from this dialog box.

Pool

If the LU has already been assigned to a pool, the pool name appears here.

Comment

Optionally, enter a comment of not more than 25 characters.

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Pool Properties: General

Pool Name

Enter a name for this pool.

Comment

Optionally, enter a comment of not more than 25 characters.

Pool contains Display LUs with Associated Printers

This option is intended for users whose host applications have a direct relationship between display LUs and printer LUs (i.e., this applies to display-type pools only). With this option selected, all display LUs in the pool will be treated as though they have associated printer LUs. Also configure the display and printer LUs with the LU numbers that the host application is expecting.

Pool Properties: Display Model

Display Model

If you select **Display** for the LU Type, you can select a Display Model.

When an LU is assigned to a pool, the display model setting for the pool overwrites the setting of the LU, and the setting displayed in the **3270 LU Properties** dialog box is dimmed.

Some emulators can only emulate certain display models. For more information, see your emulator documentation. If there is a conflict between the Display Model setting for the pool and the Display Model setting for an LU in the pool, a message box appears. You can configure the individual LU setting to change or exclude the LU from the pool.

Model can be overridden

Select this check box to allow the user to override the display model type by using a 3270 terminal emulation program.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

User Properties

User Name

Provided for information only. This field cannot be changed here.

Domain

Provided for information only. This field cannot be changed here.

Comment

Optionally, type a comment of up to 25 characters.

Use Client/Server Encryption

Check this box to enable encryption between the client system and the Host Integration Server 2004.

Allow Access To Dynamically Created Remote APPC LUs

Check this box to let this user or group use dynamically created APPC LUs.

APPC Defaults

Local APPC LU

If this user will be using APPC programs (TPs, 5250 emulators, or APPC applications), you can choose a default local APPC LU to be used when the user starts such programs.

Avoid assigning a default local APPC LU to the group "Everyone". Instead, to make a local APPC LU available to any user, when configuring the local LU, select the check box labeled **Member of Default Outgoing Local APPC LU Pool** on the **Advanced** tab of **Local LU Properties**.

Remote APPC LU

If this user will be using APPC programs (TPs, 5250 emulators, or APPC applications), you can choose a default remote APPC LU to be used when the user starts such programs.

To accept the settings, click **OK**; to exit the dialog box without accepting the settings, click **Cancel**.

When you assign default APPC LUs to user and group accounts with overlapping memberships, some of these assignments override others.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

TN3270 Properties: General

Name

Displays the name of the server running the TN3270 service. This field cannot be edited here.

Comment

Optionally, type a comment of up to 25 characters.

Use Name Resolution

Name Resolution should only be selected if you are running a domain name resolver. A domain name resolver catalogs IP addresses and corresponding network names of connected computers. The domain name resolver allows you to enter the name of a computer rather than the IP address when an IP address is required.

TN3270 Mode only

The TN3270 service also supports TN3270E, an enhancement to TN3270. When a client computer first connects to a computer running TN3270 service it negotiates which functions they both support. TN3270 emulators should be able to negotiate with TN3270 service, if only to state that they do not support TN3270. However, some TN3270 emulators are unable to negotiate properly with TN3270 service, causing the negotiation to fail. For this reason the TN3270 service has an option to default to TN3270 mode and not to use TN3270 features, so that these TN3270 negotiation problems do not occur.

Printer Flow Control

If a TN3270 service adheres strictly to the specification described in RFC 1647, there is no way of implementing flow control between a computer running TN3270 service and a TN3270 client. In practice this causes no problems for display emulators, but it does cause a problem for printer emulators, which can be overloaded with data and have no way of notifying the TN3270 service that they cannot process any more messages. If this option is turned on, the TN3270 service sends all messages to a TN3270 printer client as RESPONSE-REQUIRED, and does not send any messages until it has received a response for the previous message.

Close Listen Socket

By default the TN3270 service always has a socket open to listen for incoming requests. If this option is turned on, the TN3270 service stops listening on this socket after all of its defined LUs are in use. The purpose of this is to work with emulators that can try to connect to a number of computers running TN3270 service and that connect to whichever computer accepts their connection attempt. In this case it is useful if a computer with no LUs available is not listening.

Log Normal Audit Events

If this is set, audit messages are logged. These are messages that log successful client connection and successful client termination.

Use SNA Event Log

If this is selected, all TN3270 service event messages are written to the event log being used by the Host Integration Server 2004 system. If this is not set, all TN3270 service event messages are written to the Windows event log on the local machine.

TN3270 Properties: Port/Security

This property page contains two groups.

The **Defined ports** group displays information pertaining to the currently configured 3270 Server ports.

The **Configure ports** group consists of controls for adding, editing, and deleting port configurations.

Defined ports

Port

Lists all ports and corresponding Security settings. On a new installation, setup automatically defines Port 23 as the Default Port.

Security

Displays the level of encryption/authentication assigned to that port. Values are High (168), Medium (128), Low (40), and Unsecured (TLS/SSL not enabled). Default is **Unsecured**.

Client certificate

Displays status: Required or Not required. Default is **Not Required**.

Comment

Displays a comment.

Port configuration

Port

Enter a valid port number from 1-65535.

Security

Choose a setting from the list: High (168), Medium (128), Low (40), or Unsecured. Default is **Unsecured**.

Comment

This is optional. Maximum length allowed is 25 characters.

Verify client certificate

If selected, the client will have to provide a valid certificate to make the connection. Default is not selected. If Security level is set to Unsecured, this option is unavailable.

Note The client requires a valid Certificate with the following properties:

- Type X509
- Client Authentication
- Associated private key

These certificate settings may match some of those you would not choose to grant access to. It is therefore recommended that you check the list of default Trusted Root Certification Authorities in the TN3270 Service Store, and remove any you do not want to be there.

TN services listen on multiple ports simultaneously. You can set a default port number for the TN service (assign the port number to the server) and override this number on a per session basis (assign the port number to the LU session), allowing a single client computer to connect to multiple host computers.

You can also add the TN3270 port by using the SnaCfg tool, with the command and parameters shown below:

```
TN3PORT tn3270Server:PortNumber /ADD
   /COMMENT:"comment"
   /SECURITY:{ None | Low | Medium | High }
   /CLIENTSertVALAUTH:{ Yes | No }
```

The properties of the command are described in the following table:

Property or Method	Description	Validation
/COMMENT:Text	The comment field	0 – 25 characters
/SECURITY:Type	Security level	None, Low, Medium or High
/CLIENTCertVAL:YesNo	Indicates whether the client certificate verification is enabled	No – disabled Yes - enabled

Default Port

On a new installation, setup automatically defines Port 23 as Default Port. There can only be one default port at a time. After a port has been designated Default Port, it cannot be deleted until another Default Port has been selected. The default is **Not Selected**.

Adding Ports and Security

This property page allows increased security through support for Secure Sockets Layer (SSL) and TLS for all network transport-level services.

Although the Microsoft 3270 Client (emulator) does not support SSL or TLS, many third-party software vendors offer 3270 emulators that support this functionality, including Attachmate, IBM, NetManage, and WRQ.

To add a new port

1. On the **TN3270 Properties: Port/Security** page, click **New**.
2. Enter the port number and select a security level (default is Unsecured). You can also add a comment and make this the default TN3270 Server port.
3. For maximum security, check the Client Certificate checkbox.

To edit the properties of an existing port

1. On the **TN3270 Properties: Port/Security** page, highlight the port.
2. Click Edit.
3. When you are finished, click **Save**.

TN3270 Properties: Settings

Idle Timeout

Specify time limits. If the session is inactive for this length of time, then TN3270 service disconnects the client system.

Init Status Delay

Specify time limits. This is the delay between the time when TN3270 service connects to a host session and the time the TN3270 service starts updating the client screen. There are often a large number of startup messages when the TN3270 service first connects to a host session, and this option gives the user the opportunity not to receive them all.

Message Close Delay

Specify time limits. When TN3270 service forces a client computer to disconnect (for example, when the Host Integration Server 2004 session to the host has been lost), it sends the client computer an error message to be displayed on the screen. This value specifies the time between sending the message to the client computer and closing the socket with the client computer (which causes some client computers to clear the screen, and so erase the message).

Refresh Cycle Time

Specify time limits. This is the delay between updates of the status on the display.

Default RU Sizes - Inbound and Outbound

This controls the RU size (SNA message size) used by the TN3270 service for logon messages to and from the host. The minimum value for inbound or outbound RU size is 256 bytes. If the host application sends large logon screens, these values should be increased.

Certificate CN

> The common name of the certificate used if TLS/SSL is enabled.

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Connection Properties: SDLC

The following tabs are available on the SDLC Connection Properties sheet:

- General
- Address
- System ID
- SDLC

Connection Properties: General

Name

Enter a Name.

Link Service

Select a link service from the drop down list. If the link service you want is not in the list, click **Cancel**.

Comment

Optionally, enter a comment of not more than 25 characters.

Remote End

Select the type of remote system for this connection:

- Host System
- Peer System
- Downstream
- PU Passthrough

  If this connection will be used for 3270 or LUA LUs, then select Host System.

  If you will be using dependent APPC, which relies on a host system for communications, then select Host System, not Peer System.

Allowed Directions

Select the allowed call direction(s), **Outgoing Calls** and/or **Incoming Calls**.

Selecting **Outgoing Calls** causes Host Integration Server 2004 to initiate the link-level connection to the remote system or host. If a remote system tries to initiate a connection, Host Integration Server 2004 will not accept the connection attempt.

Selecting **Incoming Calls** causes Host Integration Server 2004 to accept connection attempts from remote systems or hosts.

If both are selected, Host Integration Server 2004 will both initiate a connection and accept connection attempts by other systems.

When multiple SDLC connections all use the same link service, and the connections accept incoming calls, the encoding (**NRZ/NRZI**) settings for all the connections must match.

Activation

If **Outgoing Calls** are included in Allowed Directions, select an Activation setting:

On Server Startup. Select this option if you want the connection to be readily available whenever the server is started.

On Demand. Select this option if you want the connection to be started when needed, and stopped when not in use.

By Administrator. Select this option if you want the administrator to control the connection on a case-by-case basis.

Passthrough via Connection

Displays a list of available (unpaired) PU Passthrough Connections. Connections that have already been paired are not available. Choose a connection that will route you to your destination PU. If PU Passthrough is not selected in the Remote End field, this list is unavailable.

Supports Dynamic Remote APPC LU Definition

Automatically configures the APPC Remote LUs as users request them. This feature requires that an APPN End Node or Net Node be available on the connection. This feature is for convenience, and should not be used in situations of restricted access. If Host System or Peer System is not selected in the Remote End field, this option is unavailable.

With dynamic APPC configuration, if a user requests a session with a valid remote LU, the connection will be established even if the remote LU has not been configured in SNA Manager. If a connection is designated to support dynamic APPC configuration, Host Integration Server 2004 will automatically define a remote LU and partner it with a local LU when needed. However, to take advantage of session status and other features of Host Integration Server 2004, it is recommended that administrators configure commonly used remote LUs.

Connection Properties: Address

Dial Data

If this connection uses a switched line and the phone number is not stored in the modem, enter the dial data. With a leased SDLC line, this field is unavailable.

For ways to supply a phone number to the modem, see Phone Number Storage and Modem Types below.

Poll Address

Type a two-digit hexadecimal number. Contact the administrator of the remote system to determine the appropriate value. If the remote system is a host, the local poll address should match the VTAM PU definition for the ADDR= parameter.

If the remote system is a peer, the poll address can be any value except the reserved values 00 and FF. When the connection is used, the link roles will be negotiable; the system that takes on the primary role uses the poll address of the other system, so that the poll addresses match during the session.

> **Note** Do not use 00 or FF. These values are reserved.

Encoding

Select the encoding scheme for your modem to use.

Your modem must use the same encoding scheme as the modem at the remote computer.

One of two encoding methods for modems:

- NRZ — Non-return to zero
- NRZI — Non-return to zero inverted

  For connections to host systems, the encoding scheme must match the NRZI setting in the LINE/GROUP definition in VTAM. Obtain this setting from the host administrator. If VTAM does not specify an NRZI setting, it defaults to NRZI=YES.

  When multiple SDLC connections all use the same link service, and the connections accept incoming calls, the encoding (**NRZ/NRZI**) settings for all the connections must match.

Phone Number Storage and Modem Types

Host Integration Server 2004 can store a phone number and then send the number (in ASCII) to a modem, which dials the number. This requires that the modem be attached to an SDLC adapter with a built-in serial (COM) port (for example, the SDLC adapters from MicroGate).

Several connection parameters must be set to work with your modem: Dial Data the duplex setting, half-duplex or full-duplex, and the encoding scheme.

Changing the Host Integration Server 2004 Dialing Method

To change the Host Integration Server 2004 dialing method for a modem, use the Host Integration Server 2004 Link Service Setup program to modify the link service. Restart SNA Manager and, from the **File** menu, choose **Save Configuration**.

Modem Requirements for Accepting a Phone Number from Host Integration Server 2004

To accept a phone number from Host Integration Server 2004, your modem must be set up so that it will:

- Accept dial commands in ASCII (eight data bits, no parity bit, one stop bit).
- Not dial when the DTR signal is raised.
- Set Clear to Send (CTS) and Data Set Ready (DSR) to **On** when ready to accept dial commands.
- Set DSR to **Off** after accepting a dial command.
- Set DSR to **On** again when (and only when) the dialed connection is made.

- Change to **Synchronous** mode after the dial-up has completed.
- Change back to **Dial-command** mode if Data Terminal Ready (DTR) is dropped and raised again.

Host Integration Server 2004 Actions When Sending a Phone Number

When Host Integration Server 2004 is sending a phone number to a modem, it ignores modem responses and holds the modem interface signals Select Standby and DTR to **Off**.

The dialing attempt initiated by Host Integration Server 2004 is assumed to have failed if one of the following occurs:

- DSR stays on after the dial string has been sent.
- The connection time-out expires before DSR comes on to indicate that the call is connected.

  When Host Integration Server 2004 creates a dial string to send to a modem, it uses the outgoing command string supplied in Setup as a base, and then appends the Dial Data (phone number) configured in SNA Manager, followed by a carriage-return line-feed sequence.

Affiliate Application

If you selected Single Sign-On, choose an Affiliate Application from the list. The Enterprise Single Sign-On (SSO) Affiliate applications are logical entities that represent a system or sub-system such as a host, back-end system, or line of business application to which you are connecting using SSO. An affiliate application can represent a back-end system such as a mainframe or UNIX computer. It can also represent an application such as SAP, or a subdivision of the system, such as the "Benefits" or "Pay stub" sub-systems.

Connection Properties: System ID

Local Node Name

Network Name

If you are instructed by the administrator of a remote host, peer, or downstream system, and if you are using Format 3 XIDs, type the Network Name of the remote system. Format 3 is the default XID type.

The Network Name works with the Control Point Name to identify a system. If either of these parameters is supplied, the other should also be supplied.

Control Point Name

If you are instructed to by the administrator of a remote host, peer, or downstream system, and if you are using Format 3 XIDs, type the Control Point Name of the remote system. Format 3 is the default XID type.

The Control Point Name works with the Network Name to identify a system. If either of these parameters is supplied, the other should also be supplied.

Local Node ID

If this connection uses a switched SDLC line (standard telephone line) to connect to a host system, type the Local Node ID. Use the same Local Node ID for all connections and link services on a particular server.

If this connection uses a leased SDLC line, you can use the default for the Local Node ID.

> **Note** Do not use 000 or FFF for the first three digits; these values are reserved.

XID Type

Select the XID Type. Most systems use Format 3.

If you want to use independent APPC LUs on this connection, you must select Format 3.

When Host Integration Server 2004 is configured to use Format 0 over a host connection, the host treats it as a PU type 2.0, and so Host Integration Server 2004 exercises only its PU type 2.0 capabilities. When Host Integration Server 2004 establishes a host or peer connection using Format 3 and independent LUs, Host Integration Server 2004 exercises its PU type 2.1 capabilities.

For configuration changes to take effect, restart the server.

Remote Node Name

Network Name (Remote Node)

If you are instructed by the administrator of a remote host, peer, or downstream system, and if you are using Format 3 XIDs, type the Network Name of the remote system. Format 3 is the default XID type.

The Network Name works with the Control Point Name to identify a system. If either of these parameters is supplied, the other should also be supplied.

Control Point Name (Remote Node)

If you are instructed to by the administrator of a remote host, peer, or downstream system, and if you are using Format 3 XIDs, type the Control Point Name of the remote system. Format 3 is the default XID type.

The Control Point Name works with the Network Name to identify a system. If either of these parameters is supplied, the other should also be supplied.

Remote Node ID

If instructed to by the administrator of a remote host, peer, or downstream system, type the Remote Node ID.

> **Note** Do not use 000 or FFF for the first three digits; these values are reserved.

Peer DLC Role

Select the DLC role for this connection. The options are:

- Primary
- Secondary
- Negotiable

Connection Properties: SDLC

Max BTU Length

Specify the Maximum Basic Transmission Unit (BTU) Length.

The range is from 265 through 16393; the default is **265**.

With an IBM SDLC adapter, set the Max BTU Length to 521 or less.

Maximum Basic Transmission Unit length. The maximum number of bytes that can be transmitted in a single data-link information frame. A BTU is sometimes called an I-frame.

For downstream connections, specify a Max BTU Length less than or equal to the maximum value supported by software on the downstream system.

For host connections, specify a Max BTU Length less than or equal to the VTAM PU definition for the MAXDATA= parameter.

Data Rate

Select the Data Rate.

The data rate for transmissions between the Host Integration Server 2004 communications adapter and the modem:

- **Low** gives more reliable transmissions and prevents the transmission errors sometimes caused by poor-quality lines at the high rate. If a fall-back line speed setting is supported by your modem and communications adapter, and you want to enable it, select **Low**.
- **High** gives faster transmissions. If you select **High**, the CCITT line 111 on the V24 interface of your modem is set to on.

  Check your adapter and modem manuals to find out if the data rate can or must be set for your equipment.

Duplex

Select the setting that matches your modem:

- For a half-duplex modem, select **Half**. If none of your adapters were installed with the Constant RTS option set, you can only choose half-duplex.
- For a full-duplex modem, select **Full**. If you want to use the full-duplex setting, one or more of your adapters must have the Constant RTS option set (at installation).

  Most servers will use the default, **Half**.

Idle Timeout (for host or peer connections)

Specify the length of time, in tenths of a second, for the local system to wait for a response to a transmission before trying again. Too small of a timeout can cause connection problems. This parameter affects sessions in which the server has a link role of secondary; therefore, it affects all sessions with a host system and some sessions with a peer system (where the link role is negotiable).

The range is from 1 (one-tenth of a second) through 300 (30 seconds). The default is **300** (30 seconds).

Idle Retry Limit (for host or peer connections)

Specify the number of times for the local system to try to send data to the remote system if there is no response. This parameter affects sessions in which the server has a link role of secondary; therefore, it affects all sessions with a host system and some sessions with a peer system (where the link role is negotiable).

The range is from 1 through 255; the default is **10**.

Poll Rate

If the remote system is a peer or downstream system, specify the **Poll Rate** (in polls per second).

The range is from 1 through 50 polls per second; the default is **5**.

Poll Timeout (for peer or downstream connections)

Specify the length of time, in tenths of a second, for the local system to wait for a response to a poll before trying again. Too small of a timeout can cause connection problems. This parameter affects sessions in which the server has a link role of primary; therefore, it affects all sessions with a downstream system and some sessions with a peer system (where the link role is negotiable).

The range is from 1 (one-tenth of a second) through 300 (30 seconds). The default is **10** (1 second).

Poll Retry Limit (for peer or downstream connections)

Specify the number of times for the local system to poll the remote system if there is no response. This parameter affects sessions in which the server has a link role of primary, therefore, it affects all sessions with a downstream system and some sessions with a peer system (where the link role is negotiable).

The range is from 1 through 255; the default is **10**.

Select Standby

If you want your modem's Standby line to be set to on, select this check box.

Check your adapter and modem manuals to find out if standby can be set for your equipment.

Multidrop Primary

If this is a leased SDLC line to downstream systems, and this server will be the primary station for a multidrop connection, then select this box.

This is a connection through which one primary computer simultaneously communicates with multiple secondary computers. Host Integration Server 2004 supports multidrop connections to peer or downstream systems on leased SDLC lines.

Contact Timeout

Specify the length of time, in tenths of a second, which the SDLC link service waits for an XID or SNRM response before resending the XID or SNRM.

This parameter is ignored for incoming calls.

The range is from 5 (five-tenths of a second) through 300 (30 seconds).

The default for a host connection is 300 (30 seconds). The default for a peer or downstream connection is 10 (1 second).

Contact Retry Limit

Specify the maximum number of times the link service will resend an XID or SNRM before declaring an outage to Host Integration Server 2004.

This parameter is ignored for incoming calls.

The range is from 1 through 20; the default is **10**.

Connection Dialing Timeout

If this connection uses a switched SDLC line (standard telephone line), specify the number of seconds that will be allowed for the user or modem to dial and make a connection to the remote computer. If the dialing will be done manually, be sure to allow enough time for the user to dial, wait for an answer, and make the connection.

The range is from 10 through 500 seconds; the default is **300**.

This parameter is ignored by incoming calls.

To exit the dialog box without accepting the configuration settings, click **Cancel**. To accept the settings, click **OK**.

To put configuration changes into effect, restart the server.

Connection Retry Limits

Supply activation limits for the connection.

Maximum Retries

Select the number of attempts for Host Integration Server 2004 to make when trying to establish the connection. After making this number of attempts, Host Integration Server 2004 makes an entry in the event log and stops trying. The range is from 1 through No Limit; the default is **No Limit**.

Delay After Failure

Select the length of time for Host Integration Server 2004 to wait between attempts to establish the connection. The range is from 5 seconds through 255 seconds; the default is **10** seconds.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Connection Properties: DLC 802.2

The following tabs are available on the DLC 802.2 Connection Properties sheet:

- General
- Address
- System ID
- DLC 802.2

General Tab

The following information must be entered on the **General** tab for the 802.2 connection:

- Connection Name
- Link Service
- Comment (optional)
- Remote End
    - Host System
    - Peer System
    - Downstream
    - PU Passthrough
- Allowed Directions
    - Outgoing Calls
    - Incoming Calls
    - Both Directions
- Activation
    - On Server Startup
    - On Demand
    - By Administrator
- Passthrough via Connection
- Supports Dynamic Remote APPC LU Definition

Address Tab

The following information must be entered on the **Address** tab for the 802.2 connection:

- Remote Network Address
- Remote SAP Address
- Local SAP Address

System Identification Tab

The following information must be entered on the **System** tab for the 802.2 connection:

- Local Node Name
    - Network Name
    - Control Point Name
    - Local Node ID
- XID Type
- Remote Node Name
    - Network Name
    - Control Point Name
    - Remote Node ID
- Peer DLC Role
- Compression Type

DLC 802.2 Tab

The following information must be entered on the **DLC 802.2** tab for the 802.2 connection:

- Max BTU Length
- Receive ACK Threshold (frames)
- Unacknowledged Send Limit (frames)
- Retry Limit
- XID Retries
- 802.2 Timeouts
    - Response (t1)
    - Receive Ack (t2)
    - Inactivity (ti)
- Connection Retry Limits
    - Maximum Retries
    - Delay After Failure

Connection Properties: Address

Remote Network Address

A 12-digit hexadecimal network address. Contact the remote system's administrator or the network administrator for the correct value.

The default is **400000000000**.

The value is determined as follows:

- For connections to a 3174 controller, use the value in the configuration response 900 of the controller's customization program.
- For connections to a 3720, 3725, or 3745 front-end processor, use the value in the MACADDR= parameter in the NCP configuration.
- For connections to an IBM 9370 host, use the value in the VTAM PORT definition for the MACADDR= parameter.
- For connections to another Host Integration Server 2004 system, the network address can be found through the **net config server** command. When this command is typed at the command prompt of the other Host Integration Server 2004 system, the resulting display shows the network address of that system, in the line labeled **Server is Active On**.

Remote Service Access Point (SAP) Address

A two-digit hexadecimal number that is a multiple of 04, between 04 and EC. See your token ring or Ethernet manual for more information.

The default is **04**.

You can also contact the remote system's administrator for information about the following:

- For connections to a 3174 controller, use the value in the configuration response 940 of the controller's customization program.
- For connections to an IBM 9370 host, use the value in the VTAM PU definition for the SAPADDR= parameter.

Local Service Access Point (SAP) Address

A two-digit hexadecimal number that is a multiple of 04, between 04 and EC. See your token ring or Ethernet manual for more information.

The Default is **04**.

You can also contact the remote system's administrator for information about the following:

- For connections to a 3174 controller, use the value in the configuration response 940 of the controller's customization program.
- For connections to an IBM 9370 host, use the value in the VTAM PU definition for the SAPADDR= parameter.

Affiliate Application

If you selected Single Sign-On, choose an Affiliate Application from the list. The Enterprise Single Sign-On (SSO) Affiliate applications are logical entities that represent a system or sub-system such as a host, back-end system, or line of business application to which you are connecting using SSO. An affiliate application can represent a back-end system such as a mainframe or UNIX computer. It can also represent an application such as SAP, or a subdivision of the system, such as the "Benefits" or "Pay stub" sub-systems.

Connection Properties: DLC 802.2

Max BTU Length

Specify the Maximum Basic Transmission Unit (BTU) Length.

The range is from 265 through 16393; the default is **265**.

With an IBM SDLC adapter, set the Max BTU Length to 521 or less.

This is the maximum number of bytes that can be transmitted in a single data-link information frame. A BTU is sometimes called an I-frame.

For downstream connections, specify a Max BTU Length less than or equal to the maximum value supported by software on the downstream system.

For host connections, specify a Max BTU Length less than or equal to the VTAM PU definition for the MAXDATA= parameter.

Receive ACK Threshold (frames)

Specify the maximum number of frames that the local system can receive from the remote system before sending a response. Set this to a value less than the **Unacknowledged Send Limit**, so that the local system acknowledges received transmissions more frequently than it expects responses to sent transmissions.

Unacknowledged Send Limit (frames)

Specify the maximum number of frames that the local system can send without receiving a response from the remote system. This parameter is sometimes called the Send Window Size.

Retry Limit

Specify the number of times that the local system should retransmit a frame if no response is received from the remote system.

The range is from 0 through 255; the default is **10**. A value of 0 means the system uses its internal default retry limit.

XID Retries

Specify the number of times that the local system should retransmit an XID (an identifying message) if no response is received from the remote system.

The range is from 0 through 30; the default is **3**.

Response (t1) Timeout

Select a value for the Response (t1) Timeout.

The amount of time that the local system should wait for the remote system to respond to a transmission before the local system tries again.

The values used for Default for the Response Timeout are 400 milliseconds for a local ring and 2 seconds for a remote ring.

If you do not select Default, but instead select a specific value, the timer always waits the selected amount of time, regardless of whether the remote system is on a local or remote ring.

Select a value greater than the total amount of time needed for the relaying of frames between the local system, the remote system, and the network.

Select **Default** to allow for two timeout values — one for a remote system on a local ring, one for a remote system on a remote ring. If you do not select **Default**, but instead select a specific value, the timer always waits the selected amount of time, regardless of whether the remote system is on a local or remote ring.

Receive ACK (t2) Timeout

Select a value for the Receive ACK (t2) Timeout.

The maximum amount of time that should be allowed before the local system sends an acknowledgment of a received transmission. An acknowledgment is sent at the end of the timeout, if some other process has not already triggered it.

Select a value less than the Response Timeout, so that the local system takes less time to acknowledge received transmissions than it takes to seek responses to sent transmissions.

Select **Default** to allow for two timeout values — one for a remote system on a local ring, one for a remote system on a remote ring. If you do not select **Default**, but instead select a specific value, the timer always waits the selected amount of time, regardless of whether the remote system is on a local or remote ring.

The values used for default for the Receive ACK Timeout are 80 milliseconds for a local ring and 800 milliseconds for a remote ring.

Inactivity (ti)

Select a value for the Inactivity (ti) Timeout.

The amount of time that the link can be inactive before the local system treats it as nonfunctioning and shuts it down.

Select **Default** to allow for two timeout values — one for a remote system on a local ring, one for a remote system on a remote ring. If you do not select **Default**, but instead select a specific value, the timer always waits the selected amount of time, regardless of whether the remote system is on a local or remote ring.

The values used for default for the Inactivity Timeout are 5 seconds for a local ring and 25 seconds for a remote ring.

Connection Retry Limits

Supply activation limits for the connection.

Maximum Retries

Select the number of attempts for Host Integration Server 2004 to make when trying to establish the connection. After making this number of attempts, Host Integration Server 2004 makes an entry in the event log and stops trying. The range is from 1 through No Limit; the default is **No Limit**.

Delay After Failure

Select the length of time for Host Integration Server 2004 to wait between attempts to establish the connection. The range is from 5 seconds through 255 seconds; the default is **10** seconds.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Connection Properties: X.25

The following tabs are available on the X.25 Connection Properties sheet:

- General
- Address
- System ID
- X.25

Connection Properties: Address

Remote X.25 Address

Select the type of virtual circuit used by the connection.

Switched Virtual Circuit Address

Enter the Switched Virtual Circuit Address of the host.

Permanent Virtual Circuit Alias

Enter the Permanent Virtual Circuit Alias of the host. This is a number that identifies the channel: 1 for the first channel, 2 for the second, and so on. The default is **1**.

Affiliate Application

If you selected Single Sign-On, choose an Affiliate Application from the list. The Enterprise Single Sign-On (SSO) Affiliate applications are logical entities that represent a system or sub-system such as a host, back-end system, or line of business application to which you are connecting using SSO. An affiliate application can represent a back-end system such as a mainframe or UNIX computer. It can also represent an application such as SAP, or a subdivision of the system, such as the "Benefits" or "Pay stub" sub-systems.

Connection Properties: X.25

Max BTU Length

Specify the Maximum Basic Transmission Unit (BTU) Length.

The range is from 265 through 16393; the default is **265**.

With an IBM SDLC adapter, set the Max BTU Length to 521 or less.

This is the maximum number of bytes that can be transmitted in a single data-link information frame. A BTU is sometimes called an I-frame.

For downstream connections, specify a Max BTU Length less than or equal to the maximum value supported by software on the downstream system.

For host connections, specify a Max BTU Length less than or equal to the VTAM PU definition for the MAXDATA= parameter.

Facility Data

For an SVC channel, specify the codes for any Facility Data required by your network provider or by the administrator of the remote system. You can specify as many as 126 Hexadecimal characters (63 Hexadecimal bytes).

User Data

For an SVC channel, specify the codes for any User Data required by your network provider. Type an even number of hexadecimal characters of 32 characters or fewer.

Packet Size

For a PVC channel, select the maximum number of data bytes (not header bytes) to be sent in a frame. Obtain this value from your network provider.

Window Size

For a PVC channel, select the maximum number of frames that the local system can send without receiving a response from the remote system. Obtain this value from the administrator of the remote host or peer system.

Connection Retry Limits

Supply activation limits for the connection:

Maximum Retries

Select the number of attempts for Host Integration Server 2004 to make when trying to establish the connection. After making this number of attempts, Host Integration Server 2004 makes an entry in the event log and stops trying. The range is from 1 through No Limit; the default is **No Limit**.

Delay After Failure

Select the length of time for Host Integration Server 2004 to wait between attempts to establish the connection. The range is from 5 seconds through 255 seconds; the default is **10** seconds.

See Also

Host Integration Server 2004, VTAM, and NCP Parameters for X.25 Connections

Connection Properties: Channel

The following tabs are available on the Channel Connection Properties sheet:

- General
- Address
- System ID
- Channel

Connection Properties: Address

Channel Address

Type a two-digit hexadecimal number identifying the channel. The range is from 00 through FF; the default is **FF**.

Control Unit Image Number

Type a value for the control unit image number. The range is 0 through F; the default is **0**.

Affiliate Application

If you selected Single Sign-On, choose an Affiliate Application from the list. The Enterprise Single Sign-On (SSO) Affiliate applications are logical entities that represent a system or sub-system such as a host, back-end system, or line of business application to which you are connecting using SSO. An affiliate application can represent a back-end system such as a mainframe or UNIX computer. It can also represent an application such as SAP, or a subdivision of the system, such as the "Benefits" or "Pay stub" sub-systems.

Connection Properties: Channel

Max BTU Length

Specify the Maximum Basic Transmission Unit (BTU) Length.

The range is from 265 through 16393; the default is **265**.

With an IBM SDLC adapter, set the Max BTU Length to 521 or less.

This is the maximum number of bytes that can be transmitted in a single data-link information frame. A BTU is sometimes called an I-frame.

For downstream connections, specify a Max BTU Length less than or equal to the maximum value supported by software on the downstream system.

For host connections, specify a Max BTU Length less than or equal to the VTAM PU definition for the MAXDATA= parameter.

Connection Retry Limits

Supply activation limits for the connection.

Maximum Retries

Select the number of attempts for Host Integration Server 2004 to make when trying to establish the connection. After making this number of attempts, Host Integration Server 2004 makes an entry in the event log and stops trying. The range is from 1 through No Limit; the default is **No Limit**.

Delay After Failure

Select the length of time for Host Integration Server 2004 to wait between attempts to establish the connection. The range is from 5 seconds through 255 seconds; the default is **10** seconds.

Local LU Properties: General

Local APPC LUs can be independent or dependent.

LU Alias

Enter the LU Alias.

Network Name

Type the Network Name. Obtain the correct name from the host or peer administrator if you will be connecting to a host system with VTAM,

The Network Name for an APPC LU that communicates with a host should match the NETID parameter in the VTAM Start command for the VTAM system.

If this server communicates with several different hosts over several connections, use the name of the subarea of the host with which the LU will communicate.

For independent LUs, the Network Name is required. For dependent LUs, the Network Name is recommended but not required, since it is used only by local software, such as the Windows event log software.

LU Name

Enter the LU Name. For independent APPC, the LU Name identifies the LU to other components on the SNA network, and therefore is required. For dependent APPC, the LU Name identifies the LU to local software, such as the Windows event log software, and is recommended but not required.

The LU Name and LU Alias for an APPC LU can be the same.

Comment

Optionally, enter a comment of no more than 25 characters.

Local LU Properties: Advanced

Member of Default Outgoing Local APPC LU Pool

If you want this LU to be available for use by a 5250 user or invoking TP not specifying a local LU, select this check box.

When a request comes from an invoking TP, and the request does not specify a local LU for the invoking TP to use, Host Integration Server 2004 first checks the user record of the user who started the TP, and tries to use the default local APPC LU assigned to that user or group. If this does not succeed, Host Integration Server 2004 tries to find a free LU in the pool of Default Outgoing Local APPC LUs. If this in turn does not succeed, the request is rejected.

Local LUs only support the number of sessions configured for the mode being used. The default for QPCSUPP is 64 sessions. If you need more than that number of sessions, then you need to configure multiple local LUs or increase the session limits in the mode definition for each mode used. To simplify user configuration, you can make all of these local APPC LUs part of the default pool by checking the **Member of Default Outgoing Local LU Pool.** This allows any user who does not specify a local APPC LU to get an available session from any local APPC LU in the default pool. This also enables load balancing among local APPC LUs. In addition, to ensure proper load balancing, do not specify a **Default Local LU Alias** for users or groups. However, if you want to have certain users or groups default to a certain local APPC LU, then you should specify that local APPC LU as the **Default Local LU Alias** in the user or group properties.

This default pool differs from, and should not be confused with, the 3270, LUA, and downstream LU pools.

Timeout for Starting Invokable TPs

If the **Invokable TP** is started manually by an operator, specify a value greater than 60 seconds to give the operator sufficient time.

Implicit Incoming Remote LU

To specify an Implicit incoming remote LU, choose an existing remote LU name from the list.

LU 6.2 Type

Select **Independent** or **Dependent**.

LU Number

For dependent LUs, enter the LU Number.

For independent LUs, this field is unavailable.

Connection

For **Dependent LU**s, choose the connection from the drop-down list.

For **Independent LU**s, this field is unavailable.

LU 6.2 Resync Service

Computer

Type the **IP Address** or the **Name** of the client computer. The client computer specifies a system that is dedicated in that the LU routes incoming connections to that client computer.

Check the **Enable** box if you have a very specialized transaction program (TP) that requires Resync Service. Resync Service or SyncPoint support is used by some database management systems (DBMS) for commit and rollback procedures. If you enable this service, the Local LU alias must be unique.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Remote LU Properties: General

Connection

From the drop-down list, choose the connection that will be used to access this remote LU.

LU Alias

Enter an LU Alias

Network Name

Enter a Network Name. Obtain the correct name from the host or peer administrator. If you will be connecting to a host system with VTAM, the Network Name for an APPC LU that communicates with a host should match the NETID parameter in the VTAM Start command for the VTAM system.

LU Name

Enter the LU Name.

A name identifying an LU. The name can be from one through eight characters long and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. The name cannot be the same as any other LU name or pool name (except for APPC LU names) on the server.

For communication with an AS/400, make the remote LU name the same as the name of the AS/400.

Uninterpreted LU Name

If this LU will be paired with a dependent local APPC LU, type the Uninterpreted LU Name.

Comment

Optionally, enter a comment of not more than 25 characters.

Remote LU Properties: Options

Supports Parallel Sessions

If this LU will be used with an independent local LU, and parallel sessions will be used, select this check box. If this LU will be used with a dependent local APPC LU, do not select this box.

If a remote LU supports parallel sessions, it can only be used with a mode that has a value greater than 1 for the parallel session limit.

Implicit Incoming Mode

To designate a mode as the Implicit Incoming Mode for this LU, select a mode from the list.

If this remote LU will be used as an Implicit Incoming Mode be sure to select a mode from the list.

No Session-Level Security

Select this option to turn off Session-Level Security.

Security Key in Hex

For a security key in hexadecimal, select this option, then type a 16-digit hexadecimal number.

Security Key in Characters

For a security key in characters, select this option, then type an eight-character string. The string can include uppercase and lowercase alphanumeric characters, and the special characters $, @, #, and the period (.).

Enable SyncPoint

If you enable **SyncPoint**, the Local LU alias must be unique.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Server Configuration Properties

Name

Displays the current server name. Click **Change** to change the server name.

Properties

The properties display the current configuration. These properties are display only. To change any of the following configuration items, click **Change**.

Subdomain

The **Subdomain** displays the current SNA subdomain.

Server Role

The server can be either a primary, backup, or member. The current role of the server is displayed.

Network Transports

Network Transports shows the transport currently in use.

Support Active Directory Clients

If selected, this server supports client computers using Active Directory and displays the current Active Directory Domain Name/Organization Unit.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Server Configuration

Subdomain Name

Displays the SNA subdomain that this server is a member of. To change the subdomain name, enter a new subdomain name and click **Save**.

Active Directory Client Support

If selected, this server is part of the Active Directory Organizational Unit (OU) as shown in the **Active Directory OU Name:** field. To change the OU, enter a new OU name and click **Save**.

Role

Select how this server will be configured, either as a **Primary Configuration Server** or a **Backup Configuration Server**.

Network Transports

Select all network transport protocols that this server will use on the network.

Services

The **Services** box shows the status of the **MngAgent** and **SnaBase** services. If these services are running, you must restart them before changes to the subdomain, server role, or network transports will take effect.

Restart

Click **Restart** to restart services required for changes to the subdomain, server role, or network transports to take effect. **Restart** is active only if you change the configuration of another server. If you want to change the configuration of the server on which you are currently working, **Restart** is unavailable. For changes to take effect on your server, close SNA Manager, open **Control Panel**, open **Services**, and then **Stop** and **Start SNA MngAgent** and **SnaBase**.

Save

Click **Save** to save your server configuration changes.

Important

- Changing server configuration parameters can have serious consequences.
- Restarting the server will cause all connections and sessions to be disconnected. Notify all users prior to restarting.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Workstation Properties: General

Workstation ID

The **workstation ID** is usually the workstation name.

Workstation ID Type

Click the type of workstation ID:

Name is the workstation name.

Address is the IP address. An IP Address specifies one server for a network address (for example, IP, IPX, or Vines).

IP Subnet is the IP Subnet address. An IP Subnet address specifies several servers with the same network address. Subnetting enables host administrators to distribute the hostids for a given netid to several subnetworks. Without subnetting, an IP address is interpreted in two parts: netid + hostid (network + node). With subnetting, an IP address is interpreted in three parts: netid + subnetid + hostid (network + subnetwork + node). Subnetting is a mechanism for using some bits in the hostid as a subnetid.

IP Mask

If you select **IP Subnet**, you must specify the **IP Mask** as well. The IP Mask refers to the netid + subnetid. You must know the IP Mask. For example, an IP Mask might be: "255.255.248.0."

Comment

Optionally, enter a comment of no more than 25 characters.

Allow access to both workstation and user resources

Select this option to allow users logged on to this computer to see the LUs assigned both to the workstation and to that user.

Allow access to workstation resources only

Selecting this option provides a higher degree of security by restricting resources available on this computer to the LUs assigned to this workstation. Users will not be able to access LUs assigned to them unless the LU is also assigned to the workstation. This feature will be useful for secure workstations, such as those used to print checks.

Allow access to Dynamically Created Remote APPC LUs

Select this check box to allow users access to remote APPC LU as they are created.

TN5250 Properties

Name

Displays the name of the server running the TN5250 service. This field cannot be edited here.

Comment

Optionally, type a comment of up to 25 characters.

Use Default

Select **Use Default** to use the port number associated with telnet (as set in \\DRIVERS\ETC\SERVICES).

Use

You can override the default value for a given server by selecting **Use** and typing another port number. You can also override this port number for a given session. TN services listen on multiple ports simultaneously. You can set a default port number for the TN service (assign the port number to the server) and override this number on a per session basis (assign the port number to the LU session), allowing a single client computer to connect to multiple host computers.

Host Integration Server 2004, VTAM, and NCP Parameters for X.25 Connections

The following table shows how Host Integration Server 2004 parameters for X.25 connections correspond to VTAM or NCP parameters. Asterisks (*) indicate required parameters.

Properties Tab	**SNA Parameter**	**VTAM or NCP Parameter**
System Identification	**Local Node ID**,* first three digits (block number)	**IDBLK=** parameter in the PU definition
System Identification	**Local Node ID**,* last five digits (node number)	**IDNUM=** parameter in the PU definition
System Identification	**Network Name (Remote Node)** Note: Network Name for local and remote nodes is generally the same	**NETID=** parameter in the VTAM Start command for the remote SSCP (VTAM system)
System Identification	**Control Point Name (Remote Node)**	**SSCPNAME=** parameter in the VTAM Start command for the remote SSCP (VTAM system)
Address	**Virtual Circuit Type or Remote X.25 Address**	**DIALNO=** parameter in the PORT definition
X.25	**Max BTU Length**	**MAXDATA=** parameter in the PU definition (set Max BTU Length less than or equal to MAXDATA)

- Required parameter in Host Integration Server 2004.

Domain Properties

The following tabs are available for the SNA Subdomain Properties sheet:

- NetView
- Display Verb
- Server Broadcasts
- Security
- Client Backup Configuration
- Error / Audit Logging
- Response Time Monitor

Domain Properties: NetView

NetView sends alerts back and forth between a host system and the Host Integration Server 2004 and associated client computers.

Send NetView Management Data to this Connection

Select a connection to which NetView data should be sent. This can be any host connection.

Domain Properties: Display Verb

Default Connection for Display

Select a connection for use by Display Verbs. When the Display Verb is used but does not specify a connection, Host Integration Server 2004 uses the connection you specify in **Display Verb Properties**. If you do not specify a default Display connection, Host Integration Server 2004 randomly selects a connection for the verb to use.

Domain Properties: Server Broadcasts

Servers communicate with each other using server broadcasts.

Mean Time between Server Broadcasts

The interval at which server broadcasts are repeated. Broadcasts of state changes (such as the activation of a server) do not wait for this interval; instead, broadcasts are repeated at this interval to ensure reception (since broadcasts by definition are not guaranteed to be received).

Specifying a larger value causes less demand on the network (since broadcasts occur less often). However, a smaller value compensates better for loss of broadcast messages.

The range is from 45 through 65535 seconds; the default is **60** seconds.

Network Transport for server Broadcasts

Choose only the protocols you need, because sending unneeded broadcasts can significantly decrease network efficiency.

Domain Properties: Security

An administrator can adjust the subdomain security settings, including user permissions, configuration file ownership, and subdomain security events to audit.

LU Types

Select the **LU Types** (3270, LUA, or APPC) to which the security settings will apply. If security for an LU type is off, anyone who knows the LU name can use it. If security is on, only users to whom the LU is assigned can use it. The default setting is on for 3270, and off for LUA and APPC.

Configuration File

To view or change user permissions on the configuration file, click **Permissions**.

To view or change audited events, click **Auditing**.

To view or change configuration file ownership, click **Take Ownership**.

Domain Properties: Client Backup Configuration

Disable Sending Client Backup Information

The server sends no information to the client computer.

Backup Domain

The server updates the client computer with the backup SNA subdomain name specified in the box.

Backup Sponsor Servers

The server updates the client computer with all of the SNA Sponsor Server names (shown in the box). The maximum is 15.

Domain Properties: Error / Audit Logging

You can use information from the Windows 2000 event logs as you test a configuration or to diagnose a problem.

Centralized Event Log Server

Select the name of the server on which Windows 2000 event logs for this server installation should be stored.

Route All Popup Messages to:

Select the name of the server to which pop-up error messages should be routed.

Default Audit Log Level

Select a level

- **Detailed problem analysis:** To record all events that can be recorded, select this option.
- **General information messages:** To record general activity but not all events, select this option.
- **Significant system events:** To record only major events, select this option.
- **Audit logging disabled:** To turn off audit logging, select this option.

Domain Properties: Response Time Monitor (RTM)

Response Time Monitor tracks the time it takes a host to respond to 3270 session requests. RTM is supported only by certain emulators. You should configure RTM only if the emulators you are using support RTM.

RTM Data Sent at

Select one or both of the following:

Counter Overflow:

To cause RTM data to be sent to the host when the number of host responses in a given time period overflows the size of the available counter, select this box.

End of Session:

To cause RTM data to be sent to the host at the end of each LU-to-LU session, select this box.

RTM Timers Run Until

Select the point at which RTM will register that a host has responded; this is when RTM stops the timers. (The timers are started when the local system sends data.)

First Data Reaches Screen:

To stop timing when data reaches the local screen, select this option.

Host Unlocks Keyboard:

To stop timing when the host unlocks the local keyboard, select this option.

Host Lets User Send:

To stop timing when the host lets the local computer send more data, select this option.

RTM Thresholds

Specify the cutoff times, in tenths of a second, at which RTM saves its count of host responses, and then restarts the count. For example, you could specify 5, 10, 20, and 50, to save the count of host responses during the intervals from 0.0 to 0.5 seconds, from 0.5 to 1.0 seconds, from 1.0 to 2.0 seconds, and from 2.0 to 5.0 seconds.

AS400 Definition Properties: General

AS/400 Remote LU Alias

Click the drop-down list box arrow and select an **AS/400 Remote LU Alias**, which contains addressing information for the AS/400.

Local LU Alias

Click the drop-down list box arrow and select a **Local LU Alias**. The **Local LU Alias** maps to the LU the client computer will use.

Mode

You must select the **QPCSUPP mode**.

AS/400 User Name

Enter your **AS/400 User Name**, which is required information.

AS/400 Password

Enter your **AS/400 Password**, which is required information.

Confirm Password

Enter your password again to confirm.

Comment

Optionally, enter a comment of not more than 25 characters long.

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Active Users

This folder displays the users that are currently actively using this server.

LUA LU Properties: General

After assigning or viewing an LUA LU, in the **LUA LU Properties** box, supply information according to the following list.

LU Number (for LUs on 802.2, SDLC, or X.25)

Type the LU Number.

LU Name

Type the LU Name.

Connection

The connection for this LU is shown. The connection cannot be changed in this dialog box.

Pool

If the LU has already been assigned to a pool, the pool name appears here.

Comment

Optionally, type a comment of 25 characters or fewer.

CPI-C Symbolic Name: General

Name

Type the Symbolic Destination Name.

Comment

Optionally, enter a comment of not more than 25 characters.

Conversation Security

Select a Conversation Security option:

- **None** turns off conversation security.
- **Same** requires the same user ID and password as that of the Remote Partner LU.
- **Program** specifies the user ID and password, select Program, and then click **User ID**.

Mode Name

Select a mode name from the drop-down list.

CPI-C Symbolic Name: Partner Information

Partner TP Name

- **Application TP:** For an Application TP, select this option, and type the Application TP Name.
- **SNA service TP** (in hex)**:** For an SNA service TP select this option, and type the SNA service TP Number.Partner LU Name
- **Alias:** To identify the **Partner LU by** Alias, select this option, and type the alias.
- **Fully Qualified:** To identify the partner LU by a Fully Qualified name, select this option, and type the name.

To accept the settings, click **OK**; to exit the dialog box without accepting the settings, click **Cancel**.

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CPI-C Symbolic Name: Security Settings

Specify a User ID and Password

User ID

The **User ID** can contain from 1 through 10 characters.

Password

The **Password** can contain from 1 through 10 characters.

Verify Password

Type the **password** again.

Host Integration Server 2004 Folder

Expand the Servers Folder to show the Microsoft® Host Integration Server 2004s assigned to this SNA Domain.

SNA Service Folder

This folder contains the SNA service installed on this Host Integration Server 2004. Each Host Integration Server 2004 can have a maximum of four SNA services installed and active at one time.

Select **SNA Service**, then right-click to perform various tasks, including:

- save the current configuration
- stop the service
- pause the service
- start the service
- create a new service
- display additional service properties

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Link Services Folder

This folder contains the link services configured on this Host Integration Server 2004.

To create a new link service, select the **Link Services** folder, right-click, point to **New** and then select **Link Service**.

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Connections Folder

This folder contains the connections configured on this Host Integration Server 2004.

To create a new connection, select the **Connections** folder, right-click, point to **New** and then select the type of connection you want to make.

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Local APPC LUs Folder

This folder contains the Local APPC LUs configured for this server.

Remote APPC LUs Folder

This folder contains the Remote APPC LUs configured for this server.

Microsoft SNA Manager

Host Integration Server 2004 Microsoft Management Console application is also called the SNA Manager.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

AS/400 Definitions

This folder displays the AS/400 definitions that are currently being used on this server.

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Active TN5250 Sessions

This folder displays the active TN5250 sessions that are using this server.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

AS/400 Definition Properties

The following tabs are available on the AS/400 Definition Properties:

- General
- Terminal Types
- IP Address List

AS/400 Definition Properties: General

AS/400 Remote LU Alias

Click the drop-down list box arrow and select an **AS/400 Remote LU Alias**, which contains addressing information for the AS/400.

Local LU Alias

Click the drop-down list box arrow and select a **Local LU Alias**. The **Local LU Alias** maps to the LU the client computer will use.

Mode

You must select the **QPCSUPP mode**.

System 36, AS/36

Select if connection to a System 36 or AS/36 computer system.

AS/400 User Name

Enter your **AS/400 User Name**, which is required information.

AS/400 Password

Enter your **AS/400 Password**, which is required information.

Confirm Password

Enter your password again to confirm.

Comment

Optionally, enter a comment of not more than 25 characters long.

AS/400 Definition Properties: Terminal Types

Terminal Names

Terminal names are displayed. You can remove selection of individual terminal names that do not apply to your network configuration by clearing the checkbox opposite the name

Port

Use Default

Select **Use Default** to use the port number configured with the service (on the Service Properties page).

Use

You can override the default value for a given session by selecting **Use** and typing another port number.

> **Note** TN services listen on multiple ports simultaneously. You can set a default number for the TN service and override this number on a per session basis, allowing a single client computer to connect to multiple host computers.

> **Note** Configuration changes are apparent only to users who establish a connection after the configuration changes are saved. Users who were connected at the time the configuration changes were made will not be affected.

AS/400 Definition Properties: IP Address List

You can associate this LUA to a specific IP address or server name.

Add Address

Click to specify the **IP Address** and **Subnet Mask** of the client workstation to which you are granting access.

IP Address

Click an entry in the **IP Address** column to edit the IP address for a client workstation.

Subnet Mask

Click an entry in the **Subnet Mask** column to edit the subnet mask for a client workstation.

Add Name

Click to add a workstation name to the **IP Address** list box. The workstation name identifies that a client workstation whose address resolves to that name can connect to the service.

Remove

Click to remove an entry that is currently highlighted in the **IP Address** list box.

Clear All

Click to remove all entries in the **IP Address** list box. The service will then be configured to allow access from any client workstation.

> **Note** The IP address must be changed from the default value of 0.0.0.0 if you want to assign a specific IP address. If you try to add the default IP address with the default subnet mask value, you will receive a message indicating an Invalid IP Address/Subnet Mask.

> **Note** The IP address of an incoming connection is compared to each of the available LUs or pools in turn. Each resource has an associated list of IP address patterns and subnet masks. The IP address from the incoming connection is masked (by bit and by the resource's subnet mask), then compared to the resource's IP address pattern masked by the resource's subnet mask. If the result is equal, the connection is allocated to this resource.

Messaging Help

Microsoft® MSMQ-MQSeries Bridge is an adaptable system that can be customized. You can set up MSMQ-MQSeries Bridge to operate on almost any Message Queuing (also known as MSMQ) or IBM MQSeries network configuration.

For additional information on the MSMQ-MQSeries Bridge user interface, see the following sections:

- General Tab
- Advanced Tab
- MQI Channels Tab
- General Tab - CN
- General Tab - Message Pipe
- Batch Tab
- Cache Tab
- Retry Tab

General Tab

This tab displays the following information:

Path Name	Network name of the MSMQ-MQSeries Bridge computer.
Service	Name of the Microsoft MSMQ-MQSeries Bridge Service.
Version	Version of the Microsoft MSMQ-MQSeries Bridge Service.
Status	Status of the Microsoft MSMQ-MQSeries Bridge Service (running, paused, or stopped).

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Advanced Tab

By default, MSMQ-MQSeries Bridge allocates one thread for each type of message pipe.

If the MSMQ-MQSeries Bridge is connected to more than one MQSeries Queue Manager (QM), you should allocate a larger number of threads. This improves performance, and if a pipe to one QM fails, it lets the other pipes continue running.

For each type of message pipe, specify:

Max Threads	The maximum number of threads (recommended one per MQSeries QM).
Refresh Queue Cache	The interval (in minutes) at which the message pipes check for Cache Timeout (see Setting Message pipe properties).
Support MSMQ to Bridge Encryption	Check this option to enable the Encryption feature from MSMQ to MSMQ-MQSeries Bridge. For additional information, see "Enabling Encryption".
Replace '.' with '-' in Queue Manager	Enables the MQSeries QM to address an MSMQ computer that has a '-' in its name. This is necessary because MQSeries does not support the '-' character. When this box is checked, MSMQ-MQSeries Bridge replaces '.' from the remote QM name on MQSeries with '-'. You should only enable this option if there is a '-' in the MSMQ computer name.

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MQI Channels Tab

MSMQ-MQSeries Bridge accesses MQSeries through MQI channels defined in both MQSeries and MSMQ-MQSeries Bridge.

> **Note** Each MQI channel connects an MSMQ-MQSeries Bridge to an MQSeries Queue Manager. Ordinarily, you should define one MQI channel for each connected network or foreign site.

First, define the channels in the MSMQ-MQSeries Bridge properties. Later, you can export the definitions to MQSeries (see Exporting MQSeries definitions).

The currently defined channels are listed in the dialog box. Click **Add** for a new MQI channel, **Properties** to edit the settings for an existing channel, or **Remove** to delete a channel.

On the **General** tab of the Channel Properties window, specify the following options:

Channel Name	A legal MQSeries name for the MQI channel. For convenience, you can assign the same name as you assigned to the connected network representing MQSeries in MSMQ, for example IBMNT_CN.
MQSeries Queue Manager	The MQSeries Queue Manager to which the channel connects.
Transport Type	TCP/IP or SNA LU 6.2 communication.

On the **Address** tab of the Channel Properties window, specify the following parameters for TCP/IP:

IP Address, Port	Of the MQSeries listener.

For SNA LU 6.2, specify:

Side Information Record	The CPI-C Symbolic Name defined in Microsoft® Host Integration Server 2004.

For more information on the TCP/IP or SNA LU 6.2 configuration, see the IBM MQSeries documentation.

On the **Security** tab of the Channel Properties window, you may specify:

MCA User	An existing or new MQSeries user name, for example FMQUSER1, under which the server side of the MQI channel runs.

In MQSeries, you should set the permissions of the MCA User, that is, the queues that MSMQ-MQSeries Bridge can address. If you do not specify an MCA User, the server side of the channel runs under the default user name, which is the value of the MQSeries SYSTEM.DEF.SVRCONN parameter.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

General Tab - CN

On the **General** tab of the CN properties window, specify the following options:

MQSeries QM Name	Select from the list of MQSeries Queue Managers to which you have defined MQI channels.

Note If the same MSMQ-MQSeries Bridge is on two connected networks, do not connect them both to the same QM.

Reply to QM Name	The default MSMQ QM to which MQSeries should return report or acknowledgment messages. Ordinarily, you would enter the name of the MSMQ-MQSeries Bridge computer, for example **MSBridge1**.

The MSMQ-MQSeries Bridge Manager exports your entry to MQSeries as a queue manager alias (see Exporting MQSeries definitions). If the Microsoft® Windows® computer name contains an invalid MQSeries character such as a hyphen (-), replace it with another character such as an underscore (_) in the Reply to QM Name box. If you want to receive acknowledgments by nontransactional instead of transactional message pipe, add a % sign to the name (for example, MSBridge1%).

MQSeries uses the alias to identify the transmission queue where it should send acknowledgments. You can redirect the acknowledgments by specifying a different alias. For example, if you want to receive acknowledgments on another computer where MSMQ-MQSeries Bridge is installed, enter the name of the computer and define the name as an alias in MQSeries. For additional information, refer to your IBM MQSeries documentation.

Startup	Enabled or disabled at MSMQ-MQSeries Bridge startup (to change the status afterwards see Starting, Stopping, or Pausing an Object).

General Tab - Message Pipe

The **General** tab of the **Message Pipe Properties** window displays the following:

Status	**Running**, **Paused**, **Pending**, **Recovering**, **Stopped**, or **Error** (This is read-only; to change the status see **Starting, Stopping, or Pausing an Object)**.
Startup	Enabled or disabled at MSMQ-MQSeries Bridge startup.

For the MQSeries—>MSMQ Transactional and Nontransactional message pipes:

Transmission Queue Name	A unique MQSeries transmission queue name for the pipe. The default names are <CN name>.XMITQ for the transactional message pipe and <CN name>.XMITQ.HIGH for the nontransactional message pipe. You may specify different names if you wish.

For example, if the MSMQ-MQSeries Bridge computer name is MSBridge1, the default transmission queue names are MSBridge1.XMITQ and MSBridge1.XMITQ.HIGH.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Batch Tab

To optimize performance, MSMQ-MQSeries Bridge batches messages together. Increasing the batch size may improve performance. For transactional message pipes, this may increase the quantity of retransmitted data after a communication failure.

To change the batch size, specify any combination of:

Max. Number of Messages	The maximum number of messages in a batch.
Max. Accumulated Size	The maximum size (in bytes) of a batch.
Max. Accumulated Time	The maximum time (in milliseconds) during which messages are batched.

Transmission begins as soon as there are messages to be sent. When any of the above limits is reached the message pipe checks that the batch was fully received on the destination side.

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Cache Tab

To reduce the overhead of opening and closing a queue for each message, MSMQ-MQSeries Bridge caches queue handles and reuses them when several messages are sent to the same queue. Specify the following option:

Cache Expiry	The time (in minutes) after which MSMQ-MQSeries Bridge closes an unused queue handle.

The system checks for Cache Timeout only at the Cache Refresh Time (see "Setting MSMQ-MQSeries Bridge Properties"). Thus the maximum time that an unused queue handle remains open is the Cache Timeout + Cache Refresh Time.

To refresh the cache immediately (for example to release a queue that is needed by another application), see "Refreshing the cache."

Retry Tab

If a message pipe fails, MSMQ-MQSeries Bridge tries to restart it automatically. For both the Short and Long retry cycles, specify:

Count	Maximum number of retries.
Delay	Interval between retries.

For example, you might specify a Short cycle of 3 retries at 30-second intervals. If the connection is still not successful, the system continues in a Long cycle of, for example, 10 retries at 300-second intervals.

> **Note** If you connect by TCP/IP, set the Delay to at least twice the keep-alive time of the destination MQSeries computer. This enables the MQSeries listener to release the resources of a broken connection before MSMQ-MQSeries Bridge tries to reconnect.

Trace Utility Help

Use the topics in this section to navigate through the Trace Utility User Interface. Click a topic below for more information.

Trace Items Tab

Tracing Global Properties Tab

Trace File Directory Tab

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Trace Items Tab

The **Trace Items** tab has several items that must be selected and configured for the Trace application to operate properly.

List of Trace Items

The following components can be configured for tracing.

- Enterprise SSO
- NVAlert
- NVRuncmd
- SNA applications
- SNA Manager Client
- SNA Manager Agent (MngAgent)
- SnaBase
- Installed link services
- SNANetMn
- SNAPrint
- SNAServer
- SNA Management
- DB2 Network Library
- SNADDM
- TN3270
- TN5250

Trace Items - Properties

Properties displays the **Trace Properties Sheet** that contains an **Internal Trace**, **Message Trace**, **API Trace** or the **TN3270 Internal Trace** tab depending on the Trace Item that was selected.

From the **Internal Trace**, **Message Trace**, **API Trace** and **TN3270 Internal Trace** tabs, you can either select a single item or click **Set All**.

To set Server trace properties

1. On the **Tools** menu, click **Trace Initiator**.
2. Click a component to trace from the list of Trace items.
3. Click **Properties**.
4. Click the appropriate trace tab.
5. Click the appropriate options for the trace, and then click **Apply**.

Trace Items - Clear All Traces

Clear All Traces will clear all trace settings and stop any running traces. If you only want to clear a specific trace item, double-click the item or select the item and click **Properties**. Then click **Clear All**.

When you select **Clear all Traces**, you will be presented with a dialog box to verify that you want to clear all trace setting.

Trace Items - Purge All Trace Files

Purge All Trace Files will delete all trace files from the Traces folder that is designated in the **Trace File Directory** tab.

When you select **Purge All Trace Files**, you will be presented with a dialog box to verify that you want to delete all trace files. If you purge all trace files, the trace settings are not deleted.

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Tracing Global Properties Tab

The **Tracing Global Properties** tab has several items that can be modified to adjust how Trace runs. These items include:

Trace File Flip Length

The default size is 20,000,000 bytes.

You can change the maximum length by highlighting the number and typing a new value.

Tracing Global Properties tab to set the length of the trace file

1. On the **Trace Settings** dialog box, click the **Tracing Global Properties** tab.
2. Enter a value for the **Trace File Flip Length** box, and then click **OK**.

Write Traces on a Background Thread

Check this box to run tracing in the background. If the box is cleared (blank), tracing runs in the foreground.

To reduce performance impacts caused by tracing Microsoft® Host Integration Server 2004 components, traces can be queued and written by a background thread when this box is checked. Otherwise, trace files will be written immediately.

Background Thread Priority

If you select **Write Traces on a Background Thread**, then check only one item to set the level of priority for tracing to run within the Microsoft® Windows® operating system. Highest gives tracing the highest level of priority, which means that tracing takes precedence over other jobs. Idle means that tracing runs when the CPU is idle.

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Trace File Directory Tab

The following information details the **Trace File Directory** tab.

The **Trace File Directory** tab allows you to change where the Trace Initiator files will be stored.

Use **Browse** or enter a new location.

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Administrator's Reference

The Administrator's Reference section provides technical information about working with Microsoft® Host Integration Server 2004.

To use this reference section effectively, you should be familiar with:

- Host Integration Server 2004
- Microsoft Windows®
- IBM Systems Network Architecture (SNA) concepts

The following topics are included:

- Document Conventions explains the formatting conventions this documentation set uses to distinguish important elements of text.
- Common Acronyms and Abbreviations lists common industry abbreviations and acronyms, along with their meanings.
- Host Integration Server 2004 Support explains how Host Integration Server 2004 works within Systems Network Architecture (SNA) networks.
- Network Management describes the support that Host Integration Server 2004 provides for centralized network management
- Network Protocols and Client/Server Communication describes how clients using different local area network (LAN) protocols can communicate with Host Integration Server 2004 computers.
- Error Messages describes the audit and error messages database and how to access it.
- The Command-Line Interface describes the command-line interface that can be used when you want to view a configuration setting quickly, or when you wnat to store configuration commands.
- Sample Host Definitions presents samples for establishing Host Integration Server 2004 connections to an IBM host system.
- CICS and VTAM Sample Definitions for LU 6.2 presents sample definitions for CICS and VTAM for Host Integration Server 2004 connections to an IBM host system.
- Sense Codes lists sense codes used by Host Integration Server 2004.
- Character Tables provides tables of the ASCII, ANSI, and IBM Extended character sets. It also provides a character translation table that can be used by the custom code page option of Host Print service.

For more information about Systems Network Architecture, see the latest version of the IBM publication, *Systems Network Architecture Technical Overview* (GC30-3073).

For frequently used terms, see the Host Integration Server 2004 Glossary.

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Document Conventions

This *Administrator's Reference* uses the following formatting conventions to distinguish important elements of text.

Convention	Purpose
bold	Indicates syntax items that must be typed exactly as shown.
italic	Indicates variables.
UPPERCASE	Represents file names, paths, volumes, array and structure names, values, and conversation states. Also represents return values and key names (such as ALT or CTRL).
[brackets]	Enclose optional items in square brackets.
{braces}	Enclose required items in curly brackets.
| (vertical bar)	Stands for OR and separates items in syntax statements.
... (ellipsis)	Indicates that the preceding syntax item can be repeated. If a punctuation mark precedes the ellipsis, you must include the punctuation when repeating the item.
X'*nnnn*'	Indicates hexadecimal digits.

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Common Acronyms and Abbreviations

The following table contains a list of common abbreviations used in this reference. For definitions of these and other terms, see the Host Integration Server 2004 Glossary.

Abbreviation	Description
ACTLU	Activate Logical Unit
ACTPU	Activate Physical Unit
ADO	ActiveX® Data Objects
API	application programming interface
APPC	Advanced Program-to-Program Communications
APPN	Advanced Peer-to-Peer Networking
ASCII	American Standard Code for Information Interchange
BB RQE	Begin Bracket, Exception Response
BTU	basic transmission unit
CD	Change Direction
CEB	Conditional End Bracket
CICS	Customer Information Control System
CCSID	Coded Character Set ID
COM	Component Object Model
CPI-C	Common Programming Interface for Communications
CSV	Common Service Verb
CTS	clear-to-send
DACTLU	Deactivate Logical Unit
DAF	destination address field
DCA	Digital Communications Associates, Inc.
DCOM	Distributed Component Object Model
DDM	Distributed Data Management
DDS	Digital Data System
DFC	data flow control
DLC	data link control
DLL	dynamic-link library
DLS	Distributed Link Service
DM	disconnect mode
DMA	Direct Memory Access
DMOD	Dynamic Module
DRDA	Distributed Relational Database Architecture
DSC	data stream compatible
DSR	Data Set Ready
DTR	Data Terminal Ready
EB	End Bracket
EBCDIC	Extended Binary Coded Decimal Interchange Code
EN	End Node
ESCON	Enterprise System Connection
FDDI	Fiber Distributed Data Interface
FEP	front-end processor
FM	function management
FRMR	frame reject
FTP	File Transfer Protocol
IMS	Information Management System
KB	Kilobyte
LAN	local area network
LCS	link connection subsystem
LL	record length field

LLC	Logical Link Control
LU	logical unit
LUA	Logical Unit for Applications (programming interface)
MAC	media access control
MB	Megabyte
MMC	Microsoft Management Console
MVS	Multiple Virtual Storage
NAU	Network Addressable Unit
NCP	Network Control Panel
NMVT	network management vector transport
NN	Network Node
N(r)	number returned
NRM	Normal Response Mode
NRZ	non-return to zero
NRZI	non-return to zero inverted
N(s)	number sent
ODBC	Open Database Connectivity
OLE	object linking and embedding
OLE DB	Object Linking and Embedding Database
PCT	Program Control Table
PDSE	Partitioned Data Set Extended
PIP	program initialization parameter
PLU	primary logical unit
PPT	Program Processing Table
PU	physical unit
PVC	permanent virtual circuit
QLLC	Qualified Logical Link Control
RH	request/response header
RIM	ring indicator monitor
RSP	Response
RTM	Response Time Monitor
RU	request/response unit
RUI	Request Unit Interface
SAP	service access point
SDK	software development kit
SDLC	Synchronous Data Link Control
SID	Security ID
SLI	Session Level Interface
SLU	secondary logical unit
SNA	Systems Network Architecture
SNRM	Set Normal Response Mode
SP	Service Pack
SQL	Structured Query Language
SSCP	System Services Control Point
SVC	switched virtual circuit
TCP/IP	Transmission Control Protocol/Internet Protocol
TCT	Terminal Control Table
TH	transmission header
TN	Telnet
TP	transaction program
TS	transmission service
TSO	time sharing option
VSAM	Virtual Storage Access Method
VTAM	Virtual Telecommunications Access Method

WAN	wide area network
XID	Exchange Identification

Host Integration Server 2004 Support

This section explains how Host Integration Server 2004 works within Systems Network Architecture (SNA) networks. The following information is included:

- A summary of the types and number of SNA sessions supported by Host Integration Server 2004.
- A list of the SNA commands supported by Host Integration Server 2004. This section also shows the type of SNA sessions in which the commands flow.
- The transmission service (TS) and function management (FM) profiles supported by Host Integration Server 2004.
- A list and explanation of the five categories of SNA sense codes generated by Host Integration Server 2004. This section also describes logical unit (LU) type 6.2-specific sense data.

For specific information about an application programming interface (API) supported by Host Integration Server 2004, see the programmer's guide for that API:

- APPC Programmer's Guide
- CPI-C Programmer's Guide
- LUA Programmer's Guide

This section contains:

- SNA Session Support
- Command Request Support
- Transmission Service and Function Management Profiles
- Option Set Support
- SNA Sense Codes

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SNA Session Support

This section lists and explains the types and numbers of SNA sessions supported by Host Integration Server 2004.

This section contains:

- LU Support
- Session Support

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LU Support

A Host Integration Server 2004 node can support as many as 15,000 sessions.

Logical unit 6.2 (LU 6.2) works in combination with node type 2.1 to provide Advanced Program-to-Program Communications (APPC). An LU 6.2 can be either a primary logical unit (PLU) or a secondary logical unit (SLU). The partner LU can reside in a type 2.1 node, within an upstream type 5 node, or within the Host Integration Server 2004 node itself.

LU types 0, 1, 2, or 3 are always SLUs, and the partner LU in an upstream type 5 node is always the PLU. LU 0 supports session-level cryptography, within certain limits, on the Request Unit Interface (RUI). You implement session-level cryptography through Cryptography Verification (CRV) requests; the RUI applications must perform all necessary processing. For details about the limits of session-level cryptography and about the processing carried out by the RUI application, see the LUA Programmer's Guide. For all interfaces other than RUI, CRV requests are handled with a negative response.

See Also

SNA Session Support

Session Support

Host Integration Server 2004 supports many types of SNA communications sessions:

- A System Services Control Point – physical unit (SSCP-PU)
- A Host Integration Server 2004 physical unit (PU) Services Manager which communicates with the System Services Control Point (SSCP) on the host
- An SSCP-LU
- A Host Integration Server 2004 logical unit (LU) which communicates with a host SSCP
- A Primary logical unit-secondary logical unit (PLU-SLU)
- A Host Integration Server 2004 LUs which communicates with host or peer LUs

See Also

Host Integration Server 2004 Support

Command Request Support

The next three tables list the SNA command requests supported by Host Integration Server 2004. Note that not all commands are supported for every LU-to-LU session type. For example, Bracket Initiation Stopped (BIS) is only supported for use by an APPC LU.

The following three tables categorize requests in the following order:

1. Session control requests
2. Function management data requests: network services (maintenance) and network services (session)
3. Data flow control requests

The three tables denote the category for each request by the setting of the request/response unit (RU) category bits in the request/response header (RH), and by the function of the request. Host Integration Server 2004 does not support commands that fall in the network control request category.

For more information about command requests, see your IBM documentation.

SNA Request Support for Session Control Requests

Session	Request	Direction
SSCP-PU	ACTPU	SSCP to PU
	DACTPU	SSCP to PU
SSCP-LU	ACTLU	SSCP to SLU
	DACTLU	SLU to SSCP
PLU-SLU	BIND	PLU to SLU
	UNBIND	PLU to/from SLU
	CLEAR	PLU to SLU
	SDT	PLU to SLU

SNA Request Support for Function Management Data Requests

Session	Request	Direction
SSCP-PU	NMVT (1)	SSCP to/from PU
	INIT-SELF (2)	SLU to SSCP
	TERM-SELF (2)	SLU to SSCP
	NOTIFY (2)	SLU to SSCP
	NSPE (2)	SSCP to SLU

1. Network services, maintenance services

2. Network services, session services

SNA Request Support for Data Flow Control Requests

Session	Request	Direction
PLU-SLU	BID	PLU to/from SLU
	BIS	PLU to/from SLU
	CANCEL	PLU to/from SLU
	CHASE	PLU to SLU
	LUSTAT	PLU to/from SLU
	RTR	PLU to/from SLU
	SHUTC	PLU from SLU
	SHUTD	PLU to SLU
	SIGNAL	PLU to/from SLU

See Also

Host Integration Server 2004 Support

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Transmission Service and Function Management Profiles

Host Integration Server 2004 enforces the rules that govern active sessions between communicating partners on an SNA network.

The Host Integration Server 2004 computer can select some of these session protocols—such as request/response control modes, bracket usage, and pacing—when you activate a session. The term "profiles" refers to specific combinations of these selectable protocol options.

Transmission service (TS) profiles refer to transmission control options, while function management (FM) profiles refer to data flow control and function management data options.

When activated, TS and FM profiles of a session are specified by using parameters in the appropriate session activation request and response such as ACTPU, ACTLU, BIND.

The following table specifies the TS and FM profiles supported by each of the Host Integration Server 2004 session types.

Session type	TS profiles	FM profiles
SSCP-LU session	1	0
SSCP-PU session	1	0
3270 display and printer PLU-SLU session	3	3
LU 6.2 PLU-SLU session	7	19
LUA PLU-SLU session	2, 3, 4	2, 3, 4, 7, 18

This section contains:

- TS Profile 1
- TS Profile 2
- TS Profile 3
- TS Profile 4
- TS Profile 7
- FM Profile 0
- FM Profile 2
- FM Profile 3
- FM Profile 4
- FM Profile 7
- FM Profile 18
- FM Profile 19

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TS Profile 1

Transmission service (TS) Profile 1 is supported on System Services Control Point physical unit (SSCP-PU) and System Services Control Point secondary logical unit (SSCP-SLU) sessions; the profile does not require a TS usage field. This profile specifies the following session rules:

- Pacing is not supported.
- Identifiers, rather than sequence numbers, are used on the normal flows.
- ACTPU, DACTPU, ACTLU, and DACTLU are supported.
- Maximum outbound request/response (RU) size is 256 bytes.
- Maximum inbound RU size is 512 bytes.

See Also

Transmission Service and Function Management Profiles

TS Profile 2

Transmission service (TS) Profile 2 is supported on primary logical unit-secondary logical unit (PLU-SLU) sessions using LU 0. This profile specifies the following session rules:

- Primary logical unit-secondary logical unit (PLU-SLU) and SLU-PLU normal flows are paced.
- Sequence numbers are used on the normal flows whenever the transmission header (TH) format used includes a sequence number field.
- CLEAR is supported.
- SDT, RQR, STSN, and CRV are not supported.

The TS usage subfields defining the options for this profile are the following:

- Pacing window counts
- Maximum request/response (RU) sizes on the normal flows

See Also

Transmission Service and Function Management Profiles

TS Profile 3

Transmission service (TS) Profile 3 is supported on primary logical unit-secondary logical unit (PLU-SLU) sessions using LU types 0, 1, 2, or 3. Selection is a BIND option. This profile specifies the following session rules:

- PLU-SLU and SLU-PLU normal flows are paced.
- Sequence numbers are used on the normal flows.
- BIND, UNBIND, CLEAR, and SDT are supported.

The TS usage subfields defining the options for this profile are the following:

- Pacing counts
- Maximum request/response (RU) sizes on the normal flows

See Also

Transmission Service and Function Management Profiles

TS Profile 4

Transmission service (TS) Profile 4 is supported on logical unit-logical unit (LU-LU) sessions using LU types 0 or 1. This profile specifies the following session rules:

- Primary logical unit-secondary logical unit (PLU-SLU) and SLU-PLU normal flows are paced.
- Sequence numbers are used on the normal flows whenever the transmission header (TH) format used includes a sequence number field.
- SDT, CLEAR, RQR, and STSN are supported.
- CRV is supported when session-level cryptography is selected via a BIND parameter.

The TS usage subfields defining the options for this profile are the following:

- Pacing window counts
- Maximum request/response (RU) sizes on the normal flows

See Also

Transmission Service and Function Management Profiles

TS Profile 7

Transmission service (TS) Profile 7 is supported on primary logical unit-secondary logical unit (PLU-SLU) sessions using LU 6.2. This profile specifies the following session rules:

- PLU-SLU and SLU-PLU normal flows are paced.
- Sequence numbers are used on the normal flows.
- BIND and UNBIND are supported.

The TS Usage subfields defining the options for this profile are the following:

- Pacing counts
- Maximum request/response (RU) sizes on the normal flows

See Also

Transmission Service and Function Management Profiles

FM Profile 0

Function management (FM) Profile 0 is supported on SSCP-PU and SSCP-SLU sessions. This profile specifies the following session rules:

- SSCP, PU, and SLU use immediate request mode and immediate response mode.
- Only single-RU chains are allowed.
- All chains require definite response.
- No compression.
- No data flow control (DFC) RUs.
- No function management (FM) headers.
- No brackets.
- No alternate code.
- Normal flow send/receive mode is half-duplex contention.
- Secondary wins contention.
- SSCP is responsible for recovery.

See Also

Transmission Service and Function Management Profiles

FM Profile 2

Function management (FM) Profile 2 is supported on primary logic unit-secondary logic unit (PLU-SLU) sessions using LU 0. This profile uses the following session rules:

- SLU uses delayed request mode.
- SLU uses immediate response mode.
- Only single-RU chains are allowed.
- SLU requests indicate no-response.
- No FMH-1 SCB compression.
- Length-checked compression allowed.
- No data flow control (DFC) RUs.
- No FM headers.
- SLU is the first speaker if brackets are used.
- Bracket termination rule 2 is used if brackets are used.
- PLU will send an end bracket (EB).
- SLU will not send an EB.
- Normal-flow send/receive mode is full duplex (FDX).
- PLU is responsible for recovery.

The following FM Usage fields define the options for Profile 2:

- Primary request control mode selection
- Primary chain response protocol (no-response cannot be used)
- Brackets usage and reset state
- Alternate code

See Also

Transmission Service and Function Management Profiles

FM Profile 3

Function management (FM) Profile 3 is supported on primary logical unit-secondary logical unit (PLU-SLU) sessions using LU types 0, 1, 2, or 3. This profile specifies the following session rules:

- PLU and SLU use immediate response mode.
- PLU and SLU support the following data flow control (DFC) commands (an asterisk [*] indicates commands permitted by the FM profile that are never sent by Host Integration Server 2004):
  - **CANCEL**
  - **SIGNAL**
  - **LUSTAT** (SLU-PLU only)
  - **CHASE***
  - **SHUTD**
  - **SHUTC**
  - **RSHUTD***
  - **BID** and **RTR**

The following FM Usage fields define the options for Profile 3:

- Chaining use (PLU and SLU)
- Request control mode selection (PLU and SLU)
- Chain response protocol (PLU and SLU)
- Compression indicator (PLU and SLU)
- Send EB indicator (PLU and SLU)
- FM header usage
- Bracket usage
- Bracket termination rule
- Alternate Code Set Allowed indicator
- Normal-flow send/receive mode

The next three tables list the FM Profile 3 options that Host Integration Server 2004 supports. Host Integration Server 2004 rejects any BIND option that specifies an option value not listed in these tables.

Supported options for BIND requests from primary LUs

Usage option	Value	Meaning
Chaining use element	0	Can send only single-element chains
	1	Can send single- or multiple-chains
Request control mode	0	Immediate request mode used
Chain response protocol	01	Can request only exception-only responses
	10	Can request only definite responses
	11	Can request definite or exception-only responses
Compression indicator	0	Cannot send compressed data
	1	Can send compressed data (LU 1 only)
Send EB indicator	1	Can send an end bracket

Supported options for BIND requests from secondary LUs

Usage option	Value	Meaning
Chaining use element	0	Can only send single-element chains (not LU 2)
	1	Can send single- or multiple-chains
Request control mode	0	Immediate request mode used
Chain response protocol	01	Can request only exception-only responses
	10	Can request only definite responses
	11	Can request definite or exception-only responses
Compression indicator	0	Cannot send compressed data
Send EB indicator	1	Cannot send end bracket

Supported common protocol values for BIND requests from any LU

Usage option	Value	Meaning
FM header usage	0	Cannot exchange FM headers
	1	Can exchange FM headers
Bracket usage	1	Bracket protocols must be used
Bracket termination rule	1	Bracket termination rule 1 is used
Alternate code set allowed	0	Must use Extended Binary Coded Decimal Interchange Code (EBCDIC)
Normal flow send/receive mode	10	Half-duplex flip-flop

See Also

Transmission Service and Function Management Profiles

FM Profile 4

Function management (FM) Profile 4 is supported on primary logical unit-secondary logical unit (PLU-SLU) sessions using LU types 0 or 1. This profile uses the following session rules:

- PLU and SLU use immediate response mode.
- PLU and SLU support the following data flow control (DFC) commands (an asterisk [*] indicates commands permitted by the FM profile that are never sent by Host Integration Server 2004):
  - **CANCEL**
  - **SIGNAL**
  - **LUSTAT**
  - **QEC**
  - **QC**
  - **RELQ**
  - **CHASE***
  - **SHUTD**
  - **SHUTC**
  - **RSHUTD***
  - **BID** and **RTR** (allowed only if brackets are used)
- Length-checked compression allowed

The following FM Usage fields define the options for Profile 4:

- Chaining use (PLU and SLU)
- Request control mode selection (PLU and SLU)
- Chain response protocol (PLU and SLU)
- FMH-1 SCB (String Control Byte) Compression indicator (PLU and SLU)
- Send EB indicator (PLU and SLU)
- FM header usage
- Brackets usage and reset state
- Bracket termination rule
- Alternate Code Set Allowed indicator
- Normal-flow send/receive mode
- Recovery responsibility
- Contention winner/loser
- Half-duplex flip-flop reset states

See Also

Transmission Service and Function Management Profiles

FM Profile 7

Function management (FM) Profile 7 is supported on primary logical unit-secondary logical unit (PLU-SLU) sessions using LU 0. This profile uses the following session rules:

- PLU and SLU use immediate response mode.
- PLU and SLU support the following data flow control (DFC) commands (an asterisk [*] indicates commands permitted by the FM profile that are never sent by Host Integration Server 2004):
  - **CANCEL**
  - **SIGNAL**
  - **LUSTAT**
  - **RSHUTD***
- Length-checked compression is allowed on LU 0 only.

The following FM Usage fields define the options for Profile 7:

- Chaining use (PLU and SLU)
- Request control mode selection (PLU and SLU)
- Chain response protocol (PLU and SLU)
- FMH-1 SCB Compression indicator (PLU and SLU)
- Send EB indicator (PLU and SLU)
- FM header usage
- Brackets usage and reset state
- Bracket termination rule
- Alternate Code Set Allowed indicator
- Normal-flow send/receive mode
- Recovery responsibility
- Contention winner/loser
- Half-duplex flip-flop reset states

See Also

Transmission Service and Function Management Profiles

FM Profile 18

Function management (FM) Profile 18 is supported on primary logical unit-secondary logical unit (PLU-SLU) sessions using LU 0. This profile uses the following session rules:

- PLU and SLU use immediate response mode.
- PLU and SLU support the following data flow control (DFC) commands (an asterisk [*] indicates commands permitted by the FM profile that are never sent by Host Integration Server 2004):
  - **CANCEL**
  - **SIGNAL**
  - **LUSTAT**
  - **BIS** and **SBI** (allowed only if brackets are used)
  - **CHASE***
  - **BID** and **RTR** (allowed only if brackets are used)
- Length-checked compression is allowed.

The following FM Usage fields define the options for Profile 18:

- Chaining use (PLU and SLU)
- Request control mode selection (PLU and SLU)
- Chain response protocol (PLU and SLU)
- FMH-1 SCB Compression indicator (PLU and SLU)
- Send EB indicator (PLU and SLU)
- FM header usage
- Brackets usage and reset state
- Bracket termination rule
- Alternate Code Set Allowed indicator
- Normal-flow send/receive mode
- Recovery responsibility
- Contention winner/loser
- Half-duplex flip-flop reset states

See Also

Transmission Service and Function Management Profiles

FM Profile 19

Function management (FM) Profile 19 is supported on primary logical unit-secondary logical unit (PLU-SLU) sessions using LU 6.2. This profile specifies the following session rules:

- PLU and SLU use immediate request mode.
- PLU and SLU use immediate response mode.
- Multiple RU chains are allowed.
- PLU and SLU requests indicate definite or exception response.
- No compression is used.
- Brackets are used.
- FM headers (types 5, 7, and 12 only) are allowed.
- Conditional termination for brackets, specified by conditional end bracket (CEB),is used.
- PLU and SLU may send CEB.
- Normal-flow send/receive mode is half-duplex flip-flop.
- Half-duplex flip-flop reset state is SEND for PLU.
- Symmetric error responsibility.
- Contention winner/loser is negotiated at BIND time.
- PLU and SLU support the following data flow control (DFC) commands:
    - **SIGNAL**
    - **LUSTAT**
    - **BIS**
    - **RTR**
- The following combinations of RQE, RQD, CEB, and CD are allowed on end-chain Russ

RQE	CD	CEB
RQD2	CD	CEB
RQD3	CD	CEB
RQE1	CD	CEB
RQD	CD	CEB

The only option for Profile 19 is contention winner/loser.

See Also

Transmission Service and Function Management Profiles

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Option Set Support

The following table lists the option sets supported by Host Integration Server 2004. The reference numbers are those specified in IBM documentation.

Ref No.	Option Set
101	Flush the send buffer of the LU
102	Get attributes
103	Post on receipt with test for posting (supported by asynchronous APPC verbs)
104	Post on receipt with wait (supported by asynchronous APPC verbs)
105	Prepare to receive
106	Receive immediate
109	Get TP name and instance identifier
110	Get conversation type
201	Queued allocation of a contention winner session
203	Immediate allocation of a session
204	Conversations between programs located at the same LU
205	Queued allocation for when session is free
211	Session-level LU-LU verification
212	User ID verification
213	Program-supplied user ID and password
214	User ID authorization
241	Send program initialization parameter (PIP) data
243	Accounting
244	Long locks
245	Test for request-to-send received
246	Data mapping
251	Extract transaction and conversation identification information
290	Logging of data in a system log
291	Mapped conversation LU services component
505	LU definition verbs (operator only)
601	MIN_CONWINNERS_TARGET parameter
602	RESPONSIBLE(TARGET) parameter
603	DRAIN_TARGET(NO) parameter
605	LU-LU session limit
606	Locally known LU names
607	Uninterpreted LU names
610	Maximum RU size bounds
612	Automatic activation limit for contention winner

See Also

Host Integration Server 2004 Support

SNA Sense Codes

If there is a communication problem during an SNA session, Host Integration Server 2004 can generate sense codes that notify the remote system of the type of problem. The sense codes fall into five distinct categories, corresponding to the type of problem that occurred.

Value	Category
X'08'	Request Reject
X'10'	Request Error
X'20'	State Error
X'40'	RH Usage Error
X'80'	Path Error

The following sections list the sense codes by category, and include two additional categories of sense codes:

- Sense codes sent by a 3270 emulator on LUSTAT requests
- Sense codes that can only flow on LU 6.2 sessions

This section contains:

- Request Reject (Category X'08')
- Request Errors (Category X'10')
- State Errors (Category X'20')
- RH Usage Errors (Category X'40')
- Path Errors (Category X'80')
- LUSTAT Sense Codes
- Sense Data Specific to LU 6.2

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Request Reject (Category X'08')

This category indicates that the request was delivered to the intended half session, and was understood and supported, but not executed. The following codes are in this category.

Code	Meaning
0801	Resource not available
0802	Intervention required (LU 1/LU 3 printer soft error)
0805	Session limit exceeded
0809	Mode inconsistency
080A	Permission rejected, NOTIFY will not be sent
080B	Bracket race error
080C	Procedure not supported
0812	Insufficient resources
0814	Bracket bid reject-RTR forthcoming
0815	Function active
081B	Contention race condition
081C	Request not executable (hard error)
0821	Invalid session parameters
0829	Change direction required
082B	Presentation space integrity lost
082D	LU busy (usually local copy print in progress)
082E	Intervention required (local copy print soft error)
082F	Request not executable (local copy print hard error)
0831	LU component disconnected
0843	WCC print command not sent (RQD or RQE, CD, EB)
0845	Permission rejected, NOTIFY will be sent
0863	Referenced character set does not exist
0871	Read partition state error (SLU in retry state)

See Also

SNA Sense Codes

Request Errors (Category X'10')

Sense codes in this category represent an imbalance in half-session capabilities. They indicate that the RU (request/response unit) was delivered to the intended half-session but could not be processed. The following codes are in this category.

Code	Meaning
1003	Function not supported (also used instead of X'0826', which is not supported by Host Integration Server 2004)
1005	Parameter modifying a control function is invalid
1007	Category not supported (SSCP data for host printer)

See Also

SNA Sense Codes

State Errors (Category X'20')

Sense codes in this category indicate a sequence number error, or a request/response header (RH) or request/response unit (RU) that is not allowed in the receiver's current state. This condition prevents delivery of the request to the intended half-session. The following codes are in this category.

Code	Meaning
2001	Sequence number error
2002	Chaining error
2003	Bracket error
2004	Direction error
2005	Data traffic reset
2006	Data traffic quiescent
2007	Data traffic not quiescent

See Also

SNA Sense Codes

RH Usage Errors (Category X'40')

These sense codes indicate that fields in the request/response header (RH) are contrary to SNA rules or previously selected BIND options and prevent the intended half-session from receiving the request.

The checks 400A and 4012 are also performed. These do not permit negative responses because they apply to no-response sessions and responses, respectively.

The following codes are in this category.

Code	Meaning
4006	Exception response not allowed
4007	Definite response not allowed
400F	Incorrect use of format indicator
4011	Incorrect specification of RU category
4014	Incorrect use of DR1, DR2, ER

See Also

SNA Sense Codes

Path Errors (Category X'80')

Sense codes in this category indicate that the request could not be delivered to the required half-session because of path errors. The following codes are in this category.

Code	Meaning
8004	Unrecognized destination field address (DAF)
8005	No session
8006	Invalid format identification (FID): Error detected and logged; negative response not sent
8007	Segmentation error request/response header (RH) not present or too short: negative response sent only for segmentation error
8008	Primary unit (PU) not active: SSCP-PU was not active and request was not ACTPU or DACTPU
8009	Logical unit (LU) not active: DAF specified an LU for which the SSCP-SLU session has not been activated, and request was not ACTLU or DACTLU
800F	Invalid address combination

See Also

SNA Sense Codes

LUSTAT Sense Codes

The following sense codes are sent by a 3270 emulator on LUSTAT requests.

Code	Meaning
0001 B000	Host initialized local copy soft error recovery
081C 0000	Soft error changed to hard error (LU 1/LU 3)
081C B000	Soft error changed to hard error (local copy)
082B 0000	SLU session changed from SSCP to PLU (SYSREQ)

See Also

SNA Sense Codes

Sense Data Specific to LU 6.2

The LU 6.2 sense codes are specified and interpreted by SNA components within Host Integration Server 2004, and, in general, are presented as return codes and as parameters to specific verbs.

The following sense codes are carried on responses flowing on LU 6.2 sessions.

Code	Meaning
0814	Bracket bid reject – RTR forthcoming
0819	RTR not required – receiver of RTR request has nothing to send
0835	Invalid parameter – request contained a fixed or variable field that is invalid. Bytes 2 and 3 contain a 2-byte binary count which indexes the field error (zero origin)
0846	ERP message forthcoming: The received request was rejected for a reason to be specified in a forthcoming FMH-7 request – which itself carries SNA sense data (see the following table for a list of these codes)
088B	BB not accepted – BIS reply requested
2010	BIS protocol error –receiver detected a BIS error, for example, two BIS replies received

The following data is carried on an FMH-7 request, coming after the flow of a negative response X'0846'.

Code	Meaning
1008 600B	Resource failure no retry
1008 6021	Allocation error TPN not recognized
1008 6031	Allocation error PIP not allowed
1008 6032	Allocation error PIP not specified correctly
1008 6034	Allocation error conversation type mismatch
1008 6041	Allocation error sync level not supported by pgm
080F 6051	Allocation error security not valid
084B 6031	Allocation error trans pgm not available retry
084C 0000	Allocation error trans pgm not available no retry
0864 0000	Deallocate abend prog
0864 0001	Deallocate abend svc
0846 0002	Deallocate abend timer
0889 0000	Prog error no trunc or prog error purging
0889 0001	Prog error trunc
0889 0100	Svc error no trunc or svc error purging
0889 1001	Svc error trunc

See Also

SNA Sense Codes

Network Management

This section describes the support that Host Integration Server 2004 provides for centralized network management.

This section contains:

- Connections Used for NetView and RTM
- Link Alerts for SDLC and Token Ring
- Link Statistics
- Alerts Used by Applications, NVAlert, and NVRunCmd
- Local Logging of Network Management Data

For information about configuring Host Integration Server 2004 to work with NetView, and information about configuring the NVAlert and NVRunCmd services, see Network Integration User's Guide.

Connections Used for NetView and RTM

Host Integration Server 2004 can make use of NetView, a reporting system that runs on an IBM host (mainframe). NetView sends alerts between the host and the PCs that connect to it. Host Integration Server 2004 can also receive information from Response Time Monitor (RTM), a 3270 and NetView facility that monitors the amount of time it takes for a host to respond during 3270 display sessions.

To send link alerts, link statistics, and application-generated alerts to the NetView program at the host, you must specify the connection on which the alerts will be sent. See the Host Integration Server 2004 online Help for information about specifying the connection.

RTM data and NetView alerts sent to the host by 3270 users are not necessarily sent via the NetView connection. RTM data is sent on the connection for the session to which it refers, while 3270 user alerts are sent on the connection for the currently selected 3270 session.

For information about configuring SNA Management to work with NetView and information about configuring the NVAlert and NVRunCmd services, see Network Integration User's Guide.

See Also

Network Management

Link Alerts for SDLC and Token Ring

When a Synchronous Data Link Control (SDLC) or Token Ring connection fails, Host Integration Server 2004 logs diagnostic information, called link alerts, about the connection failure. The alerts are logged in a log file that can be viewed using the Windows Event Log service. To find a Host Integration Server 2004 log, in the Event Log service, on the Log menu, make sure Application is selected. Under the "Source" heading, the application log file will have a name starting with "SNA."

The link alerts are also used to build a network management vector transport (NMVT) alert, which includes probable causes and suggested actions for the alert. If a connection on the server running Host Integration Server 2004 has been designated for NetView, and the connection is active, the NMVT alert will be sent on that connection.

This section includes information that includes an explanation of the general format of link alerts, common to both SDLC and Token Ring, descriptions of individual alerts produced by the SDLC link service, detailed information about the local logging of SDLC alerts, descriptions of individual alerts produced by the Token Ring link service, and details of the local logging of Token Ring alerts.

This section contains:

- Link Alert Format and Common Subvectors
- SDLC Failure Alerts
- SDLC Alert Local Logging
- Token Ring Failure Alerts

For information about the NetView vectors supported by the NVAlert and NVRunCmd services, see Alerts Used by Applications, NVAlert, and NVRunCmd.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Link Alert Format and Common Subvectors

The general format of link alerts is as follows:

```
NMVT HEADER
41 03 8D 00 00 00 00 00     NMVT Header
Major Vector Header
LL LL     Length of Major Vector
00 00     Alert major vector
```

The specific alert is identified by the alert description and alert ID (part of the generic alert subvector). Common subvectors are listed later in this section. SDLC and Token Ring failure alerts are described in the SDLC Failure Alerts and Token Ring Failure Alerts.

Each subvector or subfield begins with a 1-byte length field and a 1-byte key identifying the subvector or subfield. The length field contains the length in bytes of the entire subvector or subfield, including the length and key bytes. Where the length byte is shown as LL (record length field), this indicates that the length is not fixed because different alerts require different data to be included.

The following table lists all the possible subvectors used in the alert, with their subvector keys (identifiers).

Link alert subvectors

Subvector key (identifier)	Subvector
05	Hierarchy/Resource List Subvector
03	Hierarchy Name List Subvector
01	Date/Time Subvector
10	Product Set ID Subvector (this appears twice, as Alert Sender PSID and Indicated Resource PSID).
51	LAN LCS Data Subvector
52	LCS Configuration Data Subvector
8C	Link Station Data Subvector
91	Basic Alert Subvector
92	Generic Alert Subvector
93	Probable Cause Subvector
94	User Causes Subvector
95	Install Causes Subvector
96	Failure Causes Subvector
A1	Detail Qualifier Subvector

The following tables describe the formats of link alert subvectors. Additional tables, in this section describe the individual link alerts.

Hierarchy/resource list subvector

Format and contents	Description
LL 05	Hierarchy/Resource List Subvector
LL 10	Hierarchy/Resource List Subfield
hh	Flags: 80 (1-User) 00 (Server)
LL	Name field length: name length plus this length byte.
hh...hh	Adapter name in EBCDIC, 8 bytes
00	Flags byte: always 0
3F	Resource type: port
Optional second name	Remote host name. For Token Ring, use the local ring name. See the individual alert descriptions found later in this chapter.
LL	Name field length: name length plus this length byte.
hh...hh	Name in EBCDIC, up to 8 bytes

00	Flags byte: always 0
F4 or 2E	Resource type: control point or Token Ring.

Hierarchy/name list subvector

Format and contents	Description
LL 03	Hierarchy Name List subvector
00 or 03	Reserved byte
hh	Number of names in the hierarchy name list.
LL	Length of each name, including this length byte.
hh...hh	Name of resource for each name.
D3 C3 D6 D5	Resource type identifier: LCON (logical link connection not known to SNA)

Date/time subvector alerts

Format and contents	Description
0A 01	Date/Time Subvector
08 10	Local Date/Time subfield
hh	Year – two digits
hh	Month
hh	Date
hh	Hours
hh	Minutes
hh	Seconds (binary)

Product set ID subvector

Format and contents	Description
2A 10	Product Set ID subvector
00	(unused field)
27 11	Product ID subvector
0C	Product classification: non-IBM software
08 04	Software product common level subfield
F0 F2	Version identifier: 02
F0 F0	Release identifier: 00
F0 F0	Modification identifier: 00
13 06	Software product common name subfield
C4 C3 C1 61 D4 E2 40 C3 D6 D4 D4 40 E2 C5 D9 E5 D9	Product name: Microsoft Host Integration Server 2004
09 08	Software product program number subfield
F0 F0 F0 F0 F0 F0 F0	Product program number: zeros

LAN link connection subsystem data subvector*

Format and contents	Description
LL 51	LAN LCS Data Subvector
04 02	Ring Identifier subfield
hh hh	Ring number
08 03	Local Individual MAC Address subfield
hh...hh	Local individual MAC address
08 04	Remote Individual MAC Address subfield
hh...hh	Remote individual MAC address
LL 05	LAN Routing Information subfield
hh...hh	LAN routing information

* Token ring only.

Link connection subsystem configuration data subvector

Format and contents	Description
LL 52	LCS Configuration Data Subvector
04 01	Port Address subfield
hh hh	Port address
03 02	Remote Device Address subfield
hh	Remote device address
03 04	Local Device Address subfield
hh	Local device address
04 06	Link Station Attributes subfield
01 or 02 or 03	Link station role: Primary, Secondary, or Negotiable
03 or 04	Remote node type: Type 4 or Type 2.1
06 07	Link Attributes subfield
01 or 02	Link connection type: nonswitched or switched
01 or 02	Half-duplex or full-duplex
01	Protocol: SDLC
01 or 02	Point-to-point or multipoint

Link station data subvector

Format and contents	Description
LL 8C	Link Station Data Subvector
04 01	N(s) and N(r) counts subfield
hh	N(s) count
hh	N(r) count
03 02	Outstanding frame count subfield
hh	Outstanding frame count
04 03	Last SDLC Control Field Received subfield
hh hh	Last control field received
04 04	Last SDLC Control Field Sent subfield
hh hh	Last control field sent
03 05	Sequence Number Modulus subfield
80	Sequence number modulus
03 06	Link Station State subfield
80 or 40	Link station state: local or remote station sending RNR
04 07	LLC Reply Timer Expiration Count subfield
hh hh	Reply timer expiration count
03 08	Last Received N(r) Count subfield
hh	Last received N(r) (binary)

Basic alert subvector

Format and contents	Description
0E 91	Basic Alert subvector
00	Not-operator initiated
01	Alert type: permanent
0E	General cause code: link-level protocol error
00 80 or 00 34	Specific component code: Token Ring LAN or SDLC data link control
00 00	Alert description code
00 00	User action code
00 00	Detail text reference code
00	Unused field

Generic alert subvector

Format and contents	Description
0B 92	Generic Alert subvector
00 00	Flags: not operator-initiated, not a held alert

01	Alert type: permanent
hh hh	Alert description: See alert descriptions.
hh hh hh hh	Alert ID number (unique to a particular alert)

Probable cause subvector

Format and contents	Description
LL 93	Probable cause subvector
hh hh	Probable cause: See individual alert descriptions. This alert may include more than one entry.

User causes subvector

Format and contents	Description
LL 94	User Causes Subvector
LL 01	User causes subfield
hh hh	User cause: See individual alert descriptions. More than one entry may appear here.
LL 81	Recommended actions subfield
hh hh	Recommended action: See individual alert descriptions. More than one entry may appear here.
03 83	Product set ID index subfield
99	Product Set ID index
LL 82	Detailed data subfield. This subfield may appear more than once.
99	Product Set ID code
hh	Data ID: See individual alert descriptions.
00	Data encoding: hexadecimal
hh...hh	Detailed data: See individual alert descriptions.

Install cause subvector

Format and contents	Description
LL 95	Install Causes Subvector
LL 01	Install causes subfield
hh hh	Install cause: See individual alert descriptions. More than one entry may appear here.
LL 81	Recommended actions subfield
hh hh	Recommended action: See individual alert descriptions. More than one entry may appear here.
03 83	Product set ID index subfield
99	Product Set ID index
LL 82	Detailed data subfield. This subfield may occur more than once.
99	Product Set ID code
Hh	Data ID: See individual alert descriptions.
00	Data encoding: hexadecimal
Hh...hh	Detailed data: See individual alert descriptions.

Failure cause subvector

Format and contents	Description
LL 96	Failure Causes Subvector
LL 01	Failure causes subfield
hh hh	Failure cause: See individual alert descriptions. More than one entry may appear here.
LL 81	Recommended actions subfield
hh hh	Recommended action: See individual alert descriptions. More than one entry may appear here.
03 83	Product set ID index subfield
99	Product Set ID index
LL 82	Detailed data subfield. This subfield may occur more than once.
99	Product Set ID code
hh	Data ID: See individual alert descriptions.
00	Data encoding: hexadecimal
hh...hh	Detailed data: See individual alert descriptions.

Detail qualifier (hexadecimal) subvector

Format and contents	Description
06 A1	Detail Qualifier subvector
hh hh hh hh	Detail Qualifier subfield – four bytes as follows: Token ring: adapter number Alert number Two-byte error code SDLC: link ID Station address, outage

SDLC Failure Alerts

The tables in this section describe the alerts generated by the SDLC link service provided with Host Integration Server 2004. The alerts are listed in numerical order by alert description and within each description in numerical order by alert ID.

Write timeout alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	1000	Equipment malfunction
Alert ID:	61D0 2E7B	
Probable causes:	2031	Line
	3601	Local modem
	2200	Remote node
	3603	Remote modem
Failure causes:	3511	Line
	3601	Local modem
	2200	Remote node
	3603	Remote modem
	F034	CTS failed to rise
Recommended actions:	0403	Run modem tests
	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier
Detail qualifier:	2E	Write timeout retry exceeded

Abnormal modem response alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	1000	Equipment malfunction
Alert ID:	70A1 5CB0	
Probable causes:	3601	Local modem
	3401	Local cable
	3302	Communications adapter
User causes:	3401	Cabling installed incorrectly
Recommended actions:	0301	Check cable and its connections
Failure causes:	3601	Local modem
	3401	Local cable
	3302	Communications adapter
	F035	DSR dropped
Recommended actions:	0403	Run modem tests
	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier
Detail qualifier:	2D	Abnormal response

DSR failure alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	1000	Equipment malfunction
Alert ID:	83BB 6EC8	
Probable causes:	3601	Local modem
	3401	Local cable
	3302	Communications adapter
User causes:	3400	Cable loose
	0205	Local modem power off
Failure causes:	3601	Local modem
	3401	Local cable

	3302	Communications adapter
	F035	DSR dropped
Recommended actions:	0403	Run modem tests
	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier
Detail qualifier:	11	DSR failure

DCD failure alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	1000	Equipment malfunction
Alert ID:	C3BB 504A	
Probable causes:	2031	Line
	3601	Local modem
Failure causes:	3511	Line
	3601	Local modem
	F038	Carrier detect lost
Recommended actions:	0403	Run modem tests
	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier
Detail qualifier:	14	DCD failure

Invalid frame received: i-field not permitted alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	1103 D152	
Probable causes:	2004	SDLC communications
	1023	Communications program in remote node
Failure causes:	1023	Communications program in remote node
	F021	I-field received when not permitted
Recommended actions:	2011	Review hexadecimal display of alert report
	32A0	Report the following detail qualifier: Outage qualifier
Detail qualifier:	87	Invalid frame received

Invalid frame received: invalid/unsupported cmd/rsp alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	15C2 CCE5	
Probable causes:	2004	SDLC communications
	1023	Communications program in remote node
Failure causes:	1023	Communications program in remote node
	F020	Invalid/unsupported command or response received.
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier
Detail qualifier:	87	Invalid frame received

Invalid frame received: invalid n(r) received alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	1C40F78B	
Probable causes:	2004	SDLC communications
	1023	Communications program in remote node

Failure causes:	1023	Communications program in remote node
	F022	Invalid N(R) received
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	87	Invalid frame received

RIM/RD received alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	29BF 0032	
Probable causes:	2104	SDLC communications/remote node
	1023	Communications program in remote node
Failure causes:	2104	SDLC communications/remote node
	3511	Line
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	88	RIM received
	89	RD received

Invalid frame received: max i-field length exceeded alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	5F76 24FD	
Probable causes:	2104	SDLC communications/remote node
	1023	Communications program in remote node
Failure causes:	1023	Communications program in remote node
	F023	Received I-field exceeded maximum length
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	87	Invalid frame received

FRMR received: no reason given alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	A472 BC48	
Probable causes:	2004	SDLC communications
	1000	Software program
Failure causes:	1000	Software program
	F014	FRMR received: no reason specified
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	86	FRMR received

FRMR received: i-field received when not permitted

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	B3B7 D723	
Probable causes:	2004	SDLC communications
	1000	Software program
Failure causes:	1000	Software program
	F011	FRMR received: I-field sent when not permitted

Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	86	FRMR received

FRMR received: invalid/unsupported command or response alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	B776 CA94	
Probable causes:	2004	SDLC communications
	1000	Software program
Failure causes:	1000	Software program
	F010	FRMR received: invalid/unsupported command or response sent
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	86	FRMR received

FRMR received: max i-field length exceeded alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	BA35 EC4D	
Probable causes:	2004	SDLC communications
	1000	Software program
Failure causes:	1000	Software program
	F013	FRMR received: maximum I-field length exceeded
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	86	FRMR received

FRMR received: invalid n(r) sent alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	BEF4 F1FA	
Probable causes:	2004	SDLC communications
	1000	Software program
Failure causes:	1000	Software program
	F012	FRMR received: invalid N(R) sent
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	86	FRMR received

DISK/SNRM received: snrm received in nrm alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	D635 CA1E	
Probable causes:	2004	SDLC communications
	1023	Communications program in remote node
Failure causes:	1023	Communications program in remote node
	F015	SNRM received while in NRM
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.

Detail qualifier:	15	Connection terminated by host

CTS failure alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3300	Link error
Alert ID:	0231 CF0A	
Probable causes:	2031	Line
	3601	Local modem
Failure causes:	3511	Line
	3601	Local modem
	F030	CTS dropped
Recommended actions:	0403	Run modem tests
	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	12	CTS failure

Connection problem: xid (exchange identification) retransmission alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3300	Link error
Alert ID:	0AEC C2A6	
Probable causes:	2104	SDLC communications/remote node
	2031	Line
User causes:	0209	Remote device power off
Recommended action:	0200	Check power
Failure causes:	2104	SDLC communications/remote node
	3511	Line
	F018	XID poll count exhausted

Idle timeout alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3300	Link error
Alert ID:	0E2D DF11	
Probable causes:	2104	SDLC communications/remote node
	2031	Line
User causes:	0209	Remote device power off
Recommended action:	0200	Check power
Failure causes:	2104	SDLC communications/remote node
	3511	Line
	F019	Inactivity timer expired
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	25	Idle timeout retry exceeded

Poll count exhausted alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3300	Link error
Alert ID:	32A3 7F1B	
Probable causes:	2104	SDLC communications/remote node
	2031	Line
User causes:	0209	Remote device power off
Recommended action:	0200	Check power
Failure causes:	2104	SDLC communications/remote node
	3511	Line

	F017	Poll count exhausted
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	81	Disconnect retry limit
	82	Contact retry limit
	83	Poll retry limit
	84	No response retry limit

Remote busy retry alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3300	Link error
Alert ID:	66D6 DA74	
Probable causes:	2104	SDLC communications/remote node
User causes:	0209	Remote device power off
Recommended actions:	0200	Check power
Failure causes:	2104	SDLC communications/remote node
	3511	Line
	F00F	RNR received threshold reached
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	85	Remote busy retry limit

DM Received in Information Transfer Alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3300	Link error
Alert ID:	BD84 C4C9	
Probable causes:	2004	SDLC communications
Failure causes:	2004	SDLC communications
	F01A	DM received
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	80	DM received

Nonproductive receive timeout alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3300	Link error
Alert ID:	C458 E284	
Probable causes:	2104	SDLC communications/remote node
	2031	Line
User causes:	0209	Remote device power off
Recommended action:	0200	Check power
Failure causes:	2104	SDLC communications/remote node
	3511	Line
	F00E	NPR timeout retry limit reached
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	24	Nonproductive receive retry exceeded

DISK/SNRM received: disk received alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3300	Link error

Alert ID:	D9C4 172B	
Probable causes:	2004	SDLC communications
Failure causes:	2004	SDLC communications
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	15	Connection terminated by host

Connection problem: i-frame retransmission alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3300	Link error
Alert ID:	E3DA E42F	
Probable causes:	2104	SDLC communications/remote node
	2031	Line
User causes:	0209	Remote device power off
Recommended action:	0200	Check power
Failure causes:	2104	SDLC communications/remote node
	3511	Line
	F06A	Transmit retry limit reached
Recommended actions:	2011	Review hexadecimal display of alert
	32A0	Report the following detail qualifier: Outage qualifier.
Detail qualifier:	29	Connection problem

See Also

Link Alerts for SDLC and Token Ring

SDLC Alert Local Logging

Before Host Integration Server 2004 attempts to build and send an SDLC link alert, information about the outage that caused the alert is recorded in a log file that can be viewed using the Windows Event Log service. Message 182 is always logged, as follows:

```
182I:  Connection failure, code = (outagecode)
Cause Data                         = hh...hh
Link Role                          = hh
Remote Node Type                   = hh
```

The Outage Code (outagecode) is also reported on Message 23. For a complete list of these codes, the conditions they represent, and the specific link alerts on which they are used, see the next section.

Cause Data is a list of the failure causes from the Failure causes subvector in the alert. Link Role and Remote Node type are as described in the Link Connection Subsystem Configuration Data subvector in the alert.

A connection failure can be due to a station outage, rather than a link outage. If it is due to a station outage – which can be recognized by outage code values of X'80' or higher – then Message 183, formatted as follows, is also logged:

```
183I:
Detailed diagnostic data for station (stationaddress):
SBSY   CFTX   CFRX   V(S)   V(R)   N(R)   OSFC   T1CT
hh     hhhh   hhhh   hh     hh     hh     hh     hhhh
```

The value (stationaddress) is the station address as given in the Detail qualifier subvector in the alert.

The other fields are all data from the Link Station Data subvector, as follows:

Field	Description
SBSY	Link station state: 80 or 40
	(local or remote station sending RNR)
CFTX	Last SDLC control field sent
CRX	Last SDLC control field received
V(S)	N(S) count
V(R)	N(R) count
N(R)	Last received N(R)
OSFC	Outstanding frame count
T1CT	Reply timer expiration count

See Also

Link Alerts for SDLC and Token Ring

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Identifying Alerts from Local Logs Only

When only the local log of an alert is available, you can still obtain the information that would have been supplied on the alert. To do this, check the outage code given on Message 182 against the following list. Find the alert that uses this outage code, and then check the alert data in SDLC Failure Alerts. Some Outage Codes are used for more than one alert. In these cases, you can find the appropriate alert by comparing the Failure causes codes given on Message 182 with those given in the alert data.

SDLC outage codes

Outage code	Condition	Alert description/ID
11	DSR failure	1000 : 83BB6EC8
12	CTS failure	3300 : 0231CF0A
14	DCD failure	1000 : C3BB504A
15	Connection terminated by host	2100 : D635CA1E 2100 : D9C4172B
24	Nonproductive receive retry exceeded	3300 : C458E284
25	Idle timeout retry exceeded	3300 : 0E2DDF11
29	Connection problem	3300 : 0AECC2A6 3300 : E3DAE42F
2D	Abnormal response	1000 : 70A15CB0
2E	Write timeout retry exceeded	1000 : 61D02E7B
80	DM received	3300 : BD84C4C9
81	Disconnect retry limit	3300 : 32A37F1B
82	Contact retry limit	3300 : 32A37F1B
83	Poll retry limit	3300 : 32A37F1B
84	No response retry limit	3300 : 32A37F1B
85	Remote busy retry limit	3300 : 66D6DA74
86	FRMR received	2100 : A472BC48
		2100 : B3B7D723
		2100 : B776CA94
		2100 : BA35EC4D
		2100 : BEF4F1FA
87	Invalid frame received	2100 : 1103D152
		2100 : 15C2CCE5
		2100 : 1C40F78B
		2100 : 5F7624FD
88, 89	RIM or RD received	2100 : 29BF0032

See Also

Link Alerts for SDLC and Token Ring

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Token Ring Failure Alerts

The tables in this section describe the alerts generated by the Token Ring link service provided with Host Integration Server 2004. The alerts are listed in numerical order by alert description and within each description in numerical order by alert ID.

Adapter check error: adapter error alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	1010	Adapter error
Alert ID:	3BA0 3B6D	
Probable causes:	3320	Local Token Ring adapter
Failure causes:	3320	Local Token Ring adapter
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 02):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	02	Data ID: adapter check status
	hh hh	Adapter check status
LAN LCS:		Ring identifier Local individual MAC address

DLC status error: frmr sent—invalid N(R) received

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name.
Alert description:	2100	Software program error
Alert ID:	216D 1033	
Probable causes:	2007	LAN LLC communications
	1023	Communications program in remote node
Failure causes:	1023	Communications program in remote node
	F012	Invalid N(r) received
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

DLC status error: FRMR sent—received i-field exceeded maximum length alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	2100	Software program error
Alert ID:	25AC 0D84	
Probable causes:	2007	LAN LLC communications
	1023	Communications program in remote node
Failure causes:	1023	Communications program in remote node
	F023	Received I-field exceeded maximum length
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

DLC status error: FRMR sent—invalid/unsupported command/response received alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	2100	Software program error
Alert ID:	28EF 2B5D	
Probable causes:	2007	LAN LLC communications
	1023	Communications program in remote node
Failure causes:	1023	Communications program in remote node
	F020	Invalid/unsupported command or response received
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address

Link Station Data subvector included		

DLC status error: FRMR sent—i-field received when not permitted alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	2100	Software program error
Alert ID:	2C2E 36EA	
Probable causes:	2007	LAN LLC communications
	1023	Communications program in remote node
Failure causes:	1023	Communications program in remote node
	F021	I-field received when not permitted
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

Adapter command error: software alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	2100	Software program error
Alert ID:	3EF7 89B7	
Probable causes:	1000	Software program
Failure causes:	1000	Software program
Recommended actions:	30E1	Contact service representative
	32C0	Report the following data:
		Product Set ID index subfield included
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	03	Data ID: adapter return code
	hh	Adapter return code

DLC status error: dm or disk received alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	2100	Software program error
Alert ID:	4B74 26FB	
Probable causes:	2007	LAN LLC communications
	1023	Communications program in remote node

Failure causes:	1023	Communications program in remote node
	F01A	DM received
Recommended actions:	3301	If problem persists, do the following:
	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

DLC status error: FRMR received—invalid N(R) sent alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list		Second name is remote node CP name
Alert description:	2100	Software program error
Alert ID:	83D9 1642	
Probable causes:	2007	LAN LLC communications
	1000	Software program
Failure causes:	1000 F012	Software program Frame reject received: Invalid N(r) sent
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

DLC status error: FRMR received—max I-field length

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name.
Alert description:	2100	Software program error

Alert ID:	8718 0BF5	
Probable causes:	2007	LAN LLC communications
	1000	Software program
Failure causes:	1000	Software program
	F013	Frame reject received: maximum I-field length exceeded
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC (Media Access Control) address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

DLC status error: FRMR received—invalid/unsupported commands/response sent alert

Name of subvector	**Hexadecimal value in subvector**	**Description**
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	2100	Software program error
Alert ID:	8A5B 2D2C	
Probable causes:	2007	LAN LLC communications
	1000	Software program
Failure causes:	1000	Software program
	F010	Frame reject received: Invalid/unsupported command or response sent
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

DLC status error: FRMR received–i-field sent when not permitted alert

Name of subvector	**Hexadecimal value in subvector**	**Description**
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	2100	Software program error
Alert ID:	8E9A 309B	
Probable causes:	2007	LAN LLC communications
	1000	Software program
Failure causes:	1000	Software program
	F011	Frame reject received: I-field sent when not permitted
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

Software program error: adapter interface alert

Name of subvector	**Hexadecimal value in subvector**	**Description**
Alert description:	2100	Software program error
Alert ID:	DA7B C09D	
Probable causes:	3220	Token ring adapter interface
Install causes:	1600	Mismatch between software and microcode
	1601	Incorrect customization image
Recommended actions:	1500	Correct installation problem
	1502	Correct customization parameters
Failure causes:	3220	Token ring adapter interface
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 07):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	07	Data ID: error code
	hh hh	Error code
LAN LCS:		Ring identifier Local individual MAC address

DLC status error: SABME received for open link station alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	2100	Software program error
Alert ID:	E65B 0B7F	
Probable causes:	2007	LAN LLC communications
	1023	Communications program in remote node
Failure causes:	1023	Communications program in remote node
	F016	SABME received while in ABME
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

Bring-up error alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3210	Initialization failure
Alert ID:	AB86 8B0B	
Probable causes:	3320	Local Token Ring adapter
Install causes:	1200	Incorrect hardware configuration
	1402	Mismatch between hardware and software configurations
Recommended actions:	1503	Correct configuration
Failure causes:	3320	Local Token Ring adapter
Recommended actions:	30E1	Contact service representative
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 07):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	07	Data ID: error code
	hh hh	Error code
LAN LCS:		Local individual MAC address

Adapter open error: open failure alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is ring name

Alert description:	3211	Open failure
Alert ID:	016E 5F4E	
Probable causes:	3702	Token ring lobe
	3701	Token ring LAN component
Failure causes:	3712	Local Token Ring lobe
	3701	Token ring LAN component
	2600	Interference
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 07):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	07	Data ID: error code
	hh hh	Error code
LAN LCS:		Local individual MAC address

Adapter open error: remove command received alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3211	Open failure
Alert ID:	44D1 AD86	
Probable causes:	3705	Token ring remove command received
User causes:	3320	Token ring remove adapter command received
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 07):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	07	Data ID: error code
	hh hh	Error code
LAN LCS:		Local individual MAC address

Adapter open error: problem on local lobe alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3211	Open failure
Alert ID:	55BF 3E1C	
Probable causes:	3702	Token ring lobe
Failure causes:	3320	Local Token Ring adapter
	3711	Local Token Ring lobe
	3434	Local lobe cables
Recommended actions:	1009	Try reopening adapter after 30 seconds
	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32C0):
	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 07):
Detailed data:	61	Data ID: adapter number

	hh	Adapter number
Detailed data:	07	Data ID: error code
	hh hh	Error code
LAN LCS:		Local individual MAC address

Adapter open error: beaconing detected alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3211	Open failure
Alert ID:	CAF3 C58A	
Hierarchy/resource list:		Second name is ring name
Probable causes:	3703	Token ring fault domain
Failure causes:	3703	Token ring fault domain
Recommended actions:	1009	Try reopening adapter after 30 seconds
	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3101, or 32C0):
	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 07):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	07	Data ID: error code
	hh hh	Error code

Adapter open error: duplicate address alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3211	Open failure
Alert ID:	D615 A61E	
Probable causes:	3704	Token ring duplicate station address
Install causes:	3704	Token ring duplicate station address assigned
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 07):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	07	Data ID: error code
	hh hh	Error code
LAN LCS:		Local individual MAC address

System action: operator caused LAN adapter to be reset alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3211	Open failure
Alert ID:	F7A6 2F59	
Probable causes:	7001	Resources not active
User causes:	3300	Adapter not ready
Recommended actions:	1300	Correct then retry

	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier local individual MAC address

Network status error: lobe wire fault alert

Name of subvector	**Hexadecimal value in subvector**	**Description**
Hierarchy/resource list:		Second name is ring name
Alert description:	3212	Wire fault
Alert ID:	A676 B230	
Probable causes:	3702	Token ring lobe
Failure causes:	3711	Local access unit
	3434	Local lobe cables
	3320	Local Token Ring adapter
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 17):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	17	Data ID: ring status code
	hh hh	Ring status code
LAN LCS:		Local individual MAC address

Network status error: auto-removal alert

Name of subvector	**Hexadecimal value in subvector**	**Description**
Hierarchy/resource list:		Second name is ring name
Alert description:	3213	Auto-removal
Alert ID:	EB61 E14F	
Probable causes:	3702	Token ring lobe
Failure causes:	3320	Local Token Ring adapter
	3711	Local access unit
	3434	Local lobe cables
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 17):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	17	Data ID: ring status code
	hh hh	Ring status code
LAN LCS:		Local individual MAC address
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	17	Data ID: ring status code
	hh hh	Ring status code

LAN LCS:		Local individual MAC address

Network status error: Token Ring remove adapter command received alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	3214	Remove adapter command received
Alert ID:	59F3 2622	
Probable causes:	7013	LAN Manager operator
User causes:	7101	Token ring remove adapter command received
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 17):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	17	Data ID: ring status code
	hh hh	Ring status code
LAN LCS:		Ring identifier Local individual MAC address

Network status error: llc remove adapter command received alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	3300	Link error
Alert ID:	5B8F 5BA7	
Probable causes:	2017	LAN LLC communications/remote node
Failure causes:	2107	LAN LLC communications/remote node
	F017	Poll count exhausted
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3103, or 32A0):
	2010	Review link detailed data
	3103	Contact LAN administrator responsible for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address
Link Station Data subvector included		

DLC status error: link lost alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	3300	Link error

Alert ID:	9921 0A2B	
Probable causes:	3321	Remote Token Ring adapter
Failure causes:	3321	Remote Token Ring adapter
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address

DLC error: remote station not on local or attached rings alert

Name of subvector	Hexadecimal value in subvector	Description
Hierarchy/resource list:		Second name is remote node CP name
Alert description:	3305	Unable to communicate with remote node
Alert ID:	D91B 9E2D	
Probable causes:	2007	LAN LLC communications
	1023	Communications program in remote node
User causes:	0209	Remote device power off
Recommended actions:	0200	Check power
Failure causes:	1023	Communications program in remote node
Recommended actions:	3301	If problem persists, do the following (available messages correspond to subvectors 2010, 3101, or 32A0):
	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address Remote individual MAC address LAN routing information
LCS configuration:		Remote device address Local device address

Adapter command error: storage capacity exceeded alert

Name of subvector	Hexadecimal value in subvector	Description
Alert description:	5003	Capacity exceeded
Alert ID:	9C35 13D5	
Probable causes:	0101	Main storage
Failure causes:	0110	Storage control
Recommended actions:	2010	Review link detailed data

	3103	Contact LAN administrator responsible for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 03):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	03	Data ID: adapter return code
	hh	Adapter return code
LAN LCS:		Ring identifier Local individual MAC address

Adapter check error: receive queue overrun alert

Name of subvector	**Hexadecimal value in subvector**	**Description**
Alert description:	5012	Receive queue overrun
Alert ID:	14D5 3710	
Probable causes:	1000	Software program
Failure causes:	1000	Software program
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32A0	Report the error information described by the detailed data subvector (hex value 61):
		Product Set ID index subfield included
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
LAN LCS:		Ring identifier Local individual MAC address

Adapter check error: microcode program abnormally terminated alert

Name of subvector	**Hexadecimal value in subvector**	**Description**
Alert description:	6000	Microcode program abnormally terminated
Alert ID:	E1EC 74A7	
Probable causes:	3320	Local Token Ring adapter
Failure causes:	3320	Local Token Ring adapter
Recommended actions:	2010	Review link detailed data
	3101	Contact Token Ring administrator for this LAN
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 07):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
	07	Data ID: error code
	hh hh	Error code
LAN LCS:		Ring identifier Local individual MAC address

Adapter command error: configuration alert

Name of subvector	**Hexadecimal value in subvector**	**Description**
Alert description:	8000	Configuration error
Alert ID:	B8AB EF98	
Probable causes:	7001	Local system operator
Install causes:	1501	Incorrect customization parameters
	1400	Mismatch between hardware and software

Recommended actions:	3110	Contact communications systems programmer
	32C0	Report the error information described by the detailed data subvector (hex values 61 and 03):
Detailed data:	61	Data ID: adapter number
	hh	Adapter number
Detailed data:	03	Data ID: adapter return code
	hh	Adapter return code

See Also

Link Alerts for SDLC and Token Ring

Link Statistics

For SDLC (Synchronous Data Link Control) and Token Ring connections, Host Integration Server 2004 maintains statistics on link usage and errors. Host Integration Server 2004 logs this information when a connection ends or when the counter for a particular error or timeout reaches its maximum value.

This section contains:

- Format for Link Statistics

Format for Link Statistics

When an SDLC or Token Ring connection ends, or when an error counter reaches its maximum value, Host Integration Server 2004 records statistics on link usage. These statistics include information such as the adapter number, the date and time the link was established, and the counts of errors and timeouts. This data is also logged in NMVT (network management vector transport) format if a connection has been specified for carrying NetView data. The data is then sent if that connection and the server that owns the connection are both active.

This section contains:

- SDLC Link Statistics
- Token Ring Link Statistics

SDLC Link Statistics

Link statistics are generated when a link is closed or when one of the wrap counters listed later in this section is about to wrap. Whenever a link statistics message is built, all the wrap counters are reset to 0. The cumulative counters are not reset; they provide statistics from the point at which the particular link service was started.

The NMVT generated has the following format:

NMVT header	
41 03 8D 00 00 00 00 00	NMVT Header

Major vector header	
00 69	Length of major vector
00 25	Link statistics major vector

Data link traffic counters subvector	
65 9A	Data Link Traffic Counters subvector
03	DLC type: SDLC
hh	Adapter number (01+04)

Date/time link established	
hh	Date
hh	Month
hh hh	Year
hh	Hour
hh	Minute
hh	Second
hh	Hundredths of a second
hh	Counter

Wrap counters	
hh	Transmit I-frames OK
hh	Transmit I-frames not OK
hh	Retransmit I-frames
hh	Received I-FCS OK
hh	Received I-FCS not OK
hh	Total frames sent
00	Reserved
hh	Lost data frames received
hh	FRMR conditions sent
00	Reserved
hh	CTS drop
00	Reserved
00	Reserved
hh	DSR drop out
hh	Inactivity timeouts
00	Reserved
hh	DMA underruns
00	Reserved
hh	Transmit fail timeouts
00	Reserved

Cumulative Counters

The cumulative counters are the same counters as the wrap counters, with reserved bytes in the same positions.

See Also

Format for Link Statistics

Token Ring Link Statistics

Link statistics are generated when a link is closed or when one of the following counters is about to wrap. Whenever a link statistics message is built, all the counters are reset to 0.

The NMVT generated has the following format:

NMVT header	
41 03 8D 00 00 00 00 00	NMVT Header

Major vector header	
00 32	Length of major vector
00 25	Link Statistics major vector

Data link traffic counters subvector	
2E9A	Data Link Traffic Counters subvector
04	DLC type: Token Ring
01 or 02	Statistics type: link counter overflow or adapter counter overflow

Token ring adapter log information and counters	
hh	Adapter number (01+04)
00	Reserved
hh	Line error
hh	Internal error
hh	Burst error
hh	ARI/FCI error
hh	End delimiter
00	Reserved
hh	Lost frame
hh	Receive congestion
hh	Frame copied error
hh	Frequency error
hh	Token error
00 00 00	Reserved

DLC SAP station information	
hh hh hh hh	Count of frames transmitted OK
hh hh hh hh	Count of frames received OK
hh hh hh hh	Count of frames discarded
hh hh hh hh	Lost data
hh hh	Buffer available in SAP

DLC link station information	
hh hh	Count of I-frames transmitted
hh hh	Count of I-frames received
hh	Received I-frames error count
hh	Transmitted I-frames error count
hh hh	T1 timer expired count

See Also

Format for Link Statistics

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Alerts Used by Applications, NVAlert, and NVRunCmd

Application programs and the NVAlert and NVRunCmd services can generate alerts using the Common Service Verb (CSV) **TRANSFER_MS_DATA**. An application or service can supply subvectors, which are required to build an NMVT, or it can supply the complete NMVT. In both cases, the completed NMVT is logged locally, and may also be sent on the connection designated for NetView if the connection is configured and active. An application or service can also supply user-defined alert data, in which case the data is logged locally but cannot be sent.

This section contains:

- Format for Alerts Used by Applications, NVAlert, and NVRunCmd

Format for Alerts Used by Applications, NVAlert, and NVRunCmd

An application program or the NVAlert and NVRunCmd services can use the CSV **TRANSFER_MS_DATA** to issue alerts. The alerts are logged in a log file that can be viewed using the Windows Event Log service, and may also be sent on the NetView connection.

The data supplied to **TRANSFER_MS_DATA** may be in any of the following formats:

NMVT
The application or service supplies a complete NMVT, including the header information.

ALERT_SUBVECTORS
The application or service supplies the subvectors required for an alert, but without the NMVT header or major vector header. Host Integration Server 2004 adds the header information, as described in the next section.

PDSTATS_SUBVECTORS
The application or service supplies the subvectors required for a Problem Determination Statistics NMVT, but without the NMVT header or major vector header. Host Integration Server 2004 adds the header information, as described in the next section.

USER_DEFINED
The application or service supplies data in its own format. This data cannot be sent on the connection designated for NetView, but is logged in the same way as the other data formats.

The application or service can also request Host Integration Server 2004 to add the Product Set ID subvector (for all data types except USER_DEFINED), the Date/Time subvector, or both to the supplied data. The format of these added subvectors is described in the next section.

For all data types, the data (with added headers and subvectors, if appropriate) is logged locally in NMVT format, whether or not you specified a connection for NetView.

See Also

Added Headers and Subvectors

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Added Headers and Subvectors

The following table lists Added Headers and Subvectors.

NMVT header	
41 03 8D 00 00 00 00 00	NMVT Header

Major vector header	
LL LL	Length of Major Vector
00 00 or 00 25	Alert major vector (for the data type ALERT_SUBVECTORS), or Problem Determination Statistics major vector (for the data type PSTATS_SUBVECTORS)

Product set ID subvector	
4D 10	Product set ID subvector
00	Unused field
34 11	Product ID subvector
0C	Product classification: non-IBM software
08 04	Software product common level subfield
F0 F2	Version identifier: 02
F0 F0	Release identifier: 00
F0 F0	Modification identifier: 00
20 06	Software product common name subfield
C4 C3 C1 61 D4 E2 40 C3 D6 D4 D4 40 E2 C5 D9 E5 D9	Product name: Microsoft Host Integration Server 2004
00 .. 00	Name padded with nulls to 30 characters
09 08	Software product program number subfield
F0 F0 F0 F0 F0 F0 F0	Product program number: zeros
16 11	Product ID subvector
03	Product classification: hardware
13 00	Hardware product ID subfield
00	Format type: undefined
hh...hh	Server: Windows-based computer name

Date/time subvector	
0A 01	Date/Time Subvector
08 10	Local Date/Time subfield
hh	Year – two digits
hh	Month
hh	Date
hh	Hours
hh	Minutes
hh	Seconds

See Also

Format for Alerts Used by Applications, NVAlert, and NVRunCmd

Local Logging of Network Management Data

Data is logged in a Windows Event Log service log file in two ways. First, the data from the alert is logged in a more readable format, using standard log messages. The format is specific to the alert type. For the message numbers used and explanations of the data, see the section in this chapter that relates specifically to that type of alert.

If a connection has been designated for carrying NetView data and the server that owns the connection is active, the alert NMVT containing the data is also logged in NMVT format as it would be sent. The NMVT appears as Message 540, followed by Message 541. Note that this logging occurs before Host Integration Server 2004 attempts to send the NMVT. The log is therefore no guarantee that the NMVT is sent successfully.

For more information about local logging of alert information, see the section of this chapter relating specifically to that type of alert.

See Also

Alerts Used by Applications, NVAlert, and NVRunCmd

Network Protocols and Client/Server Communication

This section explains how clients using different local area network (LAN) protocols can communicate with Microsoft® Host Integration Server 2004 computers. The section includes an overview of how network protocols are used on clients, and how client logons work. Also included are procedures for checking the setup options for Host Integration Server 2004 specified on a client or server. These setup options must be specified correctly in order for the client to communicate with a Host Integration Server 2004 computer. You will also find descriptions and illustrations of how clients using each of the possible protocols locate a Host Integration Server 2004 computer in the network.

This section contains:

- Overview of Network Protocols for Clients
- Important Host Integration Server 2004 Network Options
- Adjusting Clients Running Windows for Workgroups
- Details about How Clients Use Protocols

Overview of Network Protocols for Clients

Host Integration Server 2004 clients can communicate with servers through the following LAN protocols:

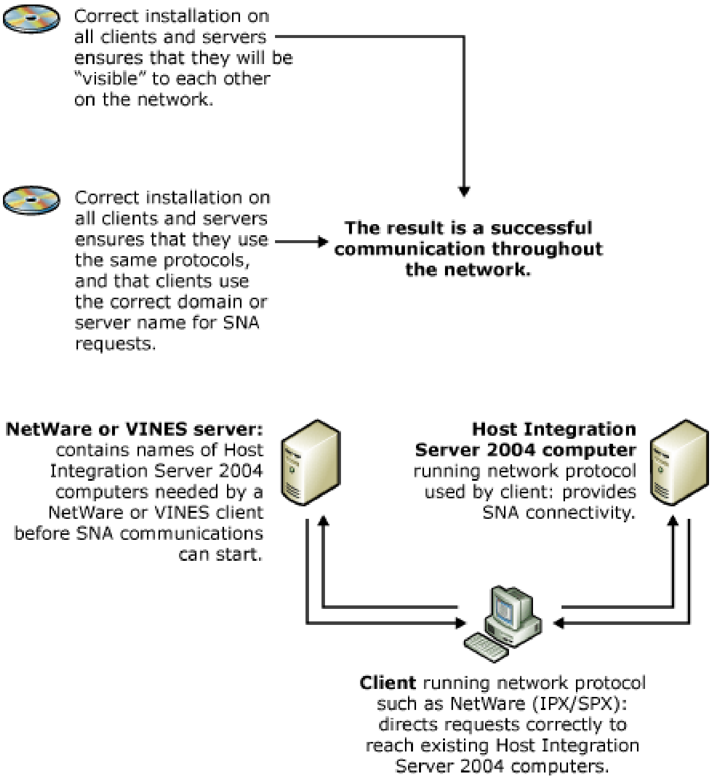
- Microsoft Networking (Named Pipes)
- IPX/SPX (the protocol used with NetWare)
- TCP/IP

  Important In order for the different client/server protocols to be handled correctly by Host Integration Server 2004, both clients and servers must have the network software and the Host Integration Server 2004 software installed correctly. Be sure to follow the installation instructions in this chapter carefully, and follow the installation instructions for other software you are using for example, Windows 2000 Server and the associated network software, Host Integration Server 2004, and network software on clients.

Correct installation of network and Host Integration Server 2004 on servers and clients ensures that two essential aspects of communication work correctly:

- The servers and clients are visible to each other on the local area network (LAN). This results when the network software is installed correctly on all affected computers.
- The Host Integration Server 2004 computers communicate with clients over the correct LAN protocol, and the clients direct their communication to the correct domain name or, for some clients using Microsoft Networking or TCP/IP, to one or more correct server names. A Host Integration Server 2004 client must be set up to use the correct server or domain name or, for Microsoft Networking, set up to locate servers in the local domain. Otherwise, the client will not be able to locate a Host Integration Server 2004 computer.

For example, in order for a client to successfully communicate over Novell NetWare, there must be working communication between the client, a NetWare server, or a Windows Server running Microsoft File and Print Services for NetWare and any Host Integration Server 2004 computers in the network. Either server provides the client with names of Host Integration Server 2004 computers, . In addition, for clients running NetWare 4.*x*, bindery emulation must be enabled. The following figure illustrates how correct installation is necessary for successful communication:


Correct installation on all clients and servers ensures that they will be "visible" to each other on the network.
Correct installation on all clients and servers ensures that they use the same protocols, and that clients use the correct domain or server name for SNA requests.
The result is a successful communication throughout the network.
NetWare or VINES server: contains names of Host Integration Server 2004 computers needed by a NetWare or VINES client before SNA communications can start.
Host Integration Server 2004 computer running network protocol used by client: provides SNA connectivity.
Client running network protocol such as NetWare (IPX/SPX): directs requests correctly to reach existing Host Integration Server 2004 computers.

For information about how Host Integration Server 2004 enables you to view and choose the domain and protocols to be used by Host Integration Server 2004 computers and clients, see Important Network Options on a Host Integration Server 2004 Computer. For details about how each of the network protocols works on a Host Integration Server 2004 client, see the section about that specific network protocol (for example, Clients Using TCP/IP).

This section contains:

- Client Logons and the Storing of Passwords
- Types of Client Logons

Client Logons and the Storing of Passwords

For security reasons, a user at a client computer may have to log on several times before obtaining access through Host Integration Server 2004 to a mainframe or AS/400. Users may not always find this to be convenient. The logons are necessary because starting an SNA session requires several kinds of access: access to the Windows domain, access to a Host Integration Server 2004 computer, access to the mainframe or AS/400 and, possibly, access to programs on the mainframe or AS/400. An example of such a program is an AS/400 program that uses conversation security when communicating with 5250 emulators. Each layer of access may require an additional logon depending on the operating system and the client/server protocol used on the client.

The Host Security Integration feature of Host Integration Server 2004 can reduce or even eliminate these multiple logons on Windows -based networks. If you are not able to take advantage of this feature, users can avoid multiple logons by following the procedures outlined in the following sections.

See Also

Types of Client Logons

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Types of Client Logons

The number of logons required for establishing an SNA session from a client varies, depending mostly on what client/server protocol the client computer is using. The following list describes the logons:

Clients Using Microsoft Networking

A client using Microsoft Networking must log on to the Windows domain and then must perform any logons required on the mainframe or AS/400. For example, a client using Microsoft Networking and also using a 5250 emulator would log on once to the Windows domain, once to the AS/400 itself, and (in many cases) once to the AS/400 program that communicates with the 5250 emulator.

After clients using Microsoft Networking are logged on to the domain, no additional logon is needed for access to Host Integration Server 2004 computers in the domain. That is, Host Integration Server 2004 can securely confirm the domain logon without any additional action by the user.

Clients Using Novell NetWare

A client using NetWare must first log on to the NetWare network and then to the Host Integration Server 2004 computers. Finally, the client must perform any logons required on the mainframe or AS/400

Clients Using TCP/IP

A client using TCP/IP must log on to the Host Integration Server 2004 computers even if the client has already accessed other resources in the Windows domain, and then must perform any logons required on the mainframe or AS/400.

See Also

Overview of Network Protocols for Clients

Important Host Integration Server 2004 Network Options

The following two sections illustrate and describe important Host Integration Server 2004 network options for a Host Integration Server 2004 server or client. These options must be set correctly in order for clients to locate Host Integration Server 2004 computers and start sessions. If the options are set incorrectly, clients may use the wrong protocols or may search the wrong locations for Host Integration Server 2004 computers.

This section contains:

- Important Network Options on a Host Integration Server 2004 Computer
- Important Network Options on a Client

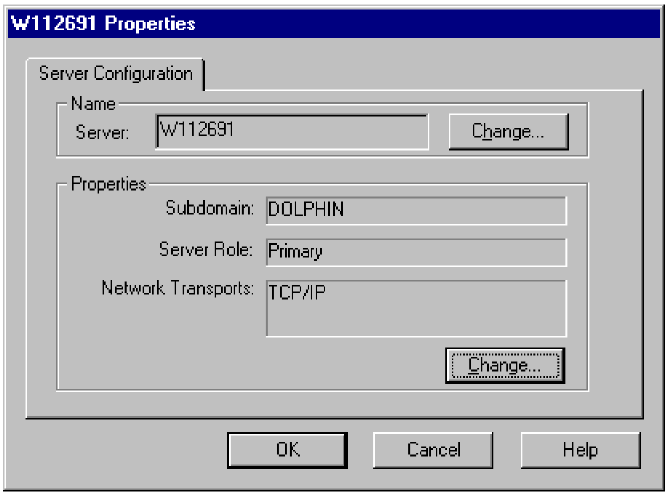
Important Network Options on a Host Integration Server 2004 Computer

When Host Integration Server 2004 network options are specified correctly on a Host Integration Server 2004 computer, the server will use the appropriate protocol(s) for communicating with clients. Servers supporting NetWare, TCP/IP, or Microsoft Networking will have the correct domain name so that clients can locate the Host Integration Server 2004 computers.

> **Important** These changes do not take effect until the server is restarted. Do not change these settings while the server has active users.

To view or change client/server protocols and other network options on a Host Integration Server 2004 computer

1. In SNA Manager, select a Host Integration Server 2004 computer.
2. Right-click a server and then click **Properties**. The **Server Properties** dialog box appears.



Server: W112691
Subdomain: DOLPHIN
Server Role: Primary
Network Transports: TCP/IP

3. To change the Host Integration Server 2004 computer name, click **Change** in the **Name** box. The Host Integration Server 2004 computer must be in an off-line state before you can change the name.
4. To modify the client/server protocols and other network options, click **Change** in the **Properties** box, and then click **OK**.
5. Complete the Server SNA Resource wizard.

> **Note** If the server has TCP/IP installed and will communicate with clients that use TCP/IP, be sure that the selections in the Select Client/Server Protocols dialog box include TCP/IP. If Microsoft Networking (Named Pipes) is selected and TCP/IP is not, the server can communicate through Named Pipes over TCP/IP, a protocol combination that does not recover from error conditions as effectively as native TCP/IP.

If TCP/IP is selected, you can also select Microsoft Networking. In this situation, the Host Integration Server 2004 computer will use native TCP/IP with clients that use TCP/IP, and Microsoft Networking with clients that use Microsoft Networking.

See Also

Important Host Integration Server 2004 Network Options

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Important Network Options on a Client

For Host Integration Server 2004 client software, several key options supply the information a client must have for locating Host Integration Server 2004 computers. These options specify which protocol the client uses to communicate with Host Integration Server 2004 computers if more than one protocol is available on the client, and which domain or server names the client will direct SNA requests to.

When a client makes an SNA request, the client must direct that request to a domain or to one or more Host Integration Server 2004 computers. The appropriate way for a client to direct requests depends on the protocol used and the relative location of clients and servers. The following table lists the ways clients direct SNA requests, and the information that will be requested by setup during client installation. For more detail about how a client directs requests and locates Host Integration Server 2004 computers, see the section about the appropriate type of client (for example, Clients Using TCP/IP).

Network protocol used on client	How the client directs SNA requests	Information to find out before running client setup
Microsoft Networking	Either to the local domain (if the Host Integration Server 2004 computers are in the same domain as the client), or to one or two specific Host Integration Server 2004 computers in a remote domain.	Whether the client is in the same domain as the Host Integration Server 2004 computers, and if not, one or two names of Host Integration Server 2004 computers.
Novell NetWare (IPX/SPX)	To a specific domain. The Host Integration Server 2004 computers must be located in this domain in order for the client to locate them.	The name of the Host Integration Server 2004 subdomain in which the Host Integration Server 2004 computers are located.
TCP/IP	Either to a domain name or to specific server name, depending on what is specified in the Host Integration Client Mode or Host Integration Server Location dialog box.	Contact your network administrator for additional information regarding a specific IP address for the Host Integration Server 2004 computer.

See Also

Important Host Integration Server 2004 Network Options

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Adjusting Clients Running Windows for Workgroups

Clients running Windows for Workgroups have a very flexible set of options for network operation. As a result, these clients may require specific adjustments in order to communicate with Host Integration Server 2004 computers.

Clients running Windows for Workgroups and using Microsoft Networking (not other network software) must use domain and password settings that coordinate with settings in Host Integration Client 2004 Setup. For example, if the client's workgroup name does not match the server's domain name, options in Host Integration Client 2004 Setup must be set accordingly.

This section contains:

- Domain and Password Settings for Clients Running Windows for Workgroups

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Domain and Password Settings for Clients Running Windows for Workgroups

This section applies only to clients running Windows for Workgroups and using Microsoft Networking to communicate with Host Integration Server 2004 computers. Such clients must be configured so that any domain names, workgroup names, local passwords, and domain passwords all work together smoothly.

This section contains:

- Domain Settings with Windows for Workgroups
- Password Settings with Windows for Workgroups

Domain Settings with Windows for Workgroups

For domain names and workgroup names, use one of the following approaches:

- **Workgroup name differs from Host Integration Server 2004 domain name.** For clients where the workgroup name must be different from the server's domain name (the name of the Windows domain), in Host Integration Client 2004 Setup, you must use the Remote Domain setting. That is, in the Host Integration Server Location dialog box, select Remote Domain, and supply the name of one or two Host Integration Server 2004 computers to which the client will send requests.

  To view a client's workgroup name, in the Control Panel, double-click the Network icon. The name is listed in the resulting dialog box.

- **Workgroup name matches Host Integration Server 2004 domain name.** For clients where the workgroup name is the same as the server's domain name (the name of the Windows domain), in Host Integration Client 2004 Setup, you can use the Local Domain setting. That is, in the Host Integration Server Location dialog box you can select Local Domain. When the client requests an SNA session, the request will reach the domain that has the same name as the client's workgroup.

  To view a client's workgroup name, in the Control Panel, double-click the Network icon. The name is listed in the resulting dialog box.

See Also

Password Settings with Windows for Workgroups

Password Settings with Windows for Workgroups

For Windows for Workgroups passwords and domain passwords, use one of the following approaches:

- **Enable logon to the Windows domain automatically at startup.** You can configure Windows for Workgroups to log the user on to the Windows domain automatically at startup.To do this, first make sure that a user account has been created for the user in the Windows domain, and obtain the assigned user name and password.

To configure Windows for Workgroups to logon to the Windows domain automatically at startup

1. On the client computer, from the Control Panel, double-click the **Network** icon and then click **Startup** .
2. In the **Startup Settings** dialog box, under **Options for Enterprise Networking**, find the check box labeled **Log On to Windows or LAN Manager Domain**. Select this check box, and type the domain name in the appropriate box.
3. Choose **OK** repeatedly until the dialog boxes are closed.

Note The next time Windows for Workgroups is restarted, the user will be prompted for both the local password and the domain password, and must type them correctly. Thereafter, only the local password is needed at startup, because the domain password is encrypted and stored (to be "unlocked" by the local password).

After domain logon has been set up, it is important for the user to understand the difference between the local Windows for Workgroups password and the actual domain password. The local Windows for Workgroups password unlocks the encrypted password list that has been stored for that user on that computer. This password list includes a copy of the domain password if the preceding configuration steps have been taken. The actual domain password is the password for that user's account on the Windows domain, as recorded on Windows servers that are domain controllers.

The user's domain account may be set up to require periodic changing of the password. If the domain password expiration date is getting close, when the user logs on to the domain, pop-up warnings will appear on the user's computer. Note that the user must try to log on in order for the pop-up warnings to appear. At this point, the user needs to understand the different buttons used for changing passwords with Windows for Workgroups. After choosing the Network option from the Control Panel, click the Password button. This only changes the password to unlock the user's local password list; it does not change the domain password.

To change the domain password, the user must choose the Startup button followed by the Set Password button. When the user changes the domain password using the Set Password button, the domain password is also changed in the local password file.

Make sure that users understand how to use these buttons correctly to change their local Windows for Workgroups password and to change their Windows domain password.

- **Log on only as needed, by using the net logon command.** If the user does not log on to the Windows domain at startup, the following command can be used before starting an SNA session. At the MS-DOS prompt (from within Windows for Workgroups), type

  net logon *username* **/domain:***domainname*

  After typing the command, the user is prompted for the domain password.

See Also

Domain Settings with Windows for Workgroups

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

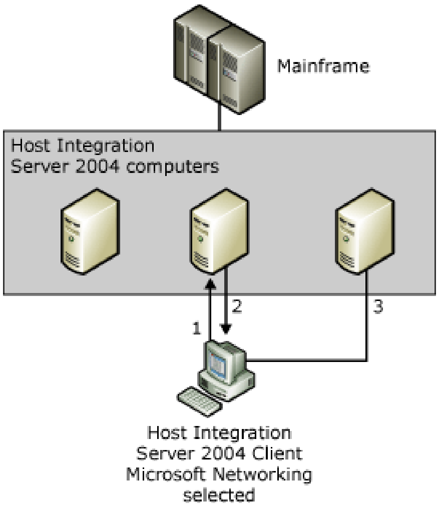
Details about How Clients Use Protocols

The following sections describe how each type of client works with Host Integration Server 2004. The clients are listed according to the protocol used: Microsoft Networking (Named Pipes), Novell NetWare (IPX/SPX), and TCP/IP.

This section contains:

- Clients Using Microsoft Networking (Named Pipes)
- Clients Using NetWare (IPX/SPX)
- Clients Using TCP/IP

Clients Using Microsoft Networking (Named Pipes)


Mainframe
Host Integration Server 2004 computers
1
2
3
Host Integration Server 2004 Client Microsoft Networking selected

A Microsoft Networking (Named Pipes) client uses the following procedure for connecting to the mainframe:

1. You can choose between two methods by which a client searches for Host Integration Server 2004 computers.

    - Active Directory
    - Sponsor connections, locating servers by SNA subdomain or by server name.

    Client locates servers by subdomain means that the client locates the server through broadcasts in the local subdomain. Therefore, the client must be in the same physical network as the Host Integration Server 2004 computers, and must not be separated from the servers by a router.

    Client locates servers by name means that the client searches for Host Integration Server 2004 computers by name, and therefore need not be on the same side of any routers as the Host Integration Server 2004 computers. When connecting with Named Pipes over TCP/IP, and there is a router separating the Host Integration Server 2004 computer and the client, the client computer requires a method of resolving NetBIOS names to an IP address. A local LMHOSTS file or a Windows Internet Name Service (WINS) server may be used to perform this resolution.

    > **Note** If Windows for Workgroups 3.11 is being used and the Microsoft IPX/SPX compatible transport is installed, add **Directhost=no** to the [network] section of SYSTEM.INI file on the Windows for Workgroups 3.11 client computer, and then reboot the computer.

    If this is a routed network, Named Pipes is not recommended. TCP/IP is the recommended interface for this environment.

2. The Host Integration Server 2004 computer responds with a list of available Host Integration Server 2004 computers that are available to get a 3270 or APPC session with. This special connection is called the sponsor connection.
3. Finally, the client attempts to connect to each Host Integration Server 2004 computer in the list until a server is found that can handle the 3270 or APPC request.

See Also

Microsoft Networking (Named Pipes) Errors

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Microsoft Networking (Named Pipes) Errors

NAMED PIPES 5

Causes

One of the following has occurred:

- Access has been denied trying to create a connection to the Host Integration Server 2004 computer. The client/server interface connects to the Host Integration Server 2004 computer just like any other local area network (LAN) connection. It must be validated by Windows as a valid user in the domain.
- The Host Integration Server 2004 computer is unreachable. If using TCP/IP this could mean that the name to IP address resolution has failed.

NAMED PIPES 2

Causes

The client has connected to the Host Integration Server 2004 computer, but the SNABase service is not running on that machine. Start the SNABase service on the Host Integration Server 2004 computer to which you are trying to connect.

NAMED PIPES 121

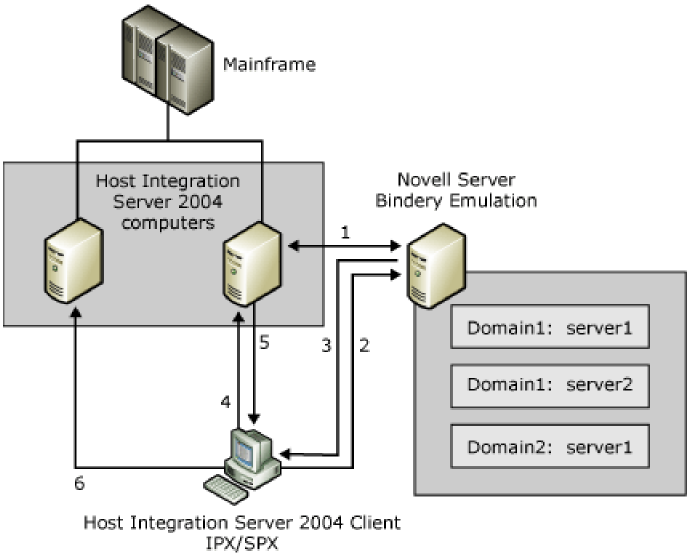
Causes

The client is configured for **Client locates servers in an Host Integration Server 2004 Subdomain** and therefore, is sending out broadcast messages to discover a Host Integration Server 2004 computer. These broadcast messages will typically not be passed by a router that may be between your client and the server. In the client configuration select **Client locates server by name** and specify an IP address or computer name of one or more Host Integration Server 2004 computers.

See Also

Clients Using Microsoft Networking (Named Pipes)

Clients Using NetWare (IPX/SPX)


Mainframe
Host Integration Server 2004 computers
Novell Server Bindery Emulation
1
2
3
4
5
6
Domain1: server1
Domain1: server2
Domain2: server1
Host Integration Server 2004 Client IPX/SPX

Novell NetWare (IPX/SPX) client computers use the following procedure for connecting to the mainframe:

1. At startup time, all Host Integration Server 2004 computers register their subdomain name and computer name with the NetWare Bindery. The subdomain name is configured in Setup for Host Integration Server 2004. The computer name used is the Windows computer name.
2. Sometime later, a client requests an initial SNA session (3270 or APPC) by sending the request to the NetWare server requesting a list of registered Host Integration Server 2004 computers.
3. In response, the NetWare server sends the client the names of the Host Integration Server 2004 computers.
4. The client then selects one of the names from this list of Host Integration Server 2004 computers at random, and attempts to get a LAN connection with one of the Host Integration Server 2004 computers. The client must be configured for the same subdomain name as the Host Integration Server 2004 computers.
5. The Host Integration Server 2004 computer responds with a list of available Host Integration Server 2004 computers that are available to get a 3270 or APPC session with. This special connection is called the *sponsor connection*.
6. Finally, the client attempts to connect to each Host Integration Server 2004 computer in the list until a server is found that can service the 3270 or APPC request.

This section contains:

- Checklist for Clients Using NetWare (IPX/SPX)
- NetWare Errors

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

Checklist for Clients Using NetWare (IPX/SPX)

When troubleshooting client problems, check that all of the following conditions have been met:

For Bindery

- **NetWare Servers**

  The NetWare server is properly installed and running, so that the bindery service is available.

- **Host Integration Server 2004 Computers**

  The Host Integration Server 2004 computer has registered its name in the bindery on the NetWare server. Several elements are required for this. The first element happens automatically: the installation of the NWLink IPX/SPX Compatible Transport on Windows. The second is matching the frame-type with the NetWare Server. For instance, if 802.2 is configured on the NetWare Servers, then the same frame type should be configured in the properties for the NWLink IPX/SPX Compatible Transport on Windows. Auto Frame Type is recommended.

  The correct subdomain name must be typed in the **Host Integration Server 2004 Subdomain Name** dialog box. The name is registered (along with the server name computer name) on the NetWare server. Only if the NetWare server is provided with the correct subdomain name can it respond to client requests and provide the clients with Host Integration Server 2004 names.

  Also, for the Host Integration Server 2004 computer to register its name on the NetWare server, the Host Integration Server 2004 must be installed to work with IPX/SPX. This means that in Setup, the Novell NetWare (IPX/SPX) option must be selected in the Select Client/Server Protocols dialog box.

- **IPX Routers**

  In addition, for Bindery, any IPX routers between the two servers must be configured to allow NetWare Service Advertising Protocol broadcasts (SAP broadcasts)() to flow. IPX routers must propagate sockets 84C8 and 84C9 to support the communication needed by Host Integration Server 2004 computers and clients.

  To discover whether any Host Integration Server 2004 computers have been registered with NetWare Bindery, use the NetWare Rconcole utility against any NetWare Server that is using Bindery. For instance, if there are two Host Integration Server 2004 computers (Server1, Server2) that have successfully registered themselves with the NetWare Bindery and both servers are configured to be in a subdomain called Domain1, the entry in the NetWare Rconsole utility would be:

  - DOMAIN1!Server1
  - DOMAIN1!Server2

For Client

- Ensure that the client is using the same subdomain name as the Host Integration Server 2004 computers you wish to connect to and has NWLink installed.
- **NDS Specific**

  The same concepts for Bindery apply to NetWare Directory Service (NDS), which the exceptions:

- **Host Integration Client 2004**

  The NetWare Directory Service (NDS) logon credentials on the Host Integration Server 2004 computer must have the right to add an entry into the NetWare NDS tree structure. If this fails, there will be an event logged to the Windows Application Event Log.

  The NDS Context and Tree Name must be provided by the client and server configurations in addition to the subdomain name in order for a client to connect successfully.

- **NetWare Servers**

  If using NetWare Directory Services (NDS), Host Integration Server 2004 requires NetWare version 4.11 or later. Earlier versions of NetWare are supported through the bindery emulation feature of NetWare version 4.0 or later.

  Note If NDS is selected on the client and an attempt to get a sponsor connection fails, it will automatically try Bindery.

See Also

NetWare Errors

NetWare Errors

- **BINDERY 250**

  The Host Integration Server 2004 computer has contacted a NetWare Server and has enumerated a list of available Host Integration Server 2004 computers in the client's subdomain. However, the client cannot connect to any of the Host Integration Server 2004 computers in this list. There may be a network problem preventing a connection. Ensure that the same frame type is being used on the client and the other Host Integration Server 2004 computer.

- **BINDERY 252**

  The client has found that there are no Host Integration Server 2004 computers in this subdomain registered with the NetWare Bindery. Ensure that the clients and servers are using the same subdomain name and that SNABase service on the Host Integration Server 2004 computers has been started and registered with Bindery. To check whether SNABase has been registered with the NetWare Bindery use the NetWare Rconsole utility. For instance, if the Host Integration Server 2004 computer is configured to be in a subdomain called Seattle, and the computer name of the Host Integration Server 2004 computer is SNAS1, then the entry in Rconsole would be:

  SEATTLE!SNAS1

- **NDS 64935**

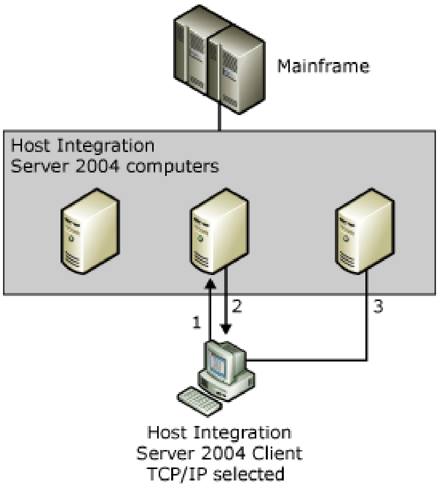
  The Context Name and / or subdomain name on the client is different than Context Name and /or subdomain name configured on the Host Integration Server 2004 computer. It can also mean that the Context Name, though the same on client and server, is not a valid NetWare Directory Services (NDS) Context Name. If NDS discovery fails and there are NetWare Servers that also support Bindery, the client will try using the Bindery automatically.

See Also

Checklist for Clients Using NetWare (IPX/SPX)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Clients Using TCP/IP


Mainframe
Host Integration Server 2004 computers
1
2
3
Host Integration Server 2004 Client TCP/IP selected

A TCP/IP client computer uses the following procedure to connect to the mainframe:

1. With TCP/IP, you can choose between two methods by which a client searches for Host Integration Server 2004 computers.
    - **Client locate servers by subdomain** means that the client locates the server through broadcasts in the local subdomain. Therefore, the client must be in the same physical network as the Host Integration Server 2004 computers, and must not be separated from the servers by a router.
    - **Client locates servers by name** means that the client searches for Host Integration Server 2004 computers by name or IP address, and therefore need not be on the same side of any routers as the Host Integration Server 2004 computers. When using a name (instead of an IP address) and there is a router separating the Host Integration Server 2004 computer and the client, the client computer requires a method of resolving a name to an IP address. A local LMHOSTS file or a Windows Internet Name Service (WINS) server may be used to perform this resolution.
2. The Host Integration Server 2004 computer responds with a list of available Host Integration Server 2004 computers that are available to get a 3270 or APPC session with. This special connection is called the sponsor connection.
3. Finally, the client attempt to connect to each Host Integration Server 2004 computer in the list until a server is found that can service the 3270 or APPC request.

Note that before attempting to establish communication involving Host Integration Server 2004, you can use the TCP/IP utility called **ping** to verify that contact can be established between client and server. This can help you identify basic TCP/IP problems, such as difficulties with name resolution or with routers. For information about the **ping** utility, see your TCP/IP documentation.

> **Note** Ensure that the logged-on user has sufficient user rights to access the Host Integration Server 2004 computer across the network. As with any other LAN connection, this is validated through the Windows Domain model.

See Also

TCP/IP Errors

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

TCP/IP Errors

TCP/IP 11004

Causes

Your client is configured for Remote **client locates servers by name**, and you have selected a computer name instead of an IP address. The computer name to IP address resolution has failed, or the IP address resolved cannot be found on the network. Try inputting an IP address instead of a computer name into the client configuration. If this works, then there may be a problem with your local lmhosts file, DNS Server or WINS when using a computer name in the configuration. If this does not work, try pinging the address. For instance, if the IP address of the Host Integration Server 2004 computer you wanted to connect to is 123.34.34.22, then type in the following command:

```
C:> ping 123.34.34.22
```

If you receive a **Request Timed Out** message, then there is a problem with TCP/IP, and you should contact your network administrator.

TCP/IP 10061

Causes

The SNABase service on Host Integration Server 2004 computer is not running or the IP address cannot be resolved, either because this Server is not on the network, the IP address is incorrect, or there is a router or network problem. Try pinging the address. For instance, if the IP address of the Host Integration Server 2004 computer you wanted to connect to is 123.34.34.22, then type in the following command:

```
C:> ping 123.34.34.22
```

If you receive a **Request Timed Out** message, then there is a problem with TCP/IP, and you should contact your network administrator.

TCP/IP 121

Causes

The client is configured for Local **Client locates servers in a Host Integration Server 2004 Subdomain** and therefore, is sending out broadcast messages to discover a Host Integration Server 2004 computer. These broadcast messages will typically not be passed by a router that may be located in between your client and the server. Go into the client configuration and select **Client locates server by name** and specify an IP address or computer name of one or more Host Integration Server 2004 computers.

See Also

Clients Using TCP/IP

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Error Messages

The messages recorded in the event log for Microsoft® Host Integration Server 2004 are now available in a database. The Message Database file, included on the Host Integration Server 2004 CD-ROM at **\Documentation\Message Database\Snamsg.mdb**, requires Microsoft Access 97 or later for viewing. This database enables you to design your own queries and reports to gather and analyze information regarding Host Integration Server 2004 events. The message database includes the message identifier, severity level, symbolic message name, source, message, and an explanation where appropriate.

Some errors and events have additional information, such as debugging suggestions or recommended actions, available in the Error Message Database (EMDB). You can access the EMDB through the link provided in the error and event log. This link will take you directly to the error in the EMDB.

You can also access the entire EMDB at the following location:

http://go.microsoft.com/fwlink/?LinkId=33506

Finally, you can view events using the Windows® Event Log service on the **Tools** menu in SNA Manager. Once you have the Windows Event Log service running, double-click an event to display the **Event Detail** dialog box. Then use the **Event Detail** dialog box to see more information about a selected event.

See Also

Administrator's Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

The Command-Line Interface

In addition to the graphical user interfaces provided by Host Integration Server 2004 Setup and the SNA Manager, Host Integration Server 2004 offers a command-line interface. The command-line interface can be useful in certain situations, such as when you want to view a configuration setting quickly without starting the graphical interface, or when you want to store configuration commands in a command file so that they can be carried out easily in the future.

Before using the command-line interface, you must install Host Integration Server 2004 and run the SNA Manager at least once. This initializes important elements of the Host Integration Server 2004 configuration that cannot be controlled with the command-line interface.

You can use the command-line interface to modify an offline configuration file (as well as a regular on-site configuration file). However, when you work with an offline configuration file, validation of server names, link names, and user names cannot take place, and errors may result. For information about specifying the name of the configuration file to modify with the command-line interface, see Specify the Subdomain Configuration File.

Other actions are also not available from the command-line. For example, you cannot use the command-line interface to configure ranges of LUs.

Certain Host Integration Server 2004 commands must be used with great care if the **/add** option is used with them. With these commands – **snacfg server**, **snacfg link**, and **snacfg user** – the information you type must match existing information in your system or on the Windows domain.

> **Important** If you specify server names, link service names, adapter properties, or user names by using the /add option with snacfg server, snacfg link, or snacfg user, these names or properties must match existing names and properties in your installation, or a nonfunctioning configuration may result. To protect against errors with these commands, use the SNA Manager instead.

This section contains:

- Snacfg Reference
- Linkcfg Reference
- VSAM File Transfer
- Snasvc Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg Reference

The following sections reference specific areas of Snacfg.

This section contains:

- Task Order
- Help with the Command-Line Interface
- Specify the Subdomain Configuration File
- Use a Command File
- Create a Snacfg Command File from a Configuration File
- General Syntax for the /print Option
- Examples of Syntax for the /print Option
- Use the /print Option
- Display the Contents of a Configuration File
- Snacfg APPCLLU
- Snacfg APPCRLU
- Snacfg Connection
- Snacfg CPIC
- Snacfg Diagnostic
- Snacfg LINK
- Snacfg LU
- Snacfg LUA
- Snacfg LUD
- Snacfg Mode
- Snacfg Pool
- Snacfg PoolA
- Snacfg PoolD
- Snacfg PrintServer
- Snacfg PrintSession3270
- Snacfg PrintSessionAPPC
- Snacfg Server
- Snacfg TN3Server
- Snacfg TN5Server
- Snacfg TN3Session
- Snacfg TN5Session
- Snacfg TNIPID
- Snacfg User
- Snacfg Workstation
- Snacfg Error Messages

Task Order

Just as with the SNA Manager, configuration tasks must be carried out in a certain order with the command-line interface. For example, before configuring an LU, you must configure the connection that the LU will use. You can vary the interface you use for each configuration task, as long as you carry out the tasks in order, and as long as you have already installed Host Integration Server 2004 with the Host Integration Server 2004 Setup and then run the SNA Manager. For example, you can carry out tasks using the SNA Manager, then the command-line interface, then the SNA Manager again, as long as the tasks are done in the correct order.

The following table shows the order in which configuration tasks must be carried out, and the command used to carry out the task.

Task Order for Configuration Tasks

Configuration task (in order)	Command that carries out task
Add a server to the configuration	**snacfg server***
Configure link service(s) for the server(s)	**snacfg link***
Configure connection(s) for the server(s)	**snacfg connection**
Configure LU(s) for the connection(s)	**snacfg appcllu**, **snacfg appcrlu**, **snacfg lu**, **snacfg lua**, or **snacfg lud**
Create LU pool(s) (optional)	**snacfg pool**, **snacfg poola**, or **snacfg poold**
Assign LUs to pool(s) (optional)	**snacfg lu**, **snacfg lua**, or **snacfg lud**
Add users to the list used by Host Integration Server 2004	**snacfg user***
Assign LU(s) or LU pool(s) to users	**snacfg user**

* It is recommended that you use the SNA Manager, not the command-line interface, for these tasks. Any errors in the typing of commands for these tasks can result in a nonfunctioning configuration.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Help with the Command-Line Interface

To see the syntax for a particular **snacfg** command, follow the command with the **/?** option.

For example, to get a listing of the words that can follow **snacfg** in the command-line, type

```
snacfg /?
```

To get a listing of the options that can follow **snacfg connection**, type

```
snacfg connection /?
```

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Specify the Subdomain Configuration File

Within a Host Integration Server 2004 command (a **snacfg** command), you can specify the path of the subdomain configuration file to access, or you can omit the path. If you omit the path, Host Integration Server 2004 attempts to access the configuration file in the normal location on the local system: \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG. To specify the path of the configuration file to access, type the **snacfg** command with the following syntax:

```
snacfg #configpath command options
```

That is, follow the **snacfg** command with a space, a pound sign, then the configuration path, and then any additional command syntax.

For example, to view a listing of the connections stored in Program Files\Host Integration Server\SYSTEM\CONFIG\BACKUP.SNA, type

```
snacfg #\Program Files\Host Integration Server\system\config\backup.sna connection /list
```

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Use a Command File

If you want to run a series of Host Integration Server 2004 configuration commands, you can remove the word **snacfg** from each command, place the new commands in a file called a command file, then use a single **snacfg** command to run the entire command file. This is similar to the way a batch file works; however, a command file opens and closes the configuration file fewer times than a batch file. When a command file is run, the configuration file is opened only once, at the beginning. Then all the commands are carried out, and the configuration file is closed. In contrast, when a batch file containing **snacfg** commands is run, the configuration file is opened and closed multiple times, once for every command in the file.

When creating a command file, do not include the following:

- The word **snacfg**
- A path for a configuration file
- A command path for another command file
- A backslash inside the text string for a comment

Also, you can include long, multiline commands in a command file by ending lines with a backslash (\ ). The backslash indicates that the string in the next line should be appended to the current command.

There are two steps for using a command file. First, create the file, either by typing the configuration commands into a plain text file, or by using the **/print** option as described in the next section. Then run the command file from the command prompt by typing a line with the following syntax:

```
snacfg [#configpath] @commandpath [/v]
```

In the preceding syntax line, *configpath* is the path of the configuration file on which commands should be carried out; precede this path with the **#** symbol. Similarly, *commandpath* is the path of the command file; precede this path with the **@** symbol. Use the **/v** (verbose) option to cause all informational messages (not just error messages) to be displayed when the command file is running. Without the **/v** option, only error messages are displayed.

For example, to run a series of commands that result in a listing of the links and connections in a configuration file, create a file called SNA_CMD1.TXT, containing the following lines:

```
link /list
connection /list
```

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Create a Snacfg Command File from a Configuration File

To create lines for a **snacfg** command file, you can type them, or you can generate them by using the **/print** option. The **/print** option accesses an existing configuration file and generates the command-line(s) required to add an individual resource or (depending on syntax) the entire configuration file.

The output generated by the **/print** option does not contain the word **snacfg**. This means that the output can be included in a **snacfg** command file.

See Also

Snacfg Reference

General Syntax for the /print Option

The syntax lines in this section and the next section show ways to use the **/print** option. By default, the output is sent to the screen. To capture the output in a file, redirect it in the standard way, by adding a greater-than sign (>) to the end of the command, followed by the name of the file in which you want to capture the output.

With all the syntax lines, if the source configuration file is not in the default path– \Program files\Host Integration Server\SYSTEM\CONFIG\COM.CFG–then for ***#configpath***, substitute a path, preceded by the pound sign (**#**). Do not type the square brackets. After the greater-than sign (**>**), type the name of the command file you want to create. (For information about using the greater-than sign or other methods of redirection, see your Windows documentation.)

The general syntax for the **/print** option is:

```
snacfg [#configpath] [resource [location:]resourcename] /print > cmdfile.ext
```

For *resource*, substitute the second word of a **snacfg** command (for example, **appcllu**, **connection**, or **server**). For *location*, if needed, substitute the server or connection name that uniquely locates a resource; for *resourcename*, substitute the name of the resource.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Examples of Syntax for the /print Option

The following examples illustrate the use of the **/print** option.

- To create a command file that can recreate an entire configuration file, type a command of the following form:

  ```
  snacfg [#configpath] /print > cmdfile.ext
  ```

- To create a command file from a particular connection in an existing configuration, type a command of the following form, substituting the name of the connection for *connectionname*:

  ```
  snacfg [#configpath] connection connectionname /print > cmdfile.ext
  ```

- To create a command file from a particular 3270 LU in an existing configuration, type a command of the following form, substituting the name of the LU for *luname*:

  ```
  snacfg [#configpath] lu luname /print > cmdfile.ext
  ```

After generating **snacfg** command files, you can modify them and then use them like any other **snacfg** command file.

See Also

Snacfg Reference

Use the /print Option

The **/print** option can make it easier to carry out repetitive configuration actions, if you have a detailed understanding of Host Integration Server 2004 configurations and of the **snacfg** command. Here are some ways of using the **/print** option:

Creating a new configuration

You can generate a **snacfg** command file corresponding to an entire configuration file, modify the command file, and use it to create a new configuration file for another subdomain or site. To generate the commands for an entire configuration file, use the syntax shown in the first example in the previous section; that is, omit all **snacfg** modifiers (such as **connection** or **lu**).

Creating a template to use for expanding one or more configurations

You can generate a **snacfg** command file that corresponds to a useful element of an existing configuration (for example, a 3270 LU in a configuration). Then you can modify the file and use it to add one or many similar elements to an existing configuration. Such a command file acts as a template for the element that it contains.

Modifying a configuration

You can generate a **snacfg** command file that corresponds to some part of an existing configuration (for example, an 802.2 connection in a configuration), modify the command file, and use it to modify the configuration file from which it came. This involves removing the **/add** option from lines in the command file, and making other changes that require a detailed understanding of the commands in the file.

See Also

Snacfg Reference

Display the Contents of a Configuration File

You can create a display of the entire contents of a configuration file by using the **/display** option with the following syntax:

```
snacfg [#configpath] /display
```

When you use the **/display** option, all the resources in the configuration file are displayed. For each resource, the display is the same as that from typing **snacfg** *resource resourcename*, where *resource* is the second word of a **snacfg** command (for example, **appcllu**, **connection**, or **server**), and *resourcename* is the name of the corresponding resource. (The exception to this is that the display of the "diagnostic" resource is the same as that from **snacfg diagnostic /list**.)

See Also

Use the /print Option

General Syntax for the /print Option

Snacfg APPCLLU

Purpose

Allows you add, delete, modify, or view a local APPC LU. Also allows you to view the command that would create a specified local APPC LU.

> **Note** Configuration settings specified with snacfg appcllu correspond to local APPC LU settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] appcllu /list
```

Recommended Syntax

```
snacfg [#configpath] appcllu servername:LUalias
snacfg [#configpath] appcllu LUalias /add
/server:servername [options]
snacfg [#configpath] appcllu servername:LUalias [options]
snacfg [#configpath] appcllu servername:LUalias /delete
snacfg [#configpath] appcllu servername:LUalias /print
```

Other Available Syntax

```
snacfg [#configpath] appcllu /list
snacfg [#configpath] appcllu LUalias
snacfg [#configpath] appcllu LUalias [options]
snacfg [#configpath] appcllu LUalias /delete
snacfg [#configpath] appcllu LUalias /print
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\System\CONFIG\COM.CFG.

/list
Generates a list of configured local APPC LUs.

*servername***:***LUalias*
Specifies the server name and LU alias of the local APPC LU on which to carry out actions. The server name should be in the format machine_name or \\machine_name\snaservr (for specifying the primary node on the machine) and \\machine_name\snasrv02 (or snasrv03, snasrv04, etc.) for specifying the secondary nodes on the machine.

It is recommended that *servername***:** be included in **snacfg appcllu** commands (other than **/add** commands) that include *LUalias*. Without *servername***:**, if there is more than one local LU called *LUalias* in the subdomain, it is difficult to predict which of these LUs will be affected by the command. The **snacfg appcllu** command does not necessarily default to the local server if *servername* is omitted.

See the following paragraphs for details about characters permitted in the LU alias.

If no options are specified after *LUalias*, the configuration settings, partner LUs, and modes are displayed for the specified LU.

LUalias
Specifies the LU alias of the local APPC LU on which to carry out actions. See the previous paragraphs and the syntax lists for recommendations about using the server name with the LU alias.

The LU alias can be from one through eight characters long, and can contain alphanumeric characters and the special characters %, $, #, and @. Lowercase letters are converted to uppercase. For a local APPC LU, the LU alias must be unique on the server.

> **Note** *LUalias* is used as the default LU name if **/luname:***text* is not specified.

If no options are specified after *LUalias*, the configuration settings, partner LUs, and modes are displayed for the specified LU.

/add
Adds a local APPC LU called *LUalias*. To configure the LU, either specify other options after **/add**, or specify configuration options in additional **snacfg appcllu** commands (using the same *LUalias*).

/connection:*conn-name*
When adding or modifying a dependent local APPC LU, this option is used to specify the LU's connection assignment.

/delete
Deletes the LU called *LUalias*.

/print
Causes the display of the **snacfg** command that would create the specified local APPC LU. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file.

Options for Local APPC LUs

/server:*servername*
Specifies the server to which to assign or move the APPC LU. When **/add** is used, this option is required. The server name should be in the format machine_name or \\machine_name\snaservr (for specifying the primary node on the machine) and \\machine_name\snasrv02 (or snasrv03, snasrv04, etc.) for specifying the secondary nodes on the machine.

/lunumber:*value*
Specifies the LU number. If an LU number of 0 is specified, the LU is configured as an independent local APPC LU.

/netname:"*text*"
Specifies a name for the network of this LU. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @.

If **/netname:***text* is not specified, the network name of the Host Integration Server 2004 on which the LU is located is used as the default.

> **Note** **/luname:***text* also has a default (the LU alias). Therefore, the fully qualified LU name (network name plus LU name) can potentially be created by default, if the LU alias and local network name are configured appropriately. A fully qualified LU name is required for an APPC LU.

/luname:"*text*"
Specifies the LU name. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. For a local APPC LU, the fully qualified LU Name (Network Name plus LU Name) must be unique on the server.

If **/luname:***text* is not specified, *LUalias* is used as the default LU name.

> **Note** **/netname:***text* also has a default (the network name of the server on which the LU is located). Therefore, the fully qualified LU name (network name plus LU name) can potentially be created by default, if the LU alias and local network name are configured appropriately. A fully qualified LU name is required for an APPC LU.

/comment:"*text*"
Adds an optional comment for the LU. The comment can contain as many as 25 characters; enclose the comment in quotes.

/autopartner:{ yes | no }
Specifies whether this LU will automatically be partnered with other APPC LUs.

If automatic partnering is left unspecified, the default is **yes**.

/defaultpool:{ yes | no }
Specifies whether this LU will be in the default outgoing local APPC LU pool. This pool makes LUs available for invoking TPs that do not specify a local LU.

/impremotelu:*remoteLUname*
Specifies an existing remote LU to be used as an implicit incoming remote LU for the local LU.

/tptimeout:*value*
Specifies the number of seconds that Host Integration Server 2004 should wait for the invokable TP to respond to a start request from the invoking TP.

/addpartner:*LUalias***,***mode*[**,***connection*]
Partners the local LU with the specified LU and the specified mode. Both *LUalias* and *mode* must exist before they can be specified as partners. If *LUalias* specifies a remote LU that is not unique on the server, the connection used by the remote LU must also be specified; otherwise, Host Integration Server 2004 will randomly choose one of the remote LUs called *LUalias* to act on.

Only one **/addpartner** option can be used in each command.

/delpartner:*LUalias***,***mode*[**,***connection*]
Deletes the pair listing that includes this local LU, the specified partner LU, and the specified mode. (Does not delete any LUs or

modes themselves.) If *LUalias* specifies a remote LU that is not unique on the server, the connection used by the remote LU must also be specified; otherwise, Host Integration Server 2004 will randomly choose one of the remote LUs called *LUalias* to act on.

Only one **/delpartner** option can be used in each command.

/syncpoint:{ yes | no }
Specifies if this Local APPC LU provides LU 6.2 SyncPoint support.
/clientname:"*text*"
Specifies client name if SyncPoint support is enabled.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg APPCRLU

Purpose

Allows you add, delete, modify, or view a remote APPC LU. Also allows you to view the command that would create a specified remote APPC LU.

> **Note** Configuration settings specified with snacfg appcrlu correspond to remote APPC LU settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] appcrlu /list
```

Recommended Syntax

```
snacfg [#configpath] appcrlu connectionname:LUalias
snacfg [#configpath] appcrlu LUalias /add
    /connection:connectionname [options]
snacfg [#configpath] appcrlu connectionname:LUalias [options]
snacfg [#configpath] appcrlu connectionname:LUalias /delete
snacfg [#configpath] appcrlu connectionname:LUalias /print
```

Other Available Syntax

```
snacfg [#configpath] appcrlu LUalias
snacfg [#configpath] appcrlu LUalias [options]
snacfg [#configpath] appcrlu LUalias /delete
snacfg [#configpath] appcrlu LUalias /print
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured remote APPC LUs.

*connectionname***:***LUalias*
Specifies the connection and LU alias of the remote APPC LU on which to carry out actions. You should include *connectionname***:** in **snacfg appcrlu** commands (other than **/add** commands) that include *LUalias*. Without *connectionname***:**, if there is more than one remote LU called *LUalias* in the subdomain, it is difficult to predict which of these LUs will be affected by the command. The **snacfg appcrlu** command does not necessarily default to a connection on the local server if *connectionname* is omitted.

See the following paragraphs for details about characters permitted in the LU alias.

If no options are specified after *LUalias*, the configuration settings, partner LUs, and modes are displayed for the specified LU.

LUalias
Specifies the LU alias of the remote APPC LU on which to carry out actions. See the previous paragraphs and the syntax lists for recommendations about using the connection name with the LU alias.

The LU alias can be from one through eight characters long, and can contain alphanumeric characters and the special characters %, $, #, and @. Lowercase letters are converted to uppercase. For a remote APPC LU, the LU alias must be unique on the connection, and must not match that of a local LU on that server.

If no options are specified after *LUalias*, the configuration settings, partner LUs, and modes are displayed for the specified LU.

/add
Adds a remote APPC LU called *LUalias*. To configure the LU, either specify other options after **/add**, or specify configuration options in additional **snacfg appcrlu** commands (using the same *LUalias*).

/delete
Deletes the LU called *LUalias*.

/print
Causes the display of the **snacfg** command that would create the specified remote APPC LU. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file. See the information about command files earlier in this section.

Options for Remote APPC LUs

/connection:*connectionname*
Specifies the connection to which to assign or move the APPC LU. When **/add** is used, this option is required.

/netname:"*text*"
Specifies a name for the network of this LU. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @.

If **/netname:***text* is not specified, the remote network name configured for the connection supporting this LU is used as the default.

> **Note** **/luname:***text* also has a default (the LU alias). Therefore, the fully qualified LU name (network name plus LU name) can potentially be created by default, if the LU alias and remote network name are configured appropriately. A fully qualified LU name is required for an APPC LU.

/luname:"*text*"
Specifies the LU name. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. For a remote APPC LU, the fully qualified LU Name must be unique on the connection, and must not match that of a local LU on that server.

If **/luname:***text* is not specified, *LUalias* is used as the default LU name.

> **Note** **/netname:***text* also has a default (the remote network name configured for the connection supporting this LU). Therefore, the fully qualified LU name (LU name plus network name) can potentially be created by default, if the LU alias and remote control point name are configured appropriately. A fully qualified LU name is required for an APPC LU.

/comment:"*text*"
Adds an optional comment for the LU. The comment can contain as many as 25 characters; enclose the comment in quotes.

/autopartner:{ yes | no }
Specifies whether this LU will automatically be partnered with other APPC LUs.

If automatic partnering is left unspecified, the default is **yes**.

/parallelsess:{ yes | no }
Specifies whether the remote LU supports parallel sessions.

/uninterpname:"*text*"
Specifies the uninterpreted LU name, which is required only when using dependent APPC. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, @ and period (.).

/impmode:*modename*
Designates *modename* as the implicit incoming mode for this LU. A mode must exist before being specified as an implicit incoming mode.

/security:{ none | **hex,***text* | **char,***text* **}**
Configures session security for a remote LU using a cleartext key. The **none** option turns off session-level security. The **hex,***text* option specifies a 16-digit security key in hexadecimal. The **char,***text* option specifies an eight-character security key that can include uppercase and lowercase alphanumeric characters, and the special characters $, @, #, and the period (.).

/addpartner:*LUalias***,***mode*
Partners the remote LU with the specified local LU and the specified mode. Both the local LU and the mode must exist before they can be specified as partners. *LUalias* should specify a local LU, not a remote LU; otherwise, an error message is displayed, indicating that no such local LU can be found.

Only one **/addpartner** option can be used in each command.

/delpartner:*LUalias***,***mode*
Deletes the pair-listing that includes this remote LU, the specified local LU, and the specified mode. (Does not delete any LUs or modes themselves.)

Only one **/delpartner** option can be used in each command.

/securityex:{ none | **hex,***text* | **char,***text* **}**
Configures session security for a remote LU using a scrambled key. For security purposes, Snacfg displays the security key information in a scrambled format when the /securityex option is specified. To change the security key, use the /security option

instead.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg Connection

Purpose

Allows you to view, add, delete, or modify connections, including peer connections (necessary for APPC LUs) or downstream connections.

Before configuring a connection, you must configure the server and link service that the connection will use.

> **Note** Configuration settings specified with snacfg connection correspond to connection settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] connection /list
snacfg [#configpath] connection connectionname
snacfg [#configpath] connection connectionname /add /server:
    servername /conntype:{ 802.2 | sdlc | x25 | } [options]
snacfg [#configpath] connection connectionname [options]
snacfg [#configpath] connection connectionname /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured connections.

connectionname
Specifies a name for the connection to be configured or viewed. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. A new connection name cannot be the same as any other connection name in the installation, and cannot be the reserved name SNASERVR.

If no options are specified after *connectionname*, the command-line interface displays a list of the configuration settings for the specified connection.

/add
Adds a connection called *connectionname*. To configure the connection, either specify other options after **/add**, or specify configuration options in additional **snacfg connection** commands (using the same *connectionname*).

/delete
Deletes *connectionname*.

Options Used with All Connection Types

/server:*servername*
Specifies the server to which to assign or move the connection. When **/add** is used, this option is required. The server name should be in the format machine_name or \\machine_name\snaservr (for specifying the primary node on the machine) and \\machine_name\snasrv02 (or snasrv03, snasrv04, etc.) for specifying the secondary nodes on the machine.

/conntype:{ 802.2 | SDLC | X.25 | CHANNEL | TWINAX }
Specifies the connection type. When **/add** is used, this option is required.

/comment:"*text*"
Adds an optional comment for the specified connection. The comment can contain as many as 25 characters; enclose the comment in quotes.

/linkservice:*linkname*
Specifies the name of the link service to be used by *connectionname*. The link service type must match the connection type (802.2, SDLC, or X.25), or the **snacfg** command will not run.

In order for the link service to function correctly, it must be installed with the SNA Manager. Link services can also be installed with **snacfg link**; however, the SNA Manager is the recommended interface for installing link services, because it helps ensure that the resulting configuration is functional.

/activation:{ onserverstartup | ondemand | byadministrator }
For outgoing calls on *connectionname*, tells how the connection will be activated: on server startup, on demand, or by the

administrator. (For incoming calls, activation is irrelevant, since the connection always begins listening for calls on server startup.)

If no value has been specified for **/activation**, the default for 802.2 (token ring or Ethernet) connections is **onserverstartup**. For all other connections, the default is **ondemand**.

/localblockno:*hexdigits*
Specifies the local block number, a three-digit hexadecimal number. The local block number forms the first part of the Local Node ID, an eight-digit hexadecimal number that identifies the local system.

Do not use 000 or FFF for the local block number. These values are reserved.

For connections to host systems, the local block number should match IDBLK in VTAM.

/localnodeno:*hexdigits*
Specifies the local node number, a five-digit hexadecimal number. The local node number forms the last part of the Local Node ID, an eight-digit hexadecimal number that identifies the local system.

For connections to host systems, the local node number should match IDNUM in VTAM.

/cpname:*text*
Specifies the control point name of the remote node, as it is represented in Format 3 XIDs. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @.

The control point name of the remote node works together with **netname**. If either of these parameters is supplied, the other should also be supplied.

When connecting to a host system and using a remote control point name, the name should match the SSCPNAME parameter in the VTAM Start command for the remote SSCP (the VTAM system).

/netname:*text*
Specifies the name of the network for the remote node, as it is represented in Format 3 XIDs. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @.

The **netname** parameter works together with the control point name of the remote node. If either of these parameters is supplied, the other should also be supplied.

/remoteblockno:*hexdigits*
Specifies the remote block number, a three-digit hexadecimal number. The remote block number forms the first part of the Remote Node ID, an eight-digit hexadecimal number that identifies the remote system.

Do not use 000 or FFF for the remote block number. These values are reserved.

/remoteend:{ Host | Ppeer | downstream | PUPassThrough}
Specifies whether the connection is to be a host, peer, downstream, or passthrough.

/remotenodeno:*hexdigits*
Specifies the remote node number, a five-digit hexadecimal number. The remote node number forms the last part of the Remote Node ID, an eight-digit hexadecimal number that identifies the remote system.

/xidtype:{ format0 | format3 }
Specifies the XID type, the type of identifying information for Host Integration Server 2004 to send. The choices are **format0** (Format 0) and **format3** (Format 3). Format 0 sends only the Node ID. Format 3 sends up to 100 bytes of identifying information, including the local node ID and control point name.

If no XID type has been specified, the default is **format3**.

/calldirection:{ Incoming | Outgoing | Both }
This option specifies the call direction.

/channeladdress:*hex string*
Specifies the channel sub address for channel attach connections. *Hex string* is a two-digit hexadecimal number, valid range 00..FF.

/localsap:*hexnum*
Specifies the local System Access Point (SAP). Enter a hexadecimal number between 04 and EC that is a multiple of 4. For example, *snacfg connection thisconn /localsap:7C*.

/localcpname:*text*
The Local Control Point Name works with the Network Name to identify a system. The maximum length is eight characters.

/localnetname:*text*
The Local Network Name works with the Local Control Point Name to identify a system. The maximum length is eight characters.

/compression:{ None | RLE | LZ9 }

These options offer progressively better compression, but at a progressively higher CPU usage cost.

/passthruconn:*text*

Specifies the name of the PU Passthrough connection.

/peerdlcrole:{ Primary | Secondary | Negotiable }

Specifies the role used in peer-to-peer communications.

/dynamicludef:{ yes | no }

Specifies that this connection supports dynamic remote APPC LU allocation.

Additional Options Used with Downstream Connections

/insert: *luname***[,*luname*,...]**

Assigns a downstream LU or pool to a downstream connection. Separate multiple LU or pool names with commas.

The downstream LU or pool named by ***luname*** must already exist. (A downstream LU can be created with **snacfg LUD**, and a downstream pool can be created with **snacfg poold**.) The connection named by *connectionname* must be a downstream connection. If these conditions are not met, the command is not processed.

/remove: *luname***[,*luname*,...]**

Removes the assignment of a downstream LU or pool to a downstream connection. Separate multiple LU or pool names with commas.

Additional Options Used with 802.2 (Token Ring or Ethernet) Connections

/remotenetaddr:*hexdigits*

Specifies the 12-digit hexadecimal network address of the remote host to which this connection provides access.

If no remote network address has been specified, the default is 400000000000.

/remotesapaddr:*hexdigits*

Specifies the remote SAP address, which is a two-digit hexadecimal number, a multiple of 4, between 04 and EC. A value of 04 is recommended for most installations.

If no remote SAP address has been specified, the default is 04.

/maxbtulen:*value*

Specifies the maximum length for the BTU, which is the number of bytes that can be transmitted in a single data-link control frame.

The range is from 265 through 16393. If no maximum BTU length has been specified, the default is 1929.

/receiveackthresh:*value*

Specifies the receive ACK threshold, the maximum number of frames that the local system can receive from the remote system before sending a response.

The range is from 1 through 127. If no receive ACK threshold has been specified, the default is 2.

/naksendlimit:*value*

Specifies the unacknowledged send limit, the maximum number of frames that the local system can send without receiving a response from the remote system.

The range is from 1 through 127. If no unacknowledged send limit has been specified, the default is 1.

/retrylimit:*value*

Specifies the retry limit, the number of times that the local system should retransmit a frame if no response is received from the remote system.

The range is from 0 through 255. A value of 0 means the system uses its internal default retry limit. If no retry limit has been specified, the default is 10.

/xidretries:*value*

Specifies the XID retries, the number of times that the local system should retransmit an XID (an identifying message) if no response is received from the remote system.

The range is from 0 through 30. If no XID retries value has been specified, the default is 3.

/t1timeout:{ Default | 200ms | 400ms | 600ms | 800ms | 1000ms | 1s | 2s | 3s | 4s | 5s }

Specifies the amount of time that the local system should wait for the remote system to respond to a transmission before the local system tries again.

The values used for **Default** for **t1timeout** are 400 milliseconds for a local ring and 2 seconds for a remote ring.

/t2timeout:{ Default | 40ms | 80ms | 120ms | 160ms | 200ms | 400ms | 800ms | 1200ms | 1600ms | 2000ms }
Select the maximum amount of time that should be allowed before the local system sends an acknowledgment of a received transmission.

The values used for **Default** for **t2timeout** are 80 milliseconds for a local ring and 800 milliseconds for a remote ring.

/titimeout:{ Default | 1s | 2s | 3s | 4s | 5s | 10s | 15s | 20s | 25s }
Select the amount of time that the link can be inactive before the local system treats it as nonfunctioning and shuts it down.

The values used for **Default** for **titimeout** are 5 seconds for a local ring and 25 seconds for a remote ring.

/activatedelay:{ Default | 5s | 10s | 15s | 20s | 25s | 30s | 35s | 40s | 45s | 50s | 55s | 60s | 65s | 70s | 75s | 80s | 85s | 90s | 95s | 100s | 105s | 110s | 115s | 120s | 125s | 130s | 135s | 140s | 145s | 150s | 155s | 160s | 165s | 170s | 175s | 180s | 185s | 190s | 195s | 200s | 205s | 210s | 215s | 220s | 225s | 230s | 235s | 240s | 245s | 250s | 255s }
This value specifies the delay between successive attempts to activate a Host Integration Server 2004 connection.

/activateretrylimit:{ None | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 }
This option specifies the number of times the server will try to activate a connection.

Additional Options Used with SDLC Connections

/dialdata:*value*
Specifies the phone number stored for this connection. For a modem that accepts a phone number from Host Integration Server 2004 – that is, a modem attached to an SDLC adapter with a built-in serial (COM) port – the dial data specifies the telephone number for Host Integration Server 2004 to send to the modem. In this case, the number should be in the format expected by the modem. For manually dialed modems, the dial data is displayed in a pop-up message when the connection is started, and can be in any format.

/encoding:{ NRZI | NRZ }
Specifies the encoding scheme to be used by the modem. The choices are **nrzi**, nonreturn to zero inverted, and **NRZ**, nonreturn to zero.

The modem must use the same encoding scheme as the modem at the remote computer. For connections to host systems, the encoding scheme must match the value in the LINE/GROUP definition in VTAM.

If no encoding scheme has been specified, the default is NRZI.

/duplex:{ half | full }
Specifies the modem duplex setting. The choices are **half**, for a half-duplex modem, and **full**, for a full-duplex modem. If you want to use the full-duplex setting, one or more of your adapters must have the constant carrier option set. The constant carrier option is set in the SNA Manager. The constant carrier option can also be set with **snacfg link**; however, the SNA Manager is the recommended interface for setting the constant carrier option and other link service options.

Most Host Integration Server 2004 computers will use the default for duplex, **half**.

/datarate:{ high | low }
Specifies the data rate for transmissions between the Host Integration Server 2004 communications adapter and the modem. This rate can only be set for certain kinds of modems and adapters; for specific information, see the adapter and modem documentation.

A data rate of **high** gives faster transmissions; **low** gives more reliable transmissions and prevents the transmission errors sometimes caused by poor-quality lines at the high rate.

If no data rate has been specified, the default is **high**.

/polladdress:*hexdigits*
Specifies the poll address, a two-digit hexadecimal number. For connections to a host, the local poll address should match the VTAM PU definition for the ADDR= parameter.

Do not use 00 or FF for the poll address; these values are reserved. If no poll address has been specified, the default is C1.

/idletimeout:*value*
Specifies, in tenths of a second, the idle time-out. The idle time-out is the length of time that the local system should wait for the host to respond to a transmission, before the local system tries again. Too small a time-out can cause connection problems.

The range is from 1 (one-tenth of a second) through 300 (30 seconds). If no idle time-out has been specified, the default is 300 (30 seconds).

/idleretrylimit:*value*
Specifies the idle retry limit, the number of times the local system should try to poll or send data to the host if there is no

response.

The range is from 1 through 255. If no idle retry limit has been specified, the default is 10.

/contacttimeout:*value*
Specifies the contact time-out: the length of time, in tenths of a second, which the local system should wait between attempts to make a connection with a remote system.

The range is from 5 (five-tenths of a second) through 300 (30 seconds). If no contact time-out has been specified, the default is 300 (30 seconds).

/contactretrylimit:*value*
Specifies contact retry limit, the maximum number of times the local system should attempt to make a given connection.

The range is from 1 through 20. If no contact retry limit has been specified, the default is 10.

/switchedconntimeout:*value*
Specifies the switched connection establishment time-out; used for switched SDLC lines (standard telephone lines) only. The switched connection establishment time-out is the number of seconds that will be allowed for the user or modem to dial the remote computer's number.

This parameter is ignored by incoming calls.

The range is from 10 through 500 seconds. If no switched connection establishment time-out has been specified, the default is 300.

/multidropprimconn:{ yes | no }
Specifies whether this connection will be a multidrop primary connection.

A multidrop connection is one in which a primary node communicates with multiple secondary nodes concurrently over the same physical transmission medium.

/selectstandby:{ yes | no }
Specifies whether the modem's standby line is set to "on." Standby can only be set for certain kinds of modems; for specific information, see the modem documentation.

If no setting has been specified for standby, the default setting is **no**.

/sdlcmaxbtu:*value*
Specifies the maximum length for the BTU, which is the number of bytes that can be transmitted in a single data-link information frame.

The range is from 265 through 16393. If no maximum BTU length for SDLC has been specified, the default is 265.

/activatedelay:{ Default | 5s | 10s | 15s | 20s | 25s | 30s | 35s | 40s | 45s | 50s | 55s | 60s | 65s | 70s | 75s | 80s | 85s | 90s | 95s | 100s | 105s | 110s | 115s | 120s | 125s | 130s | 135s | 140s | 145s | 150s | 155s | 160s | 165s | 170s | 175s | 180s | 185s | 190s | 195s | 200s | 205s | 210s | 215s | 220s | 225s | 230s | 235s | 240s | 245s | 250s | 255s }
This value specifies the delay between successive attempts to activate a Host Integration Server 2004 connection.
/activateretrylimit:{ None | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 }
This option specifies the number of times the server will try to activate a connection.

Additional Options Used with SDLC Peer Connections

/multidropprimconn:{ yes | no }
Specifies whether this server is to be the primary station for a multidrop connection on a leased SDLC line.
/pollrate:*value*
Specifies the poll rate in polls per second.

The range is from 1 through 50. If no poll rate has been specified, the default is 5.

/activatedelay:{ Default | 5s | 10s | 15s | 20s | 25s | 30s | 35s | 40s | 45s | 50s | 55s | 60s | 65s | 70s | 75s | 80s | 85s | 90s | 95s | 100s | 105s | 110s | 115s | 120s | 125s | 130s | 135s | 140s | 145s | 150s | 155s | 160s | 165s | 170s | 175s | 180s | 185s | 190s | 195s | 200s | 205s | 210s | 215s | 220s | 225s | 230s | 235s | 240s | 245s | 250s | 255s }
This value specifies the delay between successive attempts to activate a Host Integration Server 2004
/activateretrylimit:{ None | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 }
This option specifies the number of times the server will try to activate a connection.

Additional Options Used with X.25 Connections

/remotex25addr:*hexdigits*
Specifies the remote X.25 address, which identifies the remote system on an X.25 network. The address usually consists of 12 hexadecimal digits, but can contain up to 15 hexadecimal digits.

/x25maxbtu:*value*
Specifies the maximum length for the BTU, which is the number of bytes that can be transmitted in a single data-link information frame.

The range is from 265 through 16393. If no maximum BTU length for X.25 has been specified, the default (for host connections) is 265.

/virtualcircuit:{ perm | switched }
Specifies the type of virtual circuit used by the connection. The choices are **perm** and **switched**. A **perm** circuit is constantly active and uses a preset destination address. A **switched** circuit is called and cleared dynamically, and uses a destination address that is supplied when the circuit is called.

If no virtual circuit type has been specified, the default is **switched**.

/pvcalias:*value* (for PVC only)
Specifies the PVC alias, the number that identifies the PVC channel: 1 for the first channel, 2 for the second, and so on. Used for PVCs only.

The range is from 1 through the number of configured PVC channels. If no PVC alias has been specified, the default is 1.

/packetsize:*value* (for PVC only)
Specifies packet size, the maximum number of data bytes (not header bytes) to be sent in a frame on this X.25 network. Used for PVCs only.

The possible values are 64, 128, 256, 512, and 1024. If no packet size has been specified, the default is 128.

/windowsize:*value* (for PVC only)
Specifies window size, the maximum number of frames that the local system can send without receiving a response from the remote system, on this X.25 network. Used for PVCs only.

The range is from 1 through 7. If no window size has been specified, the default is 2.

/facilitydata:*text* (for SVC only)
Specifies the codes for any facility data required by the network provider or by the administrator of the remote system. Used for SVCs only. Facility data can include as many as 126 hexadecimal characters (63 hexadecimal bytes).

Facility data is a coded string of information often used to request nondefault functions from the X.25 network for a particular SVC connection.

/userdata:*text* (for SVC only)
Specifies the codes for any user data required by the network provider. Used for SVCs only. The user data must be an even number of hexadecimal characters, up to the maximum of 32 characters.

User data is a coded string of information, specifying items such as the communications protocol used by the X.25 network (for SNA, this protocol must be QLLC, specified by C3).

The default for user data is C3; this specifies the QLLC protocol.

/activatedelay:{ Default | 5s | 10s | 15s | 20s | 25s | 30s | 35s | 40s | 45s | 50s | 55s | 60s | 65s | 70s | 75s | 80s | 85s | 90s | 95s | 100s | 105s | 110s | 115s | 120s | 125s | 130s | 135s | 140s | 145s | 150s | 155s | 160s | 165s | 170s | 175s | 180s | 185s | 190s | 195s | 200s | 205s | 210s | 215s | 220s | 225s | 230s | 235s | 240s | 245s | 250s | 255s }
This value specifies the delay between successive attempts to activate a Host Integration Server 2004 connection.

/activateretrylimit:{ None | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 }
This option specifies the number of times the server will try to activate a connection.

Additional Options Used with Channel Connections

/activatedelay:{ Default | 5s | 10s | 15s | 20s | 25s | 30s | 35s | 40s | 45s | 50s | 55s | 60s | 65s | 70s | 75s | 80s | 85s | 90s | 95s | 100s | 105s | 110s | 115s | 120s | 125s | 130s | 135s | 140s | 145s | 150s | 155s | 160s | 165s | 170s | 175s | 180s | 185s | 190s | 195s | 200s | 205s | 210s | 215s | 220s | 225s | 230s | 235s | 240s | 245s | 250s | 255s }
This value specifies the delay between successive attempts to activate a Host Integration Server 2004 connection.

/activateretrylimit:{ None | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 |

210 | **215** | **220** | **225** | **230** | **235** | **240** | **245** | **250** | **255** **}**

This option specifies the number of times the server will try to activate a connection.

/controlunit: *value (0x0-0xf)*

Sets the value of the control unit image number.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg CPIC

Purpose

Allows you add, delete, modify, or view a CPI-C symbolic destination name. Also allows you to view the command that would create a specified CPI-C symbolic destination name.

> **Note** Settings specified with snacfg cpic correspond to CPI-C symbolic destination names configured with the SNA Manager.

Syntax

```
snacfg [#configpath] cpic /list
snacfg [#configpath] cpic cpicname
snacfg [#configpath] cpic cpicname /add
    { /appltpname:text  |  /svcetpname:hexstring }
    { /b:text /luname:text  |  /lualias:text }
    /modename:text /seckeytype:{ none | same | program }
    [/secuserid:text] [/secpassword:text] [/comment:text]
snacfg [#configpath] cpic cpicname [options]
snacfg [#configpath] cpic cpicname /delete
snacfg [#configpath] cpic cpicname /print
```

where

#configpath
: Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
: Generates a list of configured symbolic destination names.

cpicname
: Specifies the symbolic destination name on which to carry out actions. A symbolic destination name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @.

If no options are specified after *cpicname*, the configuration settings for the specified symbolic destination name are displayed.

/add
: Adds a symbolic destination name called *cpicname*. When you use the **/add** option, you must include the other options shown in the preceding syntax.

/delete
: Deletes *cpicname*.

/print
: Causes the display of the **snacfg** command that would create the specified symbolic destination name. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file. See the information about command files earlier in this section.

Options for CPI-C Commands

/comment:"*text*"
: Adds an optional comment for the symbolic destination name. The comment can contain as many as 25 characters; enclose the comment in quotes.

Partner TP options (use one or the other, but not both):

/appltpname:"**text**"
: Specifies that the partner TP is an application TP, and provides the name. The name can be from 1 through 64 characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase.

If you specify both an application TP name and a service TP name in the same command, the command is rejected. If you specify an application TP for an existing symbolic destination name, it overrides any previous TP name (whether application TP or service TP).

/svcetpname:**hexstring**
: Specifies that the partner TP is a service TP, and provides the hexadecimal string identifying the TP. The string can be from one through eight hexadecimal digits long.

If you specify both a service TP name and an application TP name in the same command, the command is rejected. If you specify a service TP for an existing symbolic destination name, it overrides any previous TP name (whether application TP or service TP).

Partner LU options (use one or the other, but not both):
/netname:"**text**" /luname:"**text**"
Identifies the partner LU by fully qualified LU name (network name plus LU name). Each part of the fully qualified name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase.

If you specify both a fully qualified LU name and an LU alias in the same command, the command is rejected. If you specify a fully qualified LU name for an existing symbolic destination name, it overrides any previous LU setting (whether name or alias).

/lualias:"**text**"
Identifies the partner LU by LU alias. The alias can be from one through eight characters long, and can contain alphanumeric characters and the special characters %, $, #, and @. Lowercase letters are converted to uppercase.

If you specify both an LU alias and a fully qualified LU name in the same command, the command is rejected. If you specify an LU alias for an existing symbolic destination name, it overrides any previous LU setting (whether name or alias).

/modename:"*text*"
Specifies the mode. The mode must already exist.
/seckeytype:{ none | **same** | **program }**
Sets the conversation security type. If **program** is specified, one or both of the following options can be set:
/secuserid:"**text**"
Specifies the user ID to use when the security type is **program**. The ID can contain from 1 through 10 characters.
/secpassword:"**text**"
This parameter is optional; it specifies the password to use with the user ID. The password can contain from 1 through 10 characters. A password need not be specified even if the security type is **program** and the user ID is set. If a display is created showing the symbolic destination name, the password will not be displayed.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg Diagnostic

Purpose

Allows you to view and configure settings for event logging (auditing), and view or change the connection designated to receive NetView alerts.

> **Note** Configuration settings specified with snacfg diagnostic correspond to diagnostic settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] diagnostic /list
snacfg [#configpath] diagnostic [options]
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list that tells the settings for event logs (auditing), the name of the NetView management connection (if one has been specified), and the default connection for the **DISPLAY** verb (if one has been specified).

/logserver:*servername*
Specifies a centralized server on which event logs for this Host Integration Server 2004 installation should be stored.

If **/logserver:** is typed without *servername*, the setting reverts to the default, which is to store event logs for the local server on the local server.

/auditlevel:{ 6 | 8 | 10 | off }
Sets the level of Host Integration Server 2004 events to be recorded in the Windows Event Log. These events can be viewed with the Windows Event Viewer, which is described in the Windows documentation. The following table describes the available levels:

Level	Description	Events to be recorded
6	Detailed problem analysis	All events that can be recorded
8	General information messages	General activity but not all events
10	Significant system events	Major events only
off	Auditing disabled	No events

/popupserver:*servername*
Specifies the server to which pop-up error messages for this Host Integration Server 2004 installation should be routed.

Pop-up messages will always appear on the local server; routing them to a remote server means they will appear on both the remote and local server.

If **/popupserver:** is typed without *servername*, the setting reverts to the default, which is the local server.

/netviewconn:*connectionname*
Specifies the name of the connection through which NetView alerts are sent. The connection called *connectionname* must already exist.

If **/netviewconn:** is typed without *connectionname,* the setting is cleared so that the configuration contains no NetView connection name.

/cnosdisplayconn:*connectionname*
Specifies the default connection to be used for the **DISPLAY** verb when no connection is provided. The connection called *connectionname* must already exist.

If **/cnosdisplayconn:** is typed without *connectionname*, the setting is cleared so that the configuration contains no default connection for the **DISPLAY** verb.

See Also

Snacfg Reference

Snacfg LINK

Purpose

Allows you to view, delete, or modify adapters.

> **Note** This command has been superceded by **Linkcfg**, as described in About Linkcfg.
>
> **Important** If you specify adapter properties with **snacfg link**, these properties must match existing properties in your installation, or a nonfunctioning configuration may result. To protect against errors with **snacfg link**, use the SNA Manager instead.

Before configuring link services, you must use the SNA Manager to add the server on which the link services will be located.

Syntax

```
snacfg [#configpath] link /list
```

Recommended Syntax

```
snacfg [#configpath] link servername:linkname
snacfg [#configpath] link servername:linkname /add [options]
snacfg [#configpath] link servername:linkname [options]
snacfg [#configpath] link servername:linkname /delete
```

Other Available Syntax

```
snacfg [#configpath] link linkname
snacfg [#configpath] link linkname /add [options]
snacfg [#configpath] link linkname [options]
snacfg [#configpath] link linkname /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured link services.

servername
Specifies the name of the server on which to view or change link services. Separate the name of the server from the name of the link service with a colon (**:**). It is recommended that *servername* be included in every **snacfg link** command that includes *linkname*. Without *servername*, if there is more than one link service called *linkname* in the installation, it is difficult to predict which link service called *linkname* will be affected by the command. The **snacfg link** command does not necessarily default to the local server if *servername* is omitted.

linkname
Specifies the name of the link service to view, modify, or delete. Link services names can contain from one through eight alphanumeric characters.

For adding link services, the recommended method is to use the SNA Manager, not **snacfg link**.

If no options are specified after *linkname*, the result is a list of the configuration settings for the specified link.

/add
Adds a link service called *linkname*. To configure the link service, either specify other options after **/add**, or specify configuration options in additional **snacfg link** commands (using the same *servername***:***linkname* combination).

For adding link services, the recommended method is to use the SNA Manager, not **snacfg link**.

/delete
Deletes *linkname*.

Options for Link Services

/server:*servername*
Specifies the server on which to install the link service.

/linktype:{ Token | **Ether** | **SDLC** | **X25** | **Channel | Twinax }**
Specifies the type of adapter with which *linkname* works.

/linetype:{ leased | **softdial** | **manual }** (for SDLC lines only)
Specifies the type of SDLC line (and, where applicable, the modem) that the link service will use:

- A **leased** line is a telecommunications line committed solely to SDLC communications with a particular remote system.
- A **softdial** line is a switched SDLC line on which the modem is dialed automatically by Host Integration Server 2004. Such a modem must be attached to an SDLC adapter with a built-in serial (COM) port. Otherwise it is considered a **manual** modem.
- A **manual** line is a switched SDLC line on which the modem stores a phone number, or on which the modem is dialed manually.

/carrier:{ on | **off }** (for SDLC lines only)
Specifies whether the constant carrier option for an SDLC line is **on** or **off**.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg LU

Purpose

Allows you to view, add, delete, or modify 3270 LUs, on three types of connections: 802.2, SDLC, and/or X.25. Also allows you to assign 3270 LUs to LU pools that have already been configured.

Before configuring an LU, you must configure the connection that the LU will use. Also, before assigning an LU to an LU pool, you must create the LU and the LU pool.

> **Note** Configuration settings specified with snacfg lu correspond to 3270 LU settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] lu /list
snacfg [#configpath] lu luname
snacfg [#configpath] lu luname /add /connection:connectionname
    /lunumber:value [options]
snacfg [#configpath] lu luname [options]
snacfg [#configpath] lu luname /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured 3270 LUs.

luname
Specifies the name of the 3270 LU to view, add, modify, or delete. A 3270 LU name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. A 3270 LU name cannot be the same as any other LU name or pool name (except for APPC LU names) on the server.

If no options are specified after *luname,* the result is a list of the configuration settings for the specified LU.

/add
Adds a 3270 LU called *luname*. To configure the 3270 LU, either specify other options after **/add**, or specify configuration options in additional **snacfg lu** commands (using the same *luname*).

/delete
Deletes *luname*.

Options for 3270 LUs

/connection:*connectionname*
Specifies the connection to which the 3270 LU should be assigned or moved. When **/add** is used, this option is required.

/lunumber:*value*
Specifies the LU number, which identifies the LU on its connection. When /**add** is used, this option is required. Check with the administrator of the host system for the correct value; it should match the LOCADDR= parameter of the LU definition in VTAM or the NCP Gen on the host.

If the number that you specify has already been assigned to an LU or an APPC LU-LU pair on the intended connection, the command fails.

The range is from 1 through 254.

/pool:*poolname*
Assigns or moves the 3270 LU to *poolname*. A 3270 LU can be assigned to only one pool.

The pool specified with *poolname* must already exist. A 3270 LU pool can be created with the **snacfg pool** command.

If **/pool:** is typed without *poolname*, the specified LU is removed from whichever pool it is assigned to.

/lutype:{ display | printer }
Specifies whether the 3270 LU will be used for **display** (terminal emulation) or a **printer** (that is, a local printer or a local-area network printer, attached to a PC).

If no LU type has been specified, the default is **display**.

/displaymodel:{ mod2 | mod3 | mod4 | mod5 | 2 | 3 | 4 | 5 }
Specifies the display model; applies only when the **lutype** is **display**. The following display types are available:

- Model 2 is 24 lines by 80 characters.
- Model 3 is 32 lines by 80 characters.
- Model 4 is 43 lines by 80 characters.
- Model 5 is 27 lines by 132 characters.

Some emulators can only emulate certain display models. For more information, see your emulator documentation.

When a 3270 display LU is assigned to a 3270 LU pool, the display model setting of the pool overrides the setting of the LU.

If no display model has been specified, the default is Model 2.

/allowmodeloverride:{ yes | no }
Specifies whether the user is allowed to override the display model type by using the 3270 terminal emulation program.

When a 3270 display LU is assigned to a 3270 LU pool, the model override setting of the pool overwrites the setting of the LU.

If no setting has been specified for this parameter, the default is **no**.

/associate:"*text*"
This allows you to associate a specific 3270 printer LU with a 3270 display LU. Any user or group with permission to use the display LU will also have access to the associate printer LU. The text is the printer LU name.

/unassociate:"*text*"
This allows you to unassociate a 3270 printer LU from a 3270 display LU. It is not necessary to enter any text. **Snacfg** will ignore the text and unassociate the LU. To unassociate the printer LU, use the display LU name.

/comment:"*text*"
Adds an optional comment for the specified LU. The comment can contain as many as 25 characters; enclose the comment in quotes.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg LUA

Purpose

Allows you to view, add, delete, or modify LUA LUs on three types of connections: 802.2, SDLC, and/or X.25. Also allows you to assign LUA LUs to LU pools that have already been configured.

Before configuring an LU, you must configure the connection that the LU will use. Also, before assigning an LU to an LU pool, you must create the LU and the LU pool.

> **Note** Configuration settings specified with snacfg lua correspond to LUA LU settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] lua /list
snacfg [#configpath] lua luname
snacfg [#configpath] lua luname /add /connection:connectionname
    /lunumber:value [options]
snacfg [#configpath] lua luname [options]
snacfg [#configpath] lua luname /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured LUA LUs.

luname
Specifies the name of the LUA LU to view, add, modify, or delete. An LUA LU name can be from one through eight characters long and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. An LUA LU name cannot be the same as any other LU name or pool name (except for APPC LU names) on the server.

If no options are specified after *luname*, the result is a list of the configuration settings for the specified LU.

/add
Adds an LUA LU called *luname*. To configure the LUA LU, either specify other options after **/add**, or specify configuration options in additional **snacfg lua** commands (using the same *luname*).

/delete
Deletes *luname*.

Options for LUA LUs

/connection:*connectionname*
Specifies the connection to which the LUA LU should be assigned or moved. When **/add** is used, this option is required.

/lunumber:*value*
Specifies the LU number, which identifies the LU on its connection. When **/add** is used, this option is required. Check with the administrator of the host system for the correct value; it should match the LOCADDR= parameter of the LU definition in VTAM or the NCP Gen on the host.

If the number that you specify has already been assigned to an LU or an APPC LU-LU pair on the intended connection, the command fails.

The range is from 1 through 254.

/pool:*poolname*
Assigns or moves the LUA LU to *poolname*. An LUA LU can be assigned to only one pool. The pool specified with *poolname* must already exist. An LUA LU pool can be created with the **snacfg poola** command.

If **/pool:** is typed without *poolname*, the specified LU is removed from whichever pool it is assigned to.

/highpriority:{ yes | no }
Specifies whether this LU will be given priority over low-priority LUs.

When an LUA LU is assigned to an LUA LU pool, the priority setting of the pool overwrites the priority setting of the LU.

/comment:"*text*"

Adds an optional comment for the specified LU. The comment can contain as many as 25 characters; enclose the comment in quotes.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg LUD

Purpose

Allows you to view, add, delete, or modify downstream LUs. Also allows you to assign downstream LUs to LU pools that have already been created, and allows you to view the command that would create a specified downstream LU.

> **Note** Configuration settings specified with **snacfg lud** correspond to downstream LU settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] lud /list
snacfg [#configpath] lud luname
snacfg [#configpath] lud luname /add /connection:connectionname
    /lunumber:value [options]
snacfg [#configpath] lud luname [options]
snacfg [#configpath] lud luname /delete
snacfg [#configpath] lud luname /print
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured downstream LUs.

luname
Specifies the name of the downstream LU to view, add, modify, or delete. A downstream LU name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. The name cannot be the same as any other LU or pool name that uses this connection.

If no options are specified after *luname*, the result is a list of the configuration settings for the specified LU.

/add
Adds a downstream LU called *luname*. To configure the downstream LU, either specify other options after **/add**, or specify configuration options in additional **snacfg lud** commands (using the same *luname*).

/delete
Deletes *luname*.

/print
Causes the display of the **snacfg** command that would create the specified downstream LU. The displayed command does not contain the word **snacfg**, so it can be redirected to a command file. See the information about command files earlier in this section.

Options for Downstream LUs

/connection:connectionname
Specifies the connection to which the downstream LU should be assigned or moved. When **/add** is used, this option is required.

/lunumber:*value*
Specifies the LU number, which identifies the LU on its connection. When **/add** is used, this option is required. Check with the administrator of the host system for the correct value; it should match the LOCADDR= parameter of the LU definition in VTAM or in the NCP Gen.

The LU number identifies the LU to the host system.

If the number you specify has already been assigned to an LU or an APPC LU-LU pair on the intended connection, the command fails.

The range is from 1 through 254.

/pool:*poolname*
Assigns or moves the downstream LU to *poolname*. A downstream LU can be assigned to only one pool. The pool specified with *poolname* must already exist. A downstream LU pool can be created with the **snacfg poold** command.

If **/pool:** is typed without *poolname*, the specified LU is removed from whichever pool it is assigned to.

/comment:"*text*"

Adds an optional comment for the specified LU. The comment can contain as many as 25 characters; enclose the comment in quotes.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg Mode

Purpose

Allows you add, delete, modify, or view an APPC mode. Also allows you to view the command that would create a specified mode.

> **Note** Configuration settings specified with snacfg mode correspond to APPC mode settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] mode /list
snacfg [#configpath] mode modename
snacfg [#configpath] mode modename /add [options]
snacfg [#configpath] mode modename [options]
snacfg [#configpath] mode modename /delete
snacfg [#configpath] mode modename /print
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured modes.

modename
Specifies the name of the mode on which to carry out actions. A mode name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. The mode name cannot be the same as any other mode name in the subdomain of the server.

If no options are specified after *modename*, the configuration settings for the specified mode are displayed.

/add
Adds a mode called *modename*. To configure the mode, either specify other options after **/add**, or specify configuration options in additional **snacfg mode** commands (using the same *modename*).

/delete
Deletes *modename*.

/print
Causes the display of the **snacfg** command that would create the specified mode. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file. See the information about command files earlier in this section.

Options for APPC Modes

/comment:"*text*"
Adds an optional comment for the mode. The comment can contain as many as 25 characters; enclose the comment in quotes.

/sessionlim:*value*
Specifies the parallel session limit.

The range is from 1 through 254. If no parallel session limit has been specified, the default is 1.

/conwin:*value*
Specifies the minimum contention winner limit.

The range is from 0 through the parallel session limit. If no minimum contention winner limit has been specified, the default is 0.

/conlose:*value*
Specifies the partner minimum contention winner limit.

The range is from 0 through the parallel session limit. If no partner minimum contention winner limit has been specified, the default is 0.

/autoact:*value*
Specifies the automatic activation limit.

The range is from 0 through the minimum contention winner limit.

/autopartner:{ yes | no }
Specifies whether this mode will be used in automatic partnering of APPC LUs.

If automatic partnering is left unspecified, the default is **yes**.

/highpriority:{ yes | no }
Specifies whether communication with this mode will be given preference over low-priority communication.

If the high-priority setting is left unspecified, the default is **yes**.

/pacesendcnt:*value*
Specifies the pacing send count. A value of 0 represents an unlimited number of frames.

The range is from 0 through 63. If no pacing send count has been specified, the default is 4.

/pacerecvcnt:*value*
Specifies the pacing receive count. A value of 0 represents an unlimited number of frames.

The range is from 0 through 63. If no pacing receive count has been specified, the default is 4.

/maxsendru:*value*
Specifies the maximum size for RUs sent by the TP(s) on the local system.

The range is from 256 through 16384. If no maximum send RU size has been specified, the default is 1024.

/maxrecvru:*value*
Specifies the maximum size for RUs received from the TP(s) on the remote system.

The range is from 256 through 16384. If no maximum receive RU size has been specified, the default is 1024.

/maxsendcomp:{ None | RLE | LZ9}
These options offer progressively better compression, but at a progressively higher CPU usage cost.

/maxrecvcomp:{ None | RLE | LZ9}
These options offer progressively better compression, but at a progressively higher CPU usage cost.

/allowcomp:{ yes | no}
If LZ9 is used, this option controls whether data is compressed using RLE before being further compressed using LZ9.

/endpointcomp:{ yes | no}
This option controls whether intermediate nodes may use compression if one of the endpoints does not support compression or does not wish to use it.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg Pool

Purpose

Allows you to view, add, delete, or modify 3270 LU pools.

To assign existing 3270 LUs to a 3270 LU pool, first configure the pool with the **snacfg pool** command (including options), then add the LUs with the **snacfg lu** command (using the **/pool:***poolname* option).

> **Note** Configuration settings specified with snacfg pool correspond to 3270 LU pool settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] pool /list
snacfg [#configpath] pool poolname
snacfg [#configpath] pool poolname /add [options]
snacfg [#configpath] pool poolname [options]
snacfg [#configpath] pool poolname /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured 3270 LU pools.

poolname
Specifies the name of the 3270 LU pool to view, add, modify, or delete. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. The name cannot be the same as any other pool name or LU name (other than APPC LU names) in the installation.

If no options are specified after *poolname*, the result is a list of the configuration settings for the specified pool.

/add
Adds a 3270 LU pool called *poolname*. To configure the 3270 LU pool, either specify other options after **/add**, or specify configuration options in additional **snacfg pool** commands (using the same *poolname*).

/delete
Deletes *poolname*.

Options for 3270 LU Pools

/displaymodel:{ mod2 | mod3 | mod4 | mod5 | 2 | 3 | 4 | 5 }
Specifies the model number of the LUs that will be added to this pool. (Only display LUs can be pooled; printer LUs cannot be pooled.) The following display models are available:

- Model 2 is 24 lines by 80 characters.
- Model 3 is 32 lines by 80 characters.
- Model 4 is 43 lines by 80 characters.
- Model 5 is 27 lines by 132 characters.

Some emulators can only emulate certain display models. For more information, see your emulator documentation.

The display model setting of a pool overwrites the setting of any 3270 LU assigned to the pool.

If no display model has been specified for a pool, the default is Model 2.

/allowmodeloverride:{ yes | no }
Specifies whether the user is allowed to override the display model type of the LU by using the 3270 terminal emulation program.

The model override setting of a pool overwrites the setting of any 3270 LU assigned to the pool.

If no setting has been specified for this parameter, the default is **no**.

/comment:"*text*"
Adds an optional comment to the specified 3270 LU pool. The comment can contain as many as 25 characters; enclose the comment in quotes.

/assocprint:{ yes | no }
Specifies that the LU pool contains display LUs with associated 3270 printers.

See Also

Snacfg Reference

Snacfg PoolA

Purpose

Allows you to view, add, delete, or modify LUA LU pools.

To assign existing LUA LUs to an LUA LU pool, first configure the pool with the **snacfg poola** command (including options), then add the LUs with the **snacfg lua** command (using the **/pool:***poolname* option).

> **Note** Configuration settings specified with snacfg poola correspond to LUA LU pool settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] poola /list
snacfg [#configpath] poola poolname
snacfg [#configpath] poola poolname /add [options]
snacfg [#configpath] poola poolname [options]
snacfg [#configpath] poola poolname /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured LUA LU pools.

poolname
Specifies the name of the LUA LU pool to view, add, modify, or delete. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. The name cannot be the same as any other pool name or LU name (other than APPC LU names) in the installation.

If no options are specified after *poolname*, the result is a list of the configuration settings for the specified pool.

/add
Adds an LUA LU pool called *poolname*. To configure the LUA LU pool, either specify other options after **/add**, or specify configuration options in additional **snacfg poola** commands (using the same *poolname*).

/delete
Deletes *poolname*.

Options for LUA LU Pools

/highpriority:{ yes | no }
Specifies whether LUs in this pool will be given priority over low-priority LUs. The priority setting of a pool overwrites the setting of any LUA LU assigned to the pool.

/comment:"*text*"
Adds an optional comment to the specified LUA LU pool. The comment can contain as many as 25 characters; enclose the comment in quotes.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg PoolD

Purpose

Allows you to view, add, or delete downstream LU pools. Also allows you to view the command that would create a specified downstream LU pool.

To assign existing downstream LUs to a downstream LU pool, first configure the pool with the **snacfg poold** command; then add the LUs with the **snacfg lud** command (using the **/pool:***poolname* option).

Syntax

```
snacfg [#configpath] poold /list
snacfg [#configpath] poold poolname
snacfg [#configpath] poold poolname [/add] [/comment: text]
snacfg [#configpath] poold poolname /delete
snacfg [#configpath] poold poolname /print
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured downstream LU pools.

poolname
Specifies the name of the downstream LU pool to view, add, or delete. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. The name cannot be the same as any other pool name or LU name (other than APPC LU names) in the subdomain.

If no options are specified after *poolname*, the result is a list of the configuration settings for the specified pool.

/add
Adds a downstream LU pool called *poolname*.

/delete
Deletes *poolname*.

/print
Causes the display of the **snacfg** command that would create the specified downstream LU pool. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file. See the information about command files earlier in this section.

/comment:"*text*"
Adds an optional comment to the specified downstream LU pool. The comment can contain as many as 25 characters; enclose the comment in quotes.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg PrintServer

Purpose

Allows you to add, delete, or view printer servers from one subdomain or multiple subdomains.

> **Note** Configuration settings specified with snacfg printserver correspond to settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] printserver /list
snacfg [#configpath] printserver servername /add
snacfg [#configpath] printserver servername /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of print servers in the Host Integration Server 2004 subdomain.

/add
Adds the print server name of the Host Integration Server 2004 computer that is running the Host Integration Server Host Print Service. To configure the server name, specify the name after the **/add**. The print server name must match the computer name of the computer running Host Print Service.

You can add print servers for Host Integration Server 2004 computers that do not yet exist. For example, you can prepare a configuration file to be used at another location and add the server names using this parameter. Until the computers are configured with Host Integration Server 2004 running Host Print Service, SNA Manager will show them as offline.

/delete
Deletes the print server.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg PrintSession3270

Purpose

Allows you to add, delete, modify, or view 3270 print sessions defined in the Host Print Service.

> **Note** Configuration settings specified with snacfg printsession3270 correspond to local print server settings configured with the SNA Manager.
>
> The /feedignorefinal option is no longer supported. By default, this value is enabled. A PDF file can be used to control this behavior if required.

Syntax

```
snacfg [#configpath] printsession3270name /list
snacfg [#configpath] printsession3270name /print
snacfg [#configpath] printsession3270 printsession3270name /add
   /server:servername /luname:LUname[options]
snacfg [#configpath] printsession3270 printsession3270name [options]
snacfg [#configpath] printsession3270 printsession3270name /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of 3270 print sessions.

/print
Displays a list of the configuration settings of a print session. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file. Command files are discussed earlier in this section.

/add
Adds a print session to the Host Print Service. To configure the print session, you must specify the server name and the configured 3270 printer LU name after the **/add** using the **/server:***servername* and **/luname:***Luname* options.

/delete
Deletes the printer session. To delete the print session, you must specify the server name and the configured 3270 printer LU name after the **/delete**.

Options for 3270 Print Sessions

/autoactivate:{ yes | no }
Specifies whether the printer session will automatically activate when Host Integration Server 2004 is started. The default is yes.

/bestfit:{ yes | no }
Specifies whether to scale the output to the paper size. The default is **yes**.

/codepage: {Country | Custom}
This defines the host code page language in which the print jobs are output. The default is **Country** and the default language is **English (United States) [037]**. To change the default language, provide the number of the host code page of the country/region you want with the **/country** option.

If you want to use a custom file for the host code page, you must use **/customfile:***text*, where the *text* value is the name of the file containing the specifications for the print job.

Host Code Page Numbers and Corresponding Language

Host Code Page Number	Language
0	"Afrikaans [500]"
1	"Albanian [870]"
2	"Arabic (Algeria) [420]"
3	"Arabic (Bahrain) [420]"
4	"Arabic (Egypt) [420]"
5	"Arabic (Iraq) [420]"
6	"Arabic (Jordan) [420]"

7	"Arabic (Kuwait) [420]"
8	"Arabic (Lebanon) [420]"
9	"Arabic (Libya) [420]"
10	"Arabic (Morocco) [420]"
11	"Arabic (Oman) [420]"
12	"Arabic (Qatar) [420]"
13	"Arabic (Saudi Arabia) [420]"
14	"Arabic (Syria) [420]"
15	"Arabic (Tunisia) [420]"
16	"Arabic (U.A.E.) [420]"
17	"Arabic (Yemen) [420]"
18	"Basque [284]"
19	"Belarusian [1025]"
20	"Bulgarian [1025]"
21	"Catalan [284]"
22	"Chinese (PRC) [935]"
23	"Chinese (Singapore) [935]"
24	"Chinese (Hong Kong SAR) [937]"
25	"Chinese (Macao SAR) [937]"
26	"Chinese (Taiwan) [937]"
27	"Croatian [870]"
28	"Czech [870]"
29	"Danish [277]"
30	"Dutch (Belgium) [500]"
31	"Dutch (Standard) [037]"
32	"English (Australian) [037]"
33	"English (Belize) [500]"
34	"English (Canadian) [037]"
35	"English (Caribbean) [500]"
36	"English (Ireland) [285]"
37	"English (Jamaica) [500]"
38	"English (New Zealand) [037]"
39	"English (South Africa) [037]"
40	"English (Trinidad) [500]"
41	"English (United Kingdom) [285]"
42	"English (United States) [037]"
43	"Estonian [1112]"
44	"Faeroese [277]"
45	"Finnish [278]"
46	"French (Belgium) [500]"
47	"French (Canadian) [037]"
48	"French (Luxembourg) [500]"
49	"French (Standard) [297]"
50	"French (Swiss) [500]"
51	"German (Austrian) [273]"
52	"German (Liechtenstein) [500]"
53	"German (Luxembourg) [500]"
54	"German (Standard) [273]"
55	"German (Swiss) [500]"
56	"Greek [423]"
57	"Greek (Modern) [875]"
58	"Hebrew [424]"
59	"Hungarian [870]"
60	"Icelandic [871]"

61	"Indonesian [037]"
62	"Italian [280]"
63	"Italian (Swiss) [500]"
64	"International [500]"
65	"Japanese (Extend Katakana) [930]"
66	"Japanese (English-lower) [931]"
67	"Japanese (Extend English) [939]"
68	"Japanese (Katakana) [290]"
69	"Korean [933]"
70	"Latvian [1112]"
71	"Lithuanian [1112]"
72	"Macedonian (FYROM) [1025]"
73	"Malay [037]"
74	"Norwegian (Bokmal) [277]"
75	"Norwegian (Nynorsk) [277]"
76	"Polish [870]"
77	"Portuguese (Brazil) [037]"
78	"Portuguese (Portugal) [037]"
79	"Romanian [870]"
80	"Russian [880]"
81	"Serbian (Cyrillic) [1025]"
82	"Serbian (Latin) [870]"
83	"Slovak [870]"
84	"Slovenian [870]"
85	"Spanish (Argentina) [284]"
86	"Spanish (Bolivia) [284]"
87	"Spanish (Chile) [284]"
88	"Spanish (Columbia) [284]"
89	"Spanish (Costa Rica) [284]"
90	"Spanish (Dominican Rep.) [284]"
91	"Spanish (Ecuador) [284]"
92	"Spanish (El Salvador) [284]"
93	"Spanish (Guatemala) [284]"
94	"Spanish (Honduras) [284]"
95	"Spanish (Mexico) [284]"
96	"Spanish (Modern Sort) [284]"
97	"Spanish (Nicaragua) [284]"
98	"Spanish (Panama) [284]"
99	"Spanish (Paraguay) [284]"
100	"Spanish (Peru) [284]"
101	"Spanish (Puerto Rico) [284]"
102	"Spanish (Trad. Sort) [284]"
103	"Spanish (Uruguay) [284]"
104	"Spanish (Venezuela) [284]"
105	"Swedish [278]"
106	"Thai [838]"
107	"Turkish [905]"
108	"Turkish (Latin-5) [1026]"
109	"Ukrainian [1025]"

/collate:{ yes | no }

Adds an option to collate pages sequentially.

/color:{ yes | no }

For color printers, printing will be gray scale if no is selected.

/comment:"*text*"

Adds an optional comment for the printer session. It can contain as many as 25 characters; enclose the comment in quotes.

/copies:*value*

Specifies the number of copies for printing.

/country:*value*

Specifies the language in which the print jobs are printed.

/customfile:"*text*"

Specifies the name of the file containing the custom language translation information. Use this option if you specify **/codepage:custom**.

/devicename:"*text*"

Specifies the name of the destination printer.

/duplex:*simplex* | *horizontal* | *vertical*

Specifies printing on two-sided paper.

/filterfile:"*text*"

The **/filterfile** is a defined programming API that allows you to pass the printer data stream to a third party or user supplied DLL. Enter text to signify where the printer data stream should go.

/font:"*text*"

Specifies the font to be used in the printer sessions. This can be any available font installed on the computer.

/formname:*string*

Specifies the name for the form.

/margin:*left, right, top, bottom*

Specifies the margins of the page in inches in the order of left, right, top, bottom. The default margins are 0".

/orientation:*portrait, landscape*

Specifies the page layout as portrait or landscape.

/papersize:*value*

Specifies the size of the paper for printing.

Valid Values and Descriptions for Papersize

Value	Constant Name (from wingdi.h)	Description
1	DMPAPER_LETTER	Letter, 8.5" x 11"
2	DMPAPER_LETTERSMALL	Letter Small, 8.5" x 11"
3	DMPAPER_TABLOID	Tabloid, 11" x 17"
4	DMPAPER_LEDGER	Ledger, 17" x 11"
5	DMPAPER_LEGAL	Legal, 8.5" x 14"
6	DMPAPER_STATEMENT	Statement, 5.5" x 8.5"
7	DMPAPER_EXECUTIVE	Executive, 7.25" x 10.5"
8	DMPAPER_A3	A3 Sheet, 297 x 420mm
9	DMPAPER_A4	A4 Sheet, 210 x 297mm
10	DMPAPER_A4SMALL	A4 Small Sheet, 210 x 297mm
11	DMPAPER_A5	A5 Sheet, 148 x 210mm
12	DMPAPER_B4	B4 Sheet, 250 x 354mm
13	DMPAPER_B5	B5 Sheet, 182 x 257mm
14	DMPAPER_FOLIO	Folio, 8.5" x 13"
15	DMPAPER_QUARTO	Quarto, 215 x 275mm
16	DMPAPER_10X14	10" x 14" Sheet
17	DMPAPER_11X17	11" x 17" Sheet
18	DMPAPER_NOTE	Note, 8.5" x 11"
19	DMPAPER_ENV_9	#9 Envelope, 3.875" x 8.875"
20	DMPAPER_ENV_10	#10 Envelope, 4.125" x 9.5"
21	DMPAPER_ENV_11	#11 Envelope, 4.5" x 10.375"
22	DMPAPER_ENV_12	#12 Envelope, 4.75" x 11"
23	DMPAPER_ENV_14	#14 Envelope, 5" x 11.5"
24	DMPAPER_CSHEET	C Sheet, 17" x 22"
25	DMPAPER_DSHEET	D Sheet, 22" x 34"
26	DMPAPER_ESHEET	E Sheet, 34" x 44"
27	DMPAPER_ENV_DL	DL Envelope, 110 x 220mm
28	DMPAPER_ENV_C5	C5 Envelope, 162 x 229mm
29	DMPAPER_ENV_C3	C3 Envelope, 324 x 458mm
30	DMPAPER_ENV_C4	C4 Envelope, 229 x 324mm

31	DMPAPER_ENV_C6	C6 Envelope, 114 x 162mm
32	DMPAPER_ENV_C65	C65 Envelope, 114 x 229mm
33	DMPAPER_ENV_B4	B4 Envelope, 250 x 353mm
34	DMPAPER_ENV_B5	B5 Envelope, 176 x 250mm
35	DMPAPER_ENV_B6	B6 Envelope, 176 x 125mm
36	DMPAPER_ENV_ITALY	Italy Envelope, 110 x 230mm
37	DMPAPER_ENV_MONARCH	Monarch Envelope, 3.875" x 7.5"
38	DMPAPER_ENV_PERSONAL	6.75 Envelope, 3.625" x 6.5"
39	DMPAPER_FANFOLD_US	US Standard Fanfold, 14.875" x 11"
40	DMPAPER_FANFOLD_STD_GERMAN	German Standard Fanfold, 8.5" x 12"
41	DMPAPER_FANFOLD_LGL_GERMAN	German Legal Fanfold, 8.5" x 13"

Additional values, supported by Windows

42	DMPAPER_ISO_B4	B4 (ISO) 250 x 353mm
43	DMPAPER_JAPANESE_POSTCARD	Japanese Postcard 100 x 148mm
44	DMPAPER_9X11	9" x 11"
45	DMPAPER_10X11	10" x 11"
46	DMPAPER_15X11	15" x 11"
47	DMPAPER_ENV_INVITE	Envelope Invite 220 x 220mm
48	DMPAPER_RESERVED_48	Reserved -- do not use
49	DMPAPER_RESERVED_49	Reserved -- do not use
50	DMPAPER_LETTER_EXTRA	Letter Extra, 9.275" x 12"
51	DMPAPER_LEGAL_EXTRA	Legal Extra, 9.275" x 15"
52	DMPAPER_TABLOID_EXTRA	Tabloid Extra, 11.69" x 18"
53	DMPAPER_A4_EXTRA	A4 Extra, 9.27" x 12.69"
54	DMPAPER_LETTER_TRANSVERSE	Letter Transverse, 8.275" x 11"
55	DMPAPER_A4_TRANSVERSE	A4 Transverse, 210 x 297mm
56	DMPAPER_LETTER_EXTRA_TRANSVERSE	Letter Extra Transverse, 9.275" x 12"
57	DMPAPER_A_PLUS	SuperA / A4, 227 x 356mm
58	DMPAPER_B_PLUS	SuperB / A3, 305 x 487mm
59	DMPAPER_LETTER_PLUS	Letter Plus, 8.5" x 12.69"
60	DMPAPER_A4_PLUS	A4 Plus, 210 x 330mm
61	DMPAPER_A5_TRANSVERSE	A5 Transverse, 148 x 210mm
62	DMPAPER_B5_TRANSVERSE	B5 (JIS) Transverse, 182 x 257mm
63	DMPAPER_A3_EXTRA	A3 Extra, 322 x 445mm
64	DMPAPER_A5_EXTRA	A5 Extra, 174 x 235mm
65	DMPAPER_B5_EXTRA	A5 Extra, 174 x 235mm
66	DMPAPER_A2	A2, 420 x 594mm
67	DMPAPER_A3_TRANSVERSE	A3 Transverse, 297 x 420mm
68	DMPAPER_A3_EXTRA_TRANSVERSE	A3 Extra Transverse, 322 x 445mm

/paperlength:*value*

Specifies the length of the paper for printing. The values for paperlength and paperwidth are in tenths of a millimeter, and override the papersize setting.

/paperwidth:value

Specifies the width of the paper. The values for paperlength and paperwidth are in tenths of a millimeter, and override the papersize setting.

/pdtfile:"*text*"

Specifies the name of a printer definition file.

/provider:"*text*"

This parameter maps to one of the two print provider DLLs (PPD3270.DLL or PPD5250.DLL) and tells the Host Printer Service which DLL to load to do the printer communications (ppd3270.dll or ppd5250.dll). The text for **snacfg printsession3270** is PPD3270.

/printtofile:"*text*"

Specifies the name of a text file to which the output is to be sent. When information is entered into this parameter, the print job is saved into a file on the hard drive instead of being sent to the printer.

/quality:*high, medium, low, draft*

Specifies the quality of print.

/scalefactor:*value*

Specifies the amount by which the printed output is to be scaled from the physical page size, divided by 100. For example, a scale factor of 50 would make the printed output half its normal size, 10 would be one tenth, etc.

/server:"*text*"

Specifies the name of the server to which the session should attach. This is usually the name of an Host Integration Server 2004 computer that is running the Host Print Service in the subdomain. When **/add** is used, this option is required.

/truetype:*bitmap, download, substitute*

Specifies TrueType fonts or substitutes.

/uniqueextension:{ yes | no }

When the **/printtofile** option is used, specifying YES enables the Host Print Service to generate a unique output file extension for each print job.

/overridefontsize:{ yes | no }

Specifies whether or not the default font size can be overridden.

/fontsize:*value*

Specifies the size of the font (in points) used for output.

/charset:*value*

Specifies the font face used for output.

/bypassgdi:{ yes | no }

This allows print jobs that are formatted with host software to bypass the Windows printing format system. All the data from the host is passed directly to the printer. The default is **no**.

/charsperline:*value*

Specifies the number of characters printed per line.

/feedperjob:{ yes | no }

If set to **yes**, it will issue a form feed between each print job. The default is **no**.

/feedignoreinitial:{ yes | no }

If set to **yes**, the beginning form feed in a print job will be ignored. The default is **no**.

/jobtermination:{ EndBracket | UnBind }

The print job will terminate when either a **When End Bracket Received** or a **When Unbind Received** command is received by the printer. The default is **EndBracket**.

/linespacing:*value*

Specifies the space (in points) between printed lines.

/linesperinch:{ 6 | 8 }

This specifies the number of lines per inch (either six or eight) in the print job. The default is **6**.

/linewrap:{ yes | no }

Specifies whether the text will automatically wrap at the end of a line.

/luname:"*text*"

The name of the configured 3270 printer LU. When **/add** is used, this option is required.

/monitorjob:{ yes | no }

If **yes** is specified, this feature sends a message to the host computer stating that the print job is completed. The default is **no**.

/pagewidth:{ 80 | 132 | 158 }

Specifies the default page width in number of characters per line. The values can be 80, 132, or 158 characters. The default is 80.

/skipblanklines:{ yes | no }

If there are blank lines in the print job, it will not print them if **yes** is specified. The default is **no**.

/timeout:*value*

Specifies the time limit, in seconds, for terminating print jobs.

/transparencyascii:{ yes | no }

This sets a flag that indicates that the transparent data from the host is in ASCII format and does not need translation from EBCDIC. The default is **no**.

/transparencycustom:*value*

Specifies the custom byte that sends the data stream in transparent mode. The IBM standard value is 0x35, but if the host print job uses another value, such as 0x36, then this should be specified.

See Also

Snacfg Reference

Snacfg PrintSessionAPPC

Purpose

Allows you to add, delete, modify, or view APPC print sessions defined in the Host Print Service.

> **Note** Configuration settings specified with snacfg printsessionAPPC correspond to local print server setting configured with the SNA Manager.

Syntax

```
snacfg [#configpath] printsessionAPPCname /list
snacfg [#configpath] printsessionAPPCname /print
snacfg [#configpath] printsessionAPPC printsessionAPPCname /add
    /server:servername /localLUalias:localLUname [options]
snacfg [#configpath] printsessionAPPC printsessionAPPCname [options]
snacfg [#configpath] printsessionAPPC printsessionAPPCname /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of APPC print sessions.

/print
Displays a list of the configuration settings of a print session. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file. Command files are discussed earlier in this section.

/add
Adds a print session to the Host Print Service. To configure the print session, you must specify the server name and the configured APPC local LU alias name after the **/add**. The required options are **/server:***servername* and **/localLUalias:***localLUname*

/delete
Deletes the printer session. To delete the print session, you must specify the server name and the configured local LU alias after the **/delete**.

Options for APPC Print Sessions

/autoactivate:{ yes | no }
Specifies whether the printer session will automatically activate when Host Integration Server 2004 is started. The default is **yes**.

/bestfit:{ yes | no }
Specifies whether to scale the output to the paper size. The default is **yes**.

/codepage: {Country | Custom}
This defines the host code page language in which the print jobs are printed. The default is **Country** and the default language is **English (United States) [037]**. To change the default language, provide the number of the host code page of the country/region you want using the **/country** option.

If you want to use a custom file for the host code page, you must use **/customfile:***text,* where the text value is the name of the file containing the specifications.

/collate:{ yes | no }
Adds an option to collate pages sequentially.

/color:{ yes | no }
For color printers, printing will be gray scale if no is selected.

/comment:"*text*"
Adds an optional comment for the printer session. It can contain as many as 25 characters; enclose the comment in quotes.

/country:*value*
Specifies the language in which the print jobs are printed.

/customfile:"*text*"
Specifies the name of the file containing the custom language translation information. Use this option if you specify **/codepage:custom**.

/devicename:"*text*"
Specifies the name of the destination printer.

/duplex:*simplex | horizontal | vertical*
Specifies printing on two-sided paper.

/filterfile:"*text*"
This parameter is a defined programming API that allows you to pass the printer data stream to a third-party or user-supplied DLL. Enter the text of the file to which the printer data stream should go.

/font:"*text*"
Specifies the font to be used in the printer sessions. This can be any available font installed on the computer.

/formname:*string*
Specifies the name for the form.

/margin:*left, right, top, bottom*
Specifies the margins of the page, in inches, in the order of left, right, top, bottom. The default margins are 0".

/orientation:*portrait, landscape*
Specifies the page layout as portrait or landscape.

/pagewidth:*value (0-255)*
Specifies the width of page in characters.

/papersize:*value*
Specifies the size of the paper for printing.

/paperlength:*value*
Specifies the length of the paper for printing. The values for paperlength and paperwidth are in tenths of a millimeter, and override the papersize setting.

/paperwidth:*value*
Specifies the width of the paper. The values for paperlength and paperwidth are in tenths of a millimeter, and override the papersize setting.

/pdtfile:"*text*"
Specifies the name of a printer definition file.

/provider:"*text*"
This parameter maps to one of the two print provider DLLs (PPD3270.DLL or PPD5250.DLL) and tells Host Printer Service which DLL to load for the printer communications (ppd3270.dll or ppd5250.dll). The text for **snacfg printsessionappc** is PPD5250.

/printtofile:"*text*"
Specifies the name of a text file to which the output is to be sent. When information is entered into this parameter, the print job is saved into a file on the hard drive instead of sending it to the printer.

/quality:*high, medium, low, draft*
Specifies the quality of print.

/scalefactor:*value*
specifies the amount by which the printed output is to be scaled from the physical page size, divided by 100. For example, a scale factor of 50 would make the printed output half its normal size, 10 would be one tenth, etc.

/server:"*text*"
Specifies the name of the server to which the session should attach. This is usually the name of an Host Integration Server 2004 computer that is running the Host Print Service in the subdomain. When **/add** is used, this option is required.

/systemtype: {AS400 | System36}
Specifies the type of system being used.

/truetype:*bitmap, download, substitute*
Specifies TrueType fonts or substitutes.

/uniqueextension:{ yes | no }
When the **/printtofile** option is used, the Host Print Service can generate a unique output file extension for each print job.

/overridefontsize:{ yes | no }
Specifies whether or not the default font size can be overridden.

/fontsize:*value*
Specifies the size of the font (in points) used for output.

/charset:*value*
Specifies the font face used for output.

/as400devicename:"*text*"
Specifies the name of the AS/400 computer that will be sending the print job.

/locallualias:"*text*"
Specifies the previously configured local LU alias. This is a required parameter when using **/add**.

/remotelualias:"*text*"
Specifies the default remote APPC LU. If an LU is specified here, do not enter text into **/remotefqname**.

/remotefqname:"*text*"
Specifies the fully qualified name or alias of a remote APPC LU. The fully qualified name is the network name and LU name. If text is entered here, do not enter text into **/remotelualias**.

/modename:"*text*"
The default mode name is QPCSUPP. The other mode names available are: #INTERSC, BLANK, and QSERVER.

/username:"*text*"
   Specifies the authorized user.
/password:"*text*"
   Specifies the user password.
/hostprinttransform:{ yes | no }
   Enter *yes* to activate the Host Print Transform feature.
/msgqname:"*text*"
   Specifies the qualified name of the message queue to which operational messages for this device are sent.
/msglibname:"*text*"
   Specifies the library in which the message queue is located.
/hostprintertype:"*text*"
   Specifies the type of host printer.
/copies:*value*
   Specifies the number of copies to print.
/papersrc1:{ continuous | cut | autocut }
   Specifies the type of paper used in the output device.

See Also

Snacfg Reference

Snacfg Server

Purpose

Allows you to view or change settings for servers. Can also be used to add a server, although the SNA Manager is the recommended interface for adding servers.

> **Note** Configuration settings specified with snacfg server correspond to server settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] server /list
snacfg [#configpath] server servername
snacfg [#configpath] server servername /add [options]
snacfg [#configpath] server servername [options]
snacfg [#configpath] server servername /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of the servers on the local subdomain.

servername
Specifies the name of the server on which settings will be viewed or changed. The server name should be in the format machine_name or \\machine_name\snaservr (for specifying the primary node on the machine) and \\machine_name\snasrv02 (or snasrv03, snasrv04, etc.) for specifying the secondary nodes on the machine.

/add
Adds a Host Integration Server 2004 computer called *servername*. For adding a server, the recommended method is to use the SNA Manager, not **snacfg server**.

Before you can add connections to the server, link services must also be configured for the server. The recommended interface for configuring link services is the SNA Manager.

/delete
Deletes *servername*.

Options for Servers

/netname:"*text*"
Specifies the local network name, which identifies the SNA network of the local server. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. If the local network name is specified, the local control point name must also be specified (using the **/cpname** option).

/cpname:"*text*"
Specifies the local control point name, which identifies the local system to other control points (nodes) on the SNA network. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. If the local control point name is specified, the local network name must also be specified (using the **/netname** option).

When connecting to a host system and using a local control point name, the name should match the CPNAME = parameter in the host's PU definition.

/comment:"*text*"
Adds an optional comment for the specified server. The comment can contain as many as 25 characters; enclose the comments in quotes.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg TN3Server

Purpose

Allows you to view, add, delete, or modify TN 3270 servers. This command can also be used to add a TN 3270 server, though the SNA Manager is the recommended interface for adding servers.

> **Note** Configuration settings specified with snacfg tn3server correspond to server settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] TN3Server /list
snacfg [#configpath] TN3Server TN3Servername
snacfg [#configpath] TN3Server TN3Servernname /print
snacfg [#configpath] TN3Server TN3Servernname /add / [options]
snacfg [#configpath] TN3Server TN3Servername [options]
snacfg [#configpath] TN3Server TN3Servername /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of the TN 3270 servers on the local subdomain.

tn3servername
Specifies the computer name of the TN 3270 server on which settings will be viewed or changed.

/print
Displays a list of the configuration settings of a print session. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file. Command files are discussed earlier in this section.

/add
Adds a TN 3270 Server computer called *tn3servername*. For adding a server, the recommended method is to use the SNA Manager, not **snacfg tn3server**.

Before you can add connections to the server, link services must also be configured for the server. The recommended interface for configuring link services is the SNA Manager.

/delete
Deletes *tn3servername*.

Options for TN 3270 Servers

/logauditevents:{ yes | no }
Specifies whether the TN service uses the event log to log informational messages as well as error conditions. These are messages that log successful client connection and successful client termination.

/snaeventlog:{ yes | no }
Specifies whether the TN service uses the same event log as the SNA Manager. If this is set to *yes*, all TN3270 service event messages are written to the event log being used by the Host Integration Server 2004 system. If this is set to *no*, all TN3270 service event messages are written to the Windows Event Log on the local machine.

/nameresolution:{ yes | no }
Name resolution should only be selected if you are running a domain name resolver. A domain name resolver catalogs IP addresses and corresponding network names of connected computers. The domain name resolver allows you to enter the name of a computer rather than the IP address when an IP address is required.

/closelistensocket:{ yes | no }
By default, the TN3270 Service always has a socket open for listening for incoming requests. If this option is turned on, the TN3270 Service stops listening on this socket once all of its defined LUs are in use. The purpose of this is to work with emulators that can try to connect to a number of computers running TN3270 Service and that connect to whichever computer accepts their connection attempt. In this case, it is useful if a computer with no LUs available is not listening.

/tn3270modeonly:{ yes | no }
The TN3270 Service now supports TN3270E, an enhancement to TN3270. When a client first connects to a computer running TN3270 Service, it negotiates which functions they both support. TN3270 emulators should be able to negotiate with TN3270 Service, if only to state that they do not support TN3270E. However, some TN3270 emulators are unable to negotiate properly

with TN3270 Service, causing the negotiation to fail. For this reason the TN3270 Service has an option to default to TN3270 mode and not to use TN3270E features, so that these TN3270 negotiation problems do not occur.

/printerflowcontrol:{ yes | no }

If a TN3270 Server adheres strictly to the specification described in RFC 1647, there is no way of implementing flow control between a computer running TN3270 Service and a TN3270 client. In practice this causes no problems for display emulators, but it does cause a problem for printer emulators, which can be swamped with data and have no way of notifying the TN3270 Service that they cannot process any more messages. If this option is turned on, the TN3270 Service sends all messages to a TN3270 printer client as RESPONSE-REQUIRED, and does not send any messages until it has received a response for the previous message.

/idletimeout:*value 1-1440*

Specifies time limits in seconds. If the session is inactive for this length of time, then TN3270 Service disconnects the client.

/initstatusdelay:*value (0-86400)*

Specifies time limits. This is the delay between the time when TN3270 Service connects to a host session and the time the TN3270 Service starts updating the client screen. There are often a large number of startup messages when the TN3270 Service first connects to a host session, and this option gives the user the opportunity not to receive them all.

/msgclosedelay:*value (0-86400)*

Specifies time limits. When TN3270 Service forces a client to disconnect (for example, when the Host Integration Server 2004 session to the host has been lost), it sends the client an error message to be displayed on the screen. This value specifies the time between sending the message to the client and closing the socket with the client (which causes some clients to clear the screen, and so erase the message).

/refreshcycletime:*value (0-60)*

Specifies time limits. This is the delay between updates of the status on the display.

/inboundrusize:*value (256-32768)*

This controls the RU size (SNA message size) used by the TN3270 Service for logon messages to and from the host. The minimum value for inbound or outbound RU size is 256 bytes. If the host application sends large logon screens, these values should be increased.

/outboundrusize:*value (256-32768)*

This controls the RU size (SNA message size) used by the TN3270 Service for logon messages to and from the host. The minimum value for inbound or outbound RU size is 256 bytes. If the host application sends large logon screens, these values should be increased.

/portnumber:*value*

Specifies the port number associated with telnet. You can type another port number to override the default value for a given session. TN services listen on multiple ports simultaneously. You can set a default port number for the TN service (assign the port number to the server) and override this number on a per session basis (assign the port number to the LU session), allowing a single client to connect to multiple host computers.

/comment:"*text*"

Adds an optional comment for the specified server. The comment can contain as many as 25 characters; enclose the comments in quotes.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg TN5Server

Purpose

Allows you to view, add, delete, or modify TN 5250 servers. the SNA Manager is the recommended interface for adding TN 5250 servers.

> **Note** Configuration settings specified with snacfg tn5server correspond to server settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] TN5Server /list
snacfg [#configpath] TN5Server TN5Servername
snacfg [#configpath] TN5Server TN5Servernname /print
snacfg [#configpath] TN5Server TN5Servernname /add / [options]
snacfg [#configpath] TN5Server TN5Servername [options]
snacfg [#configpath] TN5Server TN5Servername /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of the TN 5250 servers on the local subdomain.

Tn5servername
Specifies the computer name of the TN 5250 server on which settings will be viewed or changed.

/print
Displays a list of the configuration settings of a print session. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file. Command files are discussed earlier in this section.

/add
Adds a Host Integration Server 2004 computer called *tn5servername*. For adding a TN 5250 server, the recommended method is to use the SNA Manager, not **snacfg tn5server**.

Before you can add connections to the server, link services must also be configured for the server. The recommended interface for configuring link services is the SNA Manager.

/delete
Deletes *tn5servername*.

Options for TN 5250 Servers

/portnumber:*value*
Specifies the port number associated with telnet (e.g., port number 23). You can type another port number to override the default value for a given session. TN services listen on multiple ports simultaneously. You can set a default port number for the TN service (assign the port number to the server) and override this number on a per session basis (assign the port number to the LU session), allowing a single client to connect to multiple host computers.

/comment:"*text*"
Adds an optional comment for the specified server. The comment can contain as many as 25 characters; enclose the comments in quotes.

See Also

Snacfg Reference

Snacfg TN3Session

Purpose

Allows you to view, add, delete, or modify TN 3270 sessions. the SNA Manager is the recommended interface for adding sessions.

> **Note** Configuration settings specified with snacfg tn3session correspond to session settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] TN3Session /list
snacfg [#configpath] TN3 Session luname
snacfg [#configpath] TN3 Session luname /print
snacfg [#configpath] TN3 Session luname /add / [options]
snacfg [#configpath] TN3 Session luname [options]
snacfg [#configpath] TN3 Session luname /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of the sessions on the local subdomain.

luname
Specifies the LU name on which the session will be activated.

/print
Displays a list of the configuration settings of a print session. The displayed command does not contain the word snacfg, so that it can be redirected to a command file. Command files are discussed earlier in this section.

/add
Adds a TN 3270 session called luname. For adding a session, the recommended method is to use the SNA Manager, not snacfg tn3session.

/delete
Deletes lu*name*.

Options for TN 3270 Sessions

/tn3server:*tn3servername* (required)
Specifies the computer name of the TN 3270 server on which settings will be viewed or changed. The *tn3servername* is required.

/assocname:"*text*"
Printer LUs can be marked as associated instead of generic or specific. To associate a printer LU with a terminal LU, type the Associated LU name. When this option is selected, the **terminal name** will default to IBM-3287-1. The quotes must be included.

/portnumber:*value*
Specifies the port number associated with telnet (e.g., port number 23). You can type another port number to override the default value for a given session. TN services listen on multiple ports simultaneously. You can set a default port number for the TN service (assign the port number to the server) and override this number on a per session basis (assign the port number to the LU session), allowing a single client to connect to multiple host computers.

/pooltype:*pooltype*
The values for pooltype are: GenericTerminal, SpecificTerminal, GenericPrinter, SpecificPrinter, AssocPrinter.

/maxsessions:*value*
Specifies the maximum number of LU-LU sessions that one independent LU can support. The limit set by maxsessions prevents an independent LU from using up too many unreserved session control blocks.

/modeltypes:*model* [,model, ...]
Values for TN3270 model types are:

Model2, Model3, Model4, Model5,

3275_2, 3276_2, 3277_2, 3278_2, 3278_2_E, 3279_2, 3279_2_E,

3276_3, 3278_3, 3278_3_E, 3279_3, 3279_3_E, 3276_4, 3278_4, 3278_4_E, 3279_4, 3279_4_E,

3278_5, 3278_5_E, 3279_5, 3279_5_E,

Dynamic, 3287_1

See Also

Snacfg Reference

Snacfg TN5Session

Purpose

Allows you to view, add, delete, or modify TN 5250 sessions. the SNA Manager is the recommended interface for adding sessions.

> **Note** Configuration settings specified with snacfg tn5session correspond to session settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] TN5Session /list
snacfg [#configpath] TN5 Session appcrlualias
snacfg [#configpath] TN5 Session appcrlualias /print
snacfg [#configpath] TN5 Session appcrlualias /add / [options]
snacfg [#configpath] TN5 Session appcrlualias [options]
snacfg [#configpath] TN5 Session appcrlualias /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of the sessions on the local subdomain.

appcrlualias
Specifies the APPC remote LU alias name on which the session will be activated.

/print
Displays a list of the configuration settings of a print session. The displayed command does not contain the word snacfg, so that it can be redirected to a command file. Command files are discussed earlier in this section.

/add
Adds a TN 5250 session called *appcrlualias*. For adding a session, the recommended method is to use the SNA Manager, not snacfg tn5session.

/delete
Deletes *appcrlualias*.

Options for TN 5250 Sessions

/tn5server:*tn5servername* (required)
Specifies the computer name of the TN 5250 server on which settings will be viewed or changed.

/localiu:*appclualias* (required)
Specifies the name of the APPC LU alias to view, add, modify, or delete. An APPC LU alias name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. The APPC LU alias name cannot be the same as any other APPC LU alias name or pool name on the server.

/mode:*modename*
Specifies the name of the mode on which to carry out actions. A mode name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. The mode name cannot be the same as any other mode name in the subdomain of the server.

If no options are specified after modename, the configuration settings for the specified mode are displayed.

/user:*username*
Specifies the name of the user to view, change settings for, or delete. For adding TN 5250 users, the recommended method is to user the SNA Manager, not **snacfg tn5session**. If you are adding a user, *username* must match the name in the user's account on the Windows domain or on the local system.

/password:*password*
Specifies the current password for the user's account identified in *username*.

/modeltypes:*model* (,model, ...)
Specifies the model type. Values for TN5250 model types are:

5555_C01, 5555_B01, 3477_FC, 3477_FG

3180_2, 3179_2, 3196_A1

5292_2, 5291_1, 5251_11

/portnumber:*value*
Specifies the port number associated with telnet (e.g., port number 23). You can type another port number to override the default value for a given session. TN services listen on multiple ports simultaneously. You can set a default port number for the TN service (assign the port number to the server) and override this number on a per session basis (assign the port number to the LU session), allowing a single client to connect to multiple host computers.

/comment:"*text*"
Optionally, type a comment of up to 25 characters.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg TNIPID

Purpose

Allows you to view, add, delete, or modify telnet IP (Internet Protocol) addresses. the SNA Manager is the recommended interface for adding TNIPIDs.

> **Note** Configuration settings specified with snacfg tnipid correspond to session settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] tnipid /list
snacfg [#configpath] tnipid tnipid
snacfg [#configpath] tnipid tnipid /print
snacfg [#configpath] tnipid tnipid /add / [options]
snacfg [#configpath] tnipid tnipid [options]
snacfg [#configpath] tnipid tnipid /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.
/list
Generates a list of the TNIPIDs on the local subdomain.
tnipid
Specifies the TN Internet Protocol (IP) address.
/print
Displays a list of the configuration settings of valid telnet IP addresses. The displayed command does not contain the word snacfg, so that it can be redirected to a command file. Command files are discussed earlier in this section.
/add
Adds a TNIPID called *tnipid*. For adding a *tnipid*, the recommended method is to use the SNA Manager, not snacfg tnipid.
/delete
Deletes *tnipid*.

Options for TNIPID

/session:*text*
Specifies the session name for the specified telnet IP address.
/subnet:*tnipaddress*
Specifies the TN Internet Protocol (IP) address. If a tnipid parses as "n.n.n.n," it will be treated as an IPADDRESS. Otherwise, it will be treated as an IPNAME.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg User

Purpose

Allows you to view, modify settings for, or delete users recognized by Host Integration Server 2004. Also allows you to assign LUs or LU pools to 3270 users, or assign default LUs to 5250 users.

In addition, **snacfg user** allows you to add users to the list recognized by Host Integration Server 2004. However, it is recommended that you use the SNA Manager, not **snacfg user**, when adding users.

> **Important** If you add user names by using the **/add** option with **snacfg user**, these names must match existing user account names in the Windows domain, or a nonfunctioning configuration may result. To protect against errors with **snacfg user**, use the SNA Manager, instead.

Before assigning LUs or LU pools to users, you must first configure the LUs or LU pools.

> **Note** Configuration settings specified with snacfg user correspond to user or group settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] user /list
snacfg [#configpath] user username
snacfg [#configpath] user username /add [options]
snacfg [#configpath] user /validate
snacfg [#configpath] user username [options]
snacfg [#configpath] user username /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of the 3270 users recognized by Host Integration Server 2004.

domain/username
Specifies the domain and name of the user to add, view, change settings for, or delete.

For adding 3270 users, the recommended method is to use the SNA Manager, not **snacfg user**. If you are adding or removing a user, *username* must match the name in the user's account on the Windows domain specified by *domain*.

/add
Adds a user called *username* to the list of 3270 users recognized by Host Integration Server 2004. The user must already have an account on the Windows domain or on the local system.

For adding 3270 users, the recommended method is to use the SNA Manager, not **snacfg user**.

/validate
Attempts to fill in any SIDs that are missing from user or group listings in the Host Integration Server 2004 configuration file. If the SIDs can be obtained from user accounts in the Windows domain for each user, the SIDs will be added to the listings in the Host Integration Server 2004 configuration.

Run **snacfg user /validate** after working offline and adding users to the configuration, so that the user listings in Host Integration Server 2004 will be functional.

/delete
Deletes *username*.

Options for Users of 3270 Emulators

/insert:*luname*[,*luname*,...]
Assigns the specified 3270 or LUA LUs or pools to the user. Separate multiple names with commas.

/remove:*luname*[,*luname*,...]
Deletes the assignment of 3270 or LUA LUs or pools to the user. Separate multiple names with commas.

/insertrlu:*luname*[,*luname*,...]

Assigns APPC Remote LUs to the user. Separate multiple names with commas. The name *rluname* can be either the RLU alias or its fully-qualified name of the form "*netname.luname*".

/removerlu:*luname*[,*luname*,...]

Deletes the assignment of APPC Remote LUs to the user. Separate multiple names with commas. The name *rluname* can be either the RLU alias or its fully-qualified name of the form "*netname.luname*".

/domain:*domainname*

Specifies the Windows domain in which the user account is found. For all actions involving the domain name associated with a user account, the recommended method is to use the SNA Manager, not **snacfg user**. If an incorrect domain name is specified with **snacfg user**, a nonfunctioning configuration may result.

/comment:"*text*"

Adds an optional comment for the specified user. The comment can contain as many as 25 characters. The quotes must be included.

/encrypt:{ yes | no }

Specify YES to enable data encryption between the server and client.

Options for Users of TPs or 5250 Emulators

/defloclu:*LUalias*

Specifies the default local APPC LU for this user or group. Both the user (or group) name and the LU alias must already be configured in Host Integration Server 2004. If **/defloclu:** is typed without *LUalias*, the user or group record is cleared of any default local LU.

/defremlu:*LUalias*

Specifies the default remote APPC LU for this user or group. Both the user (or group) name and the LU alias must already be configured in Host Integration Server 2004. If **/defremlu:** is typed without *LUalias*, the user or group record is cleared of any default remote LU.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg Workstation

Purpose

The workstation assignment feature allows you to add, delete, modify, or view workstations. You can specify parameters such as IP address, workstation name, and define access parameters to the workstation.

> **Note** Configuration settings specified with snacfg workstation correspond to local workstation settings configured with the SNA Manager.

Syntax

```
snacfg [#configpath] workstation /list
snacfg [#configpath] workstation workstationid
snacfg [#configpath] workstation workstationid /print
snacfg [#configpath] workstation workstationid /add [options]
snacfg [#configpath] workstation workstationid [options]
snacfg [#configpath] workstation workstationid /delete
```

where

#configpath
Specifies the path of the configuration file to view or change. If the configuration path is omitted, Host Integration Server 2004 will attempt to access the configuration file on the local system, using the path \Program Files\Host Integration Server\SYSTEM\CONFIG\COM.CFG.

/list
Generates a list of configured workstations.

/print
Displays a list of the configuration settings of a workstation. The displayed command does not contain the word **snacfg**, so that it can be redirected to a command file. Command files are discussed earlier in this section.

/add
Adds the workstation ID using a either a name or IP address to identify the workstation. The workstation ID is usually the workstation name.

If using an IP address to identify the workstation, the **/address** option is a required parameter.

To configure the workstation, either specify other options after **/add** or specify configuration options in additional **snacfg workstation** *workstationid* commands.

/delete
Deletes the workstation.

Options for Workstation

/insert:*luname*[,*luname*,...]
Assigns the specified 3270 or LUA LUs or pools to the workstation. Separate multiple names with commas.

/remove:*luname*[,*luname*,...]
Deletes the assignment of 3270 or LUA LUs or pools to the workstation. Separate multiple names with commas.

/insertrlu:*luname*[,*luname*,...]
Assigns APPC Remote LUs to the workstation. Separate multiple names with commas. The name *rluname* can be either the RLU alias or its fully-qualified name of the form "*netname.luname*".

/removerlu:*luname*[,*luname*,...]
Deletes the assignment of APPC Remote LUs to the workstation. Separate multiple names with commas. The name *rluname* can be either the RLU alias or its fully-qualified name of the form "*netname.luname*".

/comment:"*comment*"
Sets the workstation's comment field. The quotes must be included.

/wkstaonly:{ yes | no }
If **yes**, it restricts resources available on the computer to the LUs assigned to the workstation. Users will not be able to access LUs assigned to them unless the LU is also assigned to the workstation. If **no**, it allows users access to the LUs assigned to the workstation and the LUs assigned to the user. The default is **no**.

/address:{ yes | no }
If **yes**, Host Integration Server 2004 will look for an IP address in place of an alphanumeric name for the workstation ID. This parameter must be set to **yes** if using an IP address. The default is **no**.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snacfg Error Messages

This section lists the error codes and their corresponding messages used by Snacfg commands.

Error Code	Message
3841	Insufficient privilege to run the SNA Manager program in this domain.
3842	The activation value is invalid.
3843	The link service is invalid.
3844	The allocation timeout is invalid.
3845	The audit level is invalid.
3846	The Control Point Name is invalid. The name can be from one through eight alphanumeric characters long.
3847	The Switched Connection Establishment Timeout is invalid. The range is from 10 through 500 seconds; the default is 300.
3848	The Contact Retry Limit is invalid. The range is from 1 through 20; the default is 10.
3849	The Contact Timeout is invalid. The range is from 5 (five-tenths of a second) through 300 (30 seconds). The default is 300 (30 seconds).
3850	The Partner Min Contention Winner Limit is invalid. The range is from 0 through the parallel session limit; the default is 0.
3851	The Minimum Contention Winner Limit is invalid. The range is from 0 through the parallel session limit; the default is 0.
3852	The default connection for the display verb is invalid.

3853	The DLC type is invalid.
3854	The domain name is invalid.
3855	The duplex value is invalid.
3856	Internal : Bad existing record.
3857	Facility Data is invalid. Facility Data can include as many as 126 hexadecimal digits.
3858	The configuration file is corrupt or does not have correct structure.
3859	The configuration file name is invalid. Verify that a primary or backup server is running in the domain you are trying to administer.
3860	Internal : Bad File Handle.
3861	The Idle Retry Limit is invalid. The range is from 1 through 255; the default is 10.
3862	The Idle Timeout is invalid. The range is from 1 (one-tenth of a second) through 300 (30 seconds). The default is 300 (30 seconds).
3863	The Automatic Activation Limit is invalid. The range is from 0 through the Minimum Contention Winner Limit.
3864	The Security Key Type is invalid.
3865	The Line Type is invalid.
3866	The LU Name is invalid. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. Names for APPC LUs must be different from one another, and names for non-APPC LUs must be different from one another.
3867	The LU Number is invalid. The range is from 1 through 255. The LU Number cannot be the same as that for any other LU using the connection, including local APPC LUs paired with remote APPC LUs that use the connection.

3869	The Mode Name is invalid. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase.
3870	The Display Model is invalid.
3871	The Name or Alias is invalid.
3872	The LU Name is invalid. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase. Names for APPC LUs must be different from one another.
3873	The NetView connection is invalid.
3874	The Network Name is invalid. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase.
3875	The Network Name is invalid. The name can be from one through eight characters long, and can contain alphanumeric characters and the special characters $, #, and @. Lowercase letters are converted to uppercase.
3876	The value for 'Model can be overridden' is invalid.
3877	The Packet Size is invalid. The possible values are 64, 128, 256, and 512. The default is 128.
3878	The LU Partner is invalid.
3879	The password is invalid. A password can contain from one through 10 characters.
3880	The Poll Address is invalid. The address is a two-digit hexadecimal number; the address cannot be the reserved values 00 or FF.
3881	The Poll Rate is invalid. The range is from 1 through 50 polls per second; the default is 5.
3882	The Poll Retry Limit is invalid. The range is from 1 through 255; the default is 10.
3883	The Poll Timeout is invalid. The range is from 1 (one-tenth of a second) through 300 (30 seconds). The default is 10 (1 second).

3884	The Port is invalid.
3885	Internal : Invalid record.
3886	The Remote X.25 Address is invalid. The address usually consists of 12 hexadecimal digits, but can contain up to 15 hexadecimal digits.
3887	The Role Type is invalid.
3888	The RTM Timers Run Until value is invalid.
3889	The first three digits of the Remote Node ID are invalid. These digits, also called the Block Number, can be any three hexadecimal digits except 000 or FFF, which are reserved.
3890	The last five digits of the Remote Node ID are invalid. These digits, also called the Node Number, can be any five hexadecimal digits.
3891	The Max Receive RU Size is invalid. The range is from 256 through 16384; the default is 1024.
3892	The Pacing Receive Count is invalid. The range is from 0 through 63; the default is 4.
3893	The Remote SAP Address is invalid. The address can be a 2-digit hexadecimal number that is a multiple of 04, between 04 and EC. The default is 04.
3894	The Security Key is invalid. For a Security Key in Hex, type a 16-digit hexadecimal number. For a Security Key in Characters, type an eight-character string consisting of alphanumeric characters and/or $, @, #, and the period (.).
3895	The server name is invalid.
3896	The Parallel Session Limit is invalid. Legal values are between 1 and 10000 inclusive.
3897	The Parallel Session Limit is invalid. Legal values are between 1 and 10000 inclusive.
3898	The Timeout for Starting TPs is invalid. The range is from 1 through 3600 seconds; the default is 60 seconds.

3899	The Timeout for Starting TPs is invalid. The range is from 1 through 3600 seconds; the default is 60 seconds.
3900	The Maximum BTU Length is invalid. The range is from 265 through 16393; the defaults are: Token Ring:\t1929Ethernet:\t1493Channel:\t4105SLDC:\t\t265X25:\t\t1033.
3901	The Remote Network Address is invalid. The address is a 12-digit hexadecimal value.
3902	The Retry Limit is invalid. The range is from 0 through 255; the default is 10. A value of zero means the system uses its internal default retry limit.
3903	The Receive ACK Threshold is invalid. The range is from 1 through 127; the default is 2.
3904	The Unacknowledged Send Limit is invalid. The range is from 1 through 127; the default is 8.
3905	The XID Retries value is invalid. The range is from 0 through 30; the default is 3.
3906	The first three digits of the Local Node ID are invalid. These digits, also called the Block Number, can be any three hexadecimal digits except 000 or FFF, which are reserved.
3907	The last five digits of the Local Node ID are invalid. These digits, also called the Node Number, can be any five hexadecimal digits except 00000, which is reserved.
3908	The Max Send RU Size is invalid. The range is from 256 through 16384; the default is 1024.
3909	Minimum Send RU is invalid.
3910	The Pacing Send Count is invalid. The range is from 0 through 63; the default is 4.
3911	User Data is invalid. User Data consists of an even number of hexadecimal charters, up to the maximum of 32 characters. The default is C3; this specifies the Qualified Logical Link Control (QLLC) protocol.
3912	The User ID is invalid. The User ID can contain from one through 10 characters.
3913	The PVC Alias is invalid. The range is from 1 through the number of configured PVC channels; the default is 1.

3914	The configuration file has been created by newer version of Host Integration Server 2004. The Admin program only supports newer versions in read only mode.
3915	The Window Size is invalid.
3917	The connection cannot be modified when there are downstream LUs associated with it.
3918	There is already a 3270 LU with this name.
3919	There is already a 3270 Pool with this name.
3920	There is already a Link Service with this name.
3921	Multiple implicit partners or modes are not allowed for a local LU.
3922	There is already an LU with this LU Number.
3923	There is already an LUA LU with this name.
3924	There is already an LUA Pool with this name.
3925	The name or alias has already been used.
3926	There is already an Host Integration Server 2004 with this name.
3927	There is already a Downstream LU with this name.
3928	There is already an Downstream LU Pool with this name.
3929	The LU-LU pair already exists, or the adapter assignment already exists for the connection.

3930	There is already a user with this name.
3931	Unable to read the file.
3932	Unable to write the file.
3933	Field conflict. Unable to change.
3934	Writing to active file is not allowed.
3935	Configuration file was not found.
3936	Limit reached on objects associated with this item.
3937	Internal: Configuration is invalid.
3938	Session Limit conflicts with contention settings.
3939	Line Types do not match.
3940	Unable to write to active configuration file.
3941	Lost contact with remote domain.
3942	Unable to allocate memory.
3943	Internal: Memory corruption has occurred. Please reload configuration file.
3944	The number of LUs or connections for this Host Integration Server 2004 has been exceeded. Each Host Integration Server 2004 is capable of supporting 250 connections and 15000 dependent LUs.

3945	Internal: LUs are on different servers.
3946	Implicit partner or mode is not implicit.
3947	Internal: The item to be deleted is already absent from this grouping.
3948	Internal: Record has already been added to the configuration.
3949	A connection must have an associated link service.
3950	The Initially Active value must be zero for Local/Local Partners.
3951	The diagnostics record could not be found in the configuration file.
3952	Parallel Sessions are not supported on this LU.
3953	When a link service is to be used by multiple connections, and the connections accept incoming calls, the NRZ/NRZI settings for all the connections must match.
3954	The configuration file is an older config file.
3955	Internal: Target record already has an owner.
3956	The internal control record for the configuration file has exceeded its maximum size.
3957	During the conversion of an old Comm Server configuration file, COM.SEC was found to be corrupt, or of the wrong version type.
3958	Insufficient privilege or the configuration file is locked for read\\write access.
3959	Limit reached on number of objects in a configuration file.

3960	Limit reached on number of objects of this type.
3961	Internal: Invalid record type.
3962	Unable to change this record.
3963	The connection cannot be modified when there are LUs associated with it.
3964	The Session Limit is invalid.
3965	One of the DLC timeout values is invalid.
3966	This Return code is not used.
3967	The LU Alias has already been used. The LU Alias cannot be the same as any other APPC LU on its server.
3968	Unable to configure domain because the primary Host Integration Server 2004 for the domain is not active.
3969	The same Remote Network Address and SAP have already been specified for this link service in connection %s. To create more than one connection to the same remote machine, add one or more 802.2/DLC link services via Host Integration Server 2004 Setup over the same adapter with different local SAP addresses. This will automatically create additional connections in SNA Manager. Alternatively, if further SAPs are available at the remote machine, choose a different Remote SAP for this connection.
3970	No users or groups have been defined with Full Control Administration Access privileges. At least one user or group must be configured with permissions to alter the configuration.
3971	The Fully Qualified LU Name has already been used. The combination of the Net Name and LU Name cannot be the same as any other APPC LU on the server.
3972	Another Incoming Connection for this Link Service is already configured for XID 0. Multiple Incoming connections for one Link Service can only be configured if the connections use XID 3.
3973	Another incoming connection for this link service is configured for a different NRZ/NRZI setting. Multiple incoming connections for one link service must use the same NRZ/NRZI setting.
3974	Another Incoming Connection for this Link Service is configured for a different Poll Address. Multiple Incoming connections for one Link Service must use the same Poll Address.

3975	Another Primary Multidrop Connection for this Link Service is configured for this Poll Address. Primary Multidrop connections for the same Link Service must use different Poll Addresses.
3976	Another Primary Multidrop Connection for this Link Service is configured for a different NRZ/NRZI setting. Primary Multidrop connections for the same Link Service must use the same NRZ/NRZI setting.
3977	Another Primary Multidrop Connection for this Link Service is configured for a different Maximum BTU Length. Primary Multidrop connections for the same Link Service must use the same Maximum BTU Length.
3984	Another Primary Multidrop Connection for this Link Service is configured for a different XID Type. Primary Multidrop connections for the same Link Service must use the same XID Type.
3985	Another Primary Multidrop Connection for this Link Service is configured for a different Duplex setting. Primary Multidrop connections for the same Link Service must use the same Duplex setting.
3986	Another Primary Multidrop Connection for this Link Service is configured for a different Data Rate. Primary Multidrop connections for the same Link Service must use the same Data Rate.
3987	Another Primary Multidrop Connection for this Link Service is configured for a different Data Rate. Primary Multidrop connections for the same Link Service must use the same Data Rate.
3988	Another Primary Multidrop Connection for this Link Service is configured for a different Poll Timeout. Primary Multidrop connections for the same Link Service must use the same Poll Timeout.
3989	Another Primary Multidrop Connection for this Link Service is configured for a different Poll Retry Limit. Primary Multidrop connections for the same Link Service must use the same Poll Retry Limit.
3990	Another Primary Multidrop Connection for this Link Service is configured for a different Contact Timeout. Primary Multidrop connections for the same Link Service must use the same Contact Timeout.
3991	Another Primary Multidrop Connection for this Link Service is configured for a different Contact Retry Limit. Primary Multidrop connections for the same Link Service must use the same Contact Retry Limit.
3992	Leased SDLC connections cannot support Incoming Calls. Leased connections do not require either end to initiate the connection, therefore both ends treat the connection as Outgoing Calls only.
3993	The Partner LU specified for the CPI-C Symbolic Destination Name does not exist.
4000	The Mean time between broadcasts is invalid. The range is from 45 through 65535 seconds; the default is 60.
4001	No protocols have been defined to send Server Broadcasts. At least one protocol must be configured to send Server Broadcasts.

4002	The Channel Address is invalid.
4003	Could not perform the necessary privilege lookup to enable the required privileges in your process.
4004	Could not perform the necessary operations on the process token to enable the required privileges.
4005	You do not have the privileges required to set system ACLs on files.
4006	Unable to get or set security information on the config file.
4007	All connections on this SDLC Link Service must have their multidrop primary flag set the same way.
4008	Unable to obtain a write lock on the config file.
4009	The config file has become out of date and you must reload it.
4010	Bad parameter to function.
4011	The LU Alias has already been used. The LU alias cannot be the same as any other APPC LU on its server.
4012	You do not have the privileges necessary to lock the config file.
4013	Only a primary 3.0 or later computer can write a pre-3.0 configuration file.
4014	This configuration contains un-partnered dependent Local LU(s). These LU(s) have been discarded.
4015	The primary configuration file could not be located. The primary Host Integration Server 2004 may be unavailable. No configuration changes may be made at this time.
4016	This LU is already assigned to this user.

4017	There is already a dependent Local APPC LU with this LU number.
4018	There is already a 3270 LU with this LU number.
4019	Insufficient privilege to modify the config file.
4020	A 3270 LU name must be provided.
4021	The AS/400 device name must be provided.
4022	The Local LU Alias must be provide
4023	The Remote LU Alias or Fully Qualified Name must be provided.
4024	The mode must be provided.
4025	A Workstation with the same ID exists. Please use a different ID.
4026	The page width must be between 40 and 512.
4027	This LU is already assigned to this workstation.

See Also

Snacfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Linkcfg Reference

The following sections reference specific areas of Linkcfg.

This section contains:

- About Linkcfg
- Linkcfg Error Messages
- Demo SDLC Link Service
- Distributed Link Service
- DLC 802.2 Link Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

About Linkcfg

Purpose

Allows you to install and delete link services from the command prompt. Linkcfg allows you to build script files to add link services. If you need to uninstall or reinstall Host Integration Server 2004, you can reinstall link services by running the Linkcfg script files.

To view the list of link services you can install using Linkcfg, type the command linkcfg. The following appears:

```
LINKCFG [ LINKSVC /LSTYPE:{
"Andrew Twinax Link Service"|
"Atlantis/SAGEM SDLC Link Service"|
"Atlantis/SAGEM X.25 Link Service"|
"DCA ISCA SDLC Link Service"|
"DCA ISCA X.25 Link Service"|
"DEMO SDLC Link Service"
"Distributed Link Service"|
"DLC 802.2 Link Service"|
"IBM SDLC Link Service"|
"IBM Twinax Link Service"|
"IBM X.25 Link Service"|
"MicroGate SDLC Link Service"|
"MicroGate X.25 Link Service" } ]
 [ @commandfile ]
```

> **Note** If one of the link services was not copied during Setup, it will not appear on the list.

When setting the parameters for each of the link services, you must type the link service exactly as it appears above.

The configurable parameters for each link service are provided in the command-line help. To see the parameters for each, type the following:

LINKCFG LINKSVC /LSTYPE:"name of link service" where the name is one of those listed above. The available parameters will appear on the screen. The following sections list the available parameters for each link service.

See Also

Linkcfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Linkcfg Error Messages

The LinkCfg command utility returns the following codes and their corresponding messages. If you use the Windows Command Prompt, you only see the message. If you use Microsoft's System Management Server (SMS) to distribute link services across clients, you see the message and return code.

Error Code	Message
0	success.
160	command-line arguments are invalid.
1114	Unable to initialize Link Service DLL.
1157	Unable to locate DLL file.

In addition, LinkCfg will return error codes from GetLastError() calls for all file I/O operations.

See Also

Linkcfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Demo SDLC Link Service

Linkcfg options for the Demo SDLC link service. You can install the 3270 Continuous Demo, the 3270 File Transfer Demo, the 3270 Logon Demo, the AS400 Demo, and the LU1 and LU3 Printing Demos. Each of these demos is a script file that is run to demonstrate access to mainframe and AS/400 computers.

> **Note** Configuration settings specified with LINKCFG correspond to local link configuration settings in the SNA Manager.

Syntax

```
LINKCFG LINKSVC "title" (The quotes must be included.)
     /SERVER:servername
     /LSTYPE:"DEMO SDLC Link Service"
     /SCRIPTFILE: {"3270 Continuous Demo.dem"    |
                   "3270 File Transfer Demo.dem" |
                   "3270 Logon Demo.dem"         |
                   "AS400 Demo.dem"              |
                   "LU1 Printing Demo.dem"       |
                   "LU3 Printing Demo.dem"}
     /DISTRIBUTABLE:{ yes | no }
```

/LINKSVC "*title*" (The quotes must be included.)
Enter the name of the service title. The quotes must be included. While any title name can be used, it is recommended that one of the following titles be used:
/LSTYPE:"Demo SDLC Link Service"
This parameter is used to list the available options for the Demo SDLC link service. You must type in the exact string as shown above for it to work correctly. The quotes must be included.
/SERVER:*servername*
This is the name of the computer on which the link service is to be installed.
/SCRIPTFILE:"*script file*"
This is the name of the demonstration script. Host Integration Server 2004 provides the following scripts:

- `"Continuous Demo.dem"` - this is the 3270 continuous demo script..
- `"File Transfer Demo.dem"` - this is the file transfer demo script.
- `"3270 Logon Demo.dem"` - this is the 3270 logon demo script.
- `"AS400 Demo.dem"` - this is the 5250 demo script.
- `"LU1 Printing Demo.dem` "- this is the demo script showing LU1 printing.
- `"LU3 Printing Demo.dem"` - this is the demo script showing LU3 printing. (The quotes must be included.)

See Also

Linkcfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Distributed Link Service

Linkcfg options for distributed link service.

> **Note** Configuration settings specified with linkcfg correspond to local link configuration settings in the SNA Manager.

Syntax

```
LINKCFG LINKSVC "title"
     /SERVER:servername
     /LSTYPE:"Distributed Link Service"
     /REMOTELINKTYPE:{ Channel | Ethernet802.2 | LeasedSDLC |
                       SwitchedSDLC | TokenRing802.2 | Twinax | X.25QLLC }
     /REMOTELIST:\\server\service[;\\server\service;...]
     /ALTLIST:\\server\service[;\\server\service;...]
     /DOMAIN:domain
     /USERID:userid
     /PASSWORD:password
```

/LINKSVC "*title*"
Enter the name of the distributed link service. The quotes must be included. Any title name can be used.

/SERVER:*servername*
This is the name of the computer on which the link service is to be installed.

/LSTYPE:"Distributed Link Service"
This parameter is used to list the available options for the distributed link service. You must type in the exact string as shown above for it to work correctly. The quotes must be included.

/REMOTELINKTYPE:{ Channel | Ethernet 802.2 | LeasedSDLC | SwitchedSDLC | TokenRing802.2 | Twinax | X.25 }
This parameter defines the remote link type for the distributed link service.

/REMOTELIST:\\*server**service*[;\\*server**service*;...]
This is the name of the remote link service, for example \\SNASERV1\SNADLC1;\\SNASERV2\SNADLC1.

/ALTLIST: \\server\service[;\\server\service;...]
These are the names of alternate (backup) link services using the preceding format and example.

/DOMAIN:*domain*
Enter the name of the Host Integration Server 2004 subdomain. This is a required parameter if Host Integration Server 2004 is installed on a system account, not a local account.

/USERID:*userid*
Enter the name of the userid for the system account. This is a required parameter if Host Integration Server 2004 is installed on a system account, not a local account.

/PASSWORD:*password*
Enter the password of the system account. This is a required parameter if Host Integration Server 2004 is installed on a system account, not a local account.

See Also

Linkcfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DLC 802.2 Link Service

Linkcfg options for the DLC 802.2 link service.

> **Note** Configuration settings specified with linkcfg correspond to local link configuration settings in the SNA Manager.

Recommended Syntax

```
LINKCFG LINKSVC "title" (The quotes must be included.)
     /SERVER:servername
     /LSTYPE:"DLC 802.2 Link Service"
     /ADAPTERTYPE:adaptertype
     /SAP:hexvalue
     /DISTRIBUTABLE:{ yes | no }
```

/LINKSVC "*title*"
Enter the name of the service title. The quotes must be included. Any title name can be used.

/SERVER:*servername*
This is the name of the computer on which the link service is to be installed.

/LSTYPE:"DLC 802.2 Link Service"
This parameter is used to list the available options for the DLC 802.2 link service. You must type in the exact string as shown above for it to work correctly. The quotes must be included.

/ADAPTERTYPE:*adaptertype*
This parameter specifies the adapter type (using the adapter name) for the link service. Type the name of the adapter. This is an optional parameter and does not need to be defined if there is only one adapter installed. If there are multiple adapters in the computer and this parameter is not specified, it will use the first adapter it finds in the Registry, and only if the adapter has been bound with the DLC protocol.

The adapter name can be located in the registry using the following path:

```
HKEY_LOCAL_MACHINE
   SOFTWARE
      Microsoft
         Windows NT
            CurrentVersion
                NetworkCards
                   number
                      NetRules
```

The value is:

Bindform:REG_SZ: "*short name of adapter*" *yes yes container*

/SAP:hexvalue
Enter the SAP address using a hexadecimal value. For example, an acceptable value is 0x4, or 0xC.

/DISTRIBUTABLE:{ yes | no }
This parameter is used to specify whether the link service will be distributed. The Distributed Link Service feature provides a method for a Host Integration Server 2004 computer to connect with a host using a link service installed on a different Host Integration Server 2004 computer.

See Also

Linkcfg Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

VSAM File Transfer

The VSAM File Transfer tool is a command-line utility that supports file transfer to and from mainframe VSAM data sets and PDS/PDSE members using the stream input/output protocol of the IBM Distributed Data Management (DDM) architecture, level 2 and higher.

This utility is implemented as a source DDM requester and interoperates with a specific target DDM server implementation on MVS/ESA and OS/390 called IBM Distributed FileManager. The DDM server is available as a component of IBM Data Facility Storage Management Subsystem (DFSMS), Version 1 Release 2 or higher.

The VSAM File Transfer utility is executed from a command prompt by typing "ddmftp." To open a host session for purposes of file transfer, type "open." You receive the following interactive prompts:

```
DDMFTP> open

host [remote LU] REMOTELU

user USERID

password PASSWORD

dataset [USERID] USERID.DATASET

local LU [LOCAL] LOCALLU

mode [QPCSUPP] MODE
```

You can also batch the commands by typing the following:

DDMFTP> open remotelu=REMOTELU user=USERID password=PASSWORD dataset=USERID.DATASET locallu=LOCALLU mode=MODE

The required elements are remotelu, user, and password. The remaining three elements are defaulted to dataset=USERID, and locallu=LOCAL, and mode=QPCSUPP.

To obtain help, type "help" or "?" at a VSAM File Transfer command prompt.

/!
Execute NT command

/?
Help

/help
Help

/quit
Quit DDMFTP

/bye
Quit DDMFTP

/get
Download file from host

/open
Open host session

/put
Upload file to host

/del
Delete host file

/delete
Delete host file

/close
Close host session

/disconnect
Close host session

/dir
List host files

/ls
List host files
/lcd
Show current local directory
/pwd
Show current host directory
/user
Specify username [and password]
/send
Upload file to host
/recv
Download file from host
/type
Transfer type
/append
Append local file to host file
/hash
Enable/disable hash mark printing
/connect
Open host session
/bell
Beep when command completed
/exit
Quit DDMFTP
/rlen
Set record length
/cd
Change current host directory

Note The APPEND command is not supported in this release.

The VSAM file transfer utility currently does not support PC directory paths containing spaces.

The utility also does not support the '.' and '..' commands in the change directory (CD) command.

To use the VSAM file transfer utility, your mainframe must be running the DFM component of the IBM DFSMS/MVS version 1.2 or later (bundled with the OS/390 release).

See Also

The Command-Line Interface

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Snasvc Reference

This section describes how to use Snasvc to add or remove SNA services.

This section contains:

- Use Snasvc to Add or Remove an SNA Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Use Snasvc to Add or Remove an SNA Service

Each Host Integration Server 2004 computer supports up to four SNA Services each of which can support connections, logical units (LUs), and other resources, independent of the other SNA Services. Snasvc is a command-line utility that allows you to add or remove an SNA Service from a given Host Integration Server 2004 computer.

> **Note** Snasvc must be run from a computer on which Host Integration Server 2004 is installed and from the computer you intend to add or remove SNA Services.

Syntax

```
snasvc [options]
```

Options for Snasvc

/?
  Displays a list of available command-line options for Snasvc.
/d
  Enables the delete flag for Snasvc. If the **/d** flag is not specified, Snasvc assumes the specified SNA Service will be added.
2
  Specifies service 2.
3
  Specifies service 3.
4
  Specifies service 4.

Examples

```
snasvc 2
```

Adds service 2 to the current configuration.

```
snasvc 3 /d
```

Removes service 3 from the current configuration.

```
snasvc 2 3 4
```

Adds services 2, 3, and 4 to the current configuration.

```
snasvc 3 4 /d
```

Removes services 3 and 4 from the current configuration.

See Also

Snasvc Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Sample Host Definitions

This section presents some sample host definitions used for establishing a Microsoft® Host Integration Server 2004 computer connection to IBM S/370 (host) systems. The samples show configuration values for Host Integration Server 2004 computer connections of the following types:

Connection type	Connection use	Host system
Token Ring	3270 emulation	Virtual Telecommunications Access Method (VTAM)
SDLC switched	3270 emulation	VTAM
SDLC leased	3270 emulation	VTAM
X.25	3270 emulation	VTAM
Any type	LU 6.2	Customer Information Control System (CICS)

Note The VTAM listings in this topic omit the column 72-continuation character.

- This section contains:
- Token Ring Definition
- SDLC Definition (for Switched and Leased Lines)
- X.25 Definition

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Token Ring Definition

The following table shows a VTAM definition for a connection between a Host Integration Server 2004 computer and an IBM 9370 host computer across a Token Ring local area network (LAN).

VTAM Token Ring definitions

Name	Description	Parameters
LANODE	VBUILD	TYPE=LAN
R01100	PORT	CUADDR=100,MACADDR=400001701100, LANCON=(5,2),MAXDATA=2012, MAXSTN=32,SAPADDR=04
G01100	GROUP	DIAL=YES,ISTATUS=ACTIVE,LNCTL=SDLC
L01100A	LINE	CALL=INOUT
P01100A	PU	MAXLU=254
L01100B	LINE	CALL=INOUT
P01100B	PU	MAXLU=254
SWLAN	VBUILD	TYPE= SWNET,MAXGRP=5,MAXNO=12
SERVER01	PU	ADDR=C1,IDBLK=05D,IDNUM=00001, ANS=CONTINUE,MAXDATA=265, MAXOUT=7,MAXPATH=7,PACING=0, VPACING=0,SSCPFM=USSSCS, LANACK=(0,0),LANCON=(5,2), LANINACT=4.8,LANRESP=(5,2), LANSDWDW=(7,1),LANSW=YES, MACADDR=4000000000FD,PUTYPE=2, DISCNT=(NO),ISTATUS=ACTIVE, SAPADDR=04
E01100A	PATH	DIALNO=0004400001701100, GRPNM=G01100,GID=1,PID=1,USE=YES
T0110000	LU	LOCADDR=002,DLOGMOD=D4C32782
T0110001	LU	LOCADDR=003,DLOGMOD=D4C32782
T0110002	LU	LOCADDR=004,DLOGMOD=D4C32782
T0110003	LU	LOCADDR=005,DLOGMOD=D4C32782
T0110004	LU	LOCADDR=006,DLOGMOD=LU33286S

The following table defines key parameters for Token Ring.

VTAM parameter descriptions for Token Ring

VTAM parameter	Corresponding Host Integration Server 2004 parameter	Description
IDBLK=	First three digits of local node ID (basic connection setting)	A three-digit hexadecimal value that, together with IDNUM, identifies the Host Integration Server 2004 computer. The values 000 and FFF cannot be used; these values are reserved.
IDNUM=	Last five digits of local node ID (basic connection setting)	A five-digit hexadecimal value that, together with IDBLK, identifies the Host Integration Server 2004 computer.
MAXDATA= (in the PU definition for SERVER01)	Max basic transmission unit (BTU) Length (advanced 802.2 setting)	The maximum length of a BTU sent or received; BTUs are also known as I-frames. Max BTU Length should be less than or equal to MAXDATA.

MACADDR= (in the PORT definition)	Remote Network Address (basic 802.2 setting)	The media access control address, a 12-digit hexadecimal address.
SAPADDR= (in the PU definition)	Remote service access point (SAP) Address (advanced 802.2 setting)	The system access point address, a two-digit hexadecimal number, a multiple of 4, between 04 and EC.
LOCADDR= (in the LU definition)	Local unit (LU) Number	The LU local address at the physical unit (PU). For independent LUs that communicate with a host, the LOCADDR parameter must be set to 0. For dependent LUs with VTAM, the LOCADDR must be at least 2. Also, for dependent LUs, the LU Numbers set in the Host Integration Server 2004 computer must match the LOCADDR values on the host.

The GRPNM value shown in the sample above is a group name; group names must match the label of a VTAM group definition. The DLOGMOD values shown in the sample are the logon mode table entries from the mode table. For descriptions of the group macros used in these samples and a complete listing of default mode table entries, see the documentation for your IBM product.

See Also

Sample Host Definitions

SDLC Definition (for Switched and Leased Lines)

The following table shows a sample IBM 9370 VTAM definition for four Synchronous Data Link Control (SDLC) lines. The LLGROUP label shows the VTAM definitions for lines B80 and BB0 of a leased group. The SNAGROUP label shows the VTAM definitions for lines B90 and BA0 of a switched group.

VTAM definition for four SDLC lines

Label	Operation	Operands
IBMLINE	VBUILD	TYPE=CA
LLGROUP	GROUP	LNCTL=SDLC,DIAL=NO,ACTIVTO=10
L01B80	LINE	ADDRESS=B80,PAUSE=0.4,REPLYTO=2.0, RETRIES=7
P01B80A	PU	ADDR=C1,DISCNT=NO,PASSLIM=7, PUTYPE=2,MAXOUT=7,USSTAB=AUSSTAB
T01B8002	LU	LOCADDR=002,DLOGMOD=D4C32792
T01B8003	LU	LOCADDR=003,DLOGMOD=D4C32792
T01B8004	LU	LOCADDR=004,DLOGMOD=D4C32792
L01BB0	LINE	ADDRESS=BB0,PAUSE=0.4,REPLYTO=2.0, RETRIES=7
P01BB0A	PU	ADDR=C1,DISCNT=NO,PASSLIM=7, PUTYPE=2,MAXOUT=7,USSTAB=AUSSTAB
T01BB000	LU	LOCADDR=002,DLOGMOD=D4C32792
T01BB001	LU	LOCADDR=003,DLOGMOD=D4C32792
T01BB002	LU	LOCADDR=004,DLOGMOD=D4C32792
T01BB003	LU	LOCADDR=005,DLOGMOD=D3C32792
T01BB004	LU	LOCADDR=006,DLOGMOD=LU33286S
SNAGROUP	GROUP	LNCTL=SDLC,DIAL=YES,MAXLU=20
L01B90	LINE	ADDRESS=B90,PAUSE=0.4,REPLYTO=2.0, RETRIES=7
P01B90A	PU	
L01BA0	LINE	ADDRESS=BA0,PAUSE=0.4,REPLYTO=2.0, RETRIES=7
P01BA0A	PU	

The following table shows the sample IBM 9370 VTAM switched definition for the SNAGROUP label.

VTAM switched definition for SNAGROUP

Label	Operation	Operands
SWNODE	VBUILD	TYPE=SWNET,MAXGRP=0,MAXNO=0
SWPU1	PU	ADDR=C1,IDBLK=017,IDNUM=DC006, DISCNT=NO,PASSLIM=2,PUTYPE=2, MAXDATA=265,MAXOUT=2, USSTAB=MSUSSTAB
T01BA000	LU	LOCADDR=2,DLOGMOD=D4C32782
T01BA001	LU	LOCADDR=3,DLOGMOD=D4C32782
T01BA002	LU	LOCADDR=4,DLOGMOD=D4C32782
T01BA003	LU	LOCADDR=5,DLOGMOD=D4C32782
T01BA004	LU	LOCADDR=6,DLOGMOD=LU33286S

The following table describes key parameters for SDLC.

VTAM Parameter Descriptions for SDLC

VTAM parameter	Corresponding Host Integration Server 2004 parameter	Description

ADDR=	Poll Address (advanced SDLC setting)	A two-digit hexadecimal value that identifies the control unit that the host uses to poll.
IDBLK=	First three digits of Local Node ID (basic connection setting)	A three-digit hexadecimal value that, together with IDNUM, identifies the Host Integration Server 2004 computer. The values 000 and FFF cannot be used; these values are reserved.
IDNUM=	Last five digits of Local Node ID (basic connection setting)	A five-digit hexadecimal value that, together with IDBLK, identifies the Host Integration Server 2004 computer.
MAXDATA= (in the PU definition for SWPU1)	Max basic transmission unit (BTU) Length (advanced SDLC setting)	The maximum length of a BTU sent or received; BTUs are also known as I-frames.
LOCADDR=	LU Number	The LU local address at the PU. For independent LUs that communicate with a host, the LOCADDR parameter must be set to zero. For dependent LUs with VTAM, the LOCADDR must be at least 2. Also, for dependent LUs, the LU Numbers set in Host Integration Server 2004 computer must match the LOCADDR values on the host.

The DLOGMOD values shown in the example are the logon mode table entries from the mode table. For a complete listing of default mode table entries, see the documentation for your IBM product.

See Also

Sample Host Definitions

X.25 Definition

The following table shows a sample IBM 9370 VTAM definition for X.25 circuits. The X25GROUP label shows the VTAM definitions for switched virtual circuits 001 through 006.

VTAM definition for X.25 connection

Label	Operation	Operands
X25NODE	VBUILD	TYPE=PACKET
PORTA00	PORT	CUADDR=(A00,A08),NETTYPE=1, CHARGACC=YES,CHARGE=NO, VCALLS=(,,001,006,,),DIALNO=31370023061 MAXOUT=7,NETLEVEL=80,PMOD=8, PLENGTH=256,PWINDOW=3,REPLYT0=3, RETRIES=7
VCPA00	VCPARMS	LC=(1,6),PWINDOW=3,PLENGTH=256
X25GROUP	GROUP	DIAL=YES,LNCTL=SDLC,CALL=INOUT, ISTATUS=ACTIVE
L01A00A	LINE	ADDRESS=001,AUTO=001, ISTATUS=ACTIVE
P01AOOA	PU	MAXLU=32
L01A00B	LINE	ADDRESS=002,ISTATUS=INACTIVE, AUTO=002
P01AOOB	PU	MAXLU=32
L01A00C	LINE	ADDRESS=003,ISTATUS=INACTIVE, AUTO=003
P01AOOC	PU	MAXLU=32
L01A00D	LINE	ADDRESS=004,ISTATUS=INACTIVE, AUTO=004
P01AOOD	PU	MAXLU=32
L01A00E	LINE	ADDRESS=005,ISTATUS=INACTIVE, AUTO=005
P01AOOE	PU	MAXLU=32
L01A00F	LINE	ADDRESS=006,ISTATUS=INACTIVE, AUTO=006
P01AOOF	PU	MAXLU=32

The following table shows the sample IBM 9370 VTAM switched definition for the X25GROUP label.

VTAM switched definition for X25GROUP

Label	Operation	Operands
X25	VBUILD	TYPE=SWNET,MAXGRP=5,MAXNO=12
USER01	PU	ADDR=C1,IDBLK=05D,IDNUM=00025, ANS=CONTINUE,MAXDATA=265, MAXOUT=7,MAXPATH=0,PACING=0, VPACING=0,SSCPFM=USSSCS, IRETRY=YES,USSTAB=MSUSSTAB, PUTYPE=2,DISCNT=YES,ISTATUS=ACTIVE
T01A0002	LU	LOCADDR=002,DLOGMOD=D4C32792
T01A0003	LU	LOCADDR=003,DLOGMOD=D4C32792
T01A0004	LU	LOCADDR=004,DLOGMOD=D4C32792
T01A0005	LU	LOCADDR=005,DLOGMOD=D4C32792
T01A0006	LU	LOCADDR=006,DLOGMOD=LU33286S

The following table defines key parameters for X.25.

VTAM Parameter Descriptions for X.25

VTAM parameter	Corresponding Host Integration Server 2004 parameter	Description
IDBLK=	First three digits of Local Node ID (basic connection setting)	A three-digit hexadecimal value that, together with IDNUM, identifies the Host Integration Server 2004 computer. The values 000 and FFF cannot be used; these values are reserved.
IDNUM=	Last five digits of Local Node ID (basic connection setting)	A five-digit hexadecimal value that, together with IDBLK, identifies the Host Integration Server 2004 computer.
DIALNO= (in the PORT definition)	Remote X.25 Address	An address that identifies an X.25 system. The address consists of from 1 through 15 hexadecimal digits. If a 15-digit address is used, the final 3 digits are used for routing between stations with the same 12-digit address.
MAXDATA= (in the PU definition for USER01)	Max BTU Length (advanced X.25 setting)	The maximum length of a BTU sent or received.
LOCADDR=	LU Number	The LU local address at the PU. For independent LUs that communicate with a host, the LOCADDR parameter must be set to 0. For dependent LUs with VTAM, the LOCADDR must be at least 2. Also, for dependent LUs, the LU numbers set in the Host Integration Server 2004 computer must match the LOCADDR values on the host. In Table A.4, the LU numbers range from 002 to 006.

See Also

Sample Host Definitions

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CICS and VTAM Sample Definitions for LU 6.2

This topic presents sample definitions for CICS (version 1.6) and VTAM (version 3.2) for Host Integration Server 2004 computer connections to an IBM host system for LU 6.2 operation.

To configure a CICS host system for LU 6.2 operation with a Host Integration Server 2004 system, you configure the following information at the host:

- The remote systems with which CICS is able to communicate.
- The name used by VTAM to communicate with each remote system.
- The transaction programs (TPs) available on the CICS system.
- The programming language (PL/I, COBOL, or Assembler) in which each program is written.

This information is configured in CICS and VTAM tables. This topic provides sample definitions that show how to configure CICS for LU 6.2 using these CICS and VTAM tables.

This section contains:

- CICS Tables
- VTAM Definitions

CICS Tables

CICS uses the following tables to define LU 6.2 information:

- Terminal Control Table (TCT)—defines the remote systems to CICS.
- Program Control Table (PCT)—defines the local TPs to CICS.
- Program Processing Table (PPT)—defines the load module characteristics to CICS.

The following sections describe these tables, and include sample definitions to illustrate how they are used.

> **Note** These samples assume there are four TPs residing on CICS written in PL/I with the following names: TRAN0, TRAN1, TRAN2, and TRAN3.

This section contains:

- Terminal Control Table
- Program Control Table
- Program Processing Table

Terminal Control Table

The sample Terminal Control Table (TCT) defines the remote systems to CICS. Each remote system is specified using a DFHTCT definition, which includes both the name by which CICS knows the system (the SYSIDNT field), and the name by which VTAM knows the system (the NETNAME field).

Sample CICS terminal control table entries

Label	Definition	Operands
TP11	DFHTCT	TYPE=SYSTEM ACCMETH=VTAM, FEATURE=SINGLE,TRMTYPE=LUTYPE62, NETNAME=TPLU6207,SYSIDNT=DC11, MODENAM=LU62,CONNECT=AUTO, BUFFER=256,RUSIZE=256, TRMSTAT=(TRANSCEIVE)
TP12	DFHTCT	TYPE=SYSTEM ACCMETH=VTAM, FEATURE=SINGLE,TRMTYPE=LUTYPE62, NETNAME=TPLU6208,SYSIDNT=DC12, MODENAM=LU62,CONNECT=AUTO, BUFFER=256,RUSIZE=256, TRMSTAT=(TRANSCEIVE)
TP13	DFHTCT	TYPE=SYSTEM ACCMETH=VTAM, FEATURE=SINGLE,TRMTYPE=LUTYPE62, NETNAME=TPLU6209,SYSIDNT=DC13, MODENAM=LU62,CONNECT=AUTO, BUFFER=256,RUSIZE=256, TRMSTAT=(TRANSCEIVE)
TP14	DFHTCT	TYPE=SYSTEM ACCMETH=VTAM, FEATURE=SINGLE,TRMTYPE=LUTYPE62, NETNAME=TPLU620A,SYSIDNT=DC14, MODENAM=LU62,CONNECT=AUTO, BUFFER=256,RUSIZE=256, TRMSTAT=(TRANSCEIVE)

See Also

CICS Tables

Program Control Table

The Program Control Table (PCT) defines the local transaction programs (TPs) to CICS. Each TP is specified using a DFHPCT definition that includes the name by which the TP is invoked (the TRANSID field) and the corresponding load module name from the CICS library of TPs.

Sample CICS program control table entries

TP Label	Definition	Operands
TRAN0	DFHPCT	TYPE=ENTRY PROGRAM=TRAN0000, TWASIZE=1000,SPURGE=NO,TPURGE=NO, RSL=00,RSLC=NO,MODENAM=NORMAL, TRANSID=TRAN0
TRAN1	DFHPCT	TYPE=ENTRY PROGRAM=TRAN0001, TWASIZE=1000,SPURGE=NO,TPURGE=NO, RSL=00,RSLC=NO,MODENAM=NORMAL, TRANSID=TRAN1
TRAN2	DFHPCT	TYPE=ENTRY PROGRAM=TRAN0002, TWASIZE=1000,SPURGE=NO,TPURGE=NO, RSL=00,RSLC=NO,MODENAM=NORMAL, TRANSID=TRAN2
TRAN3	DFHPCT	TYPE=ENTRY PROGRAM=TRAN0003, TWASIZE=1000,SPURGE=NO,TPURGE=NO, RSL=00,RSLC=NO,MODENAM=NORMAL, TRANSID=TRAN3

* ****** * PROFILE TO BE USED IN LU6.2 ALLOCATE * ****** *

TP Label	Definition	Operands
	DFHPCT	TYPE=PROFILE, PROFILE=DFHCICSA, INBFMH=ALL,MODENAME=LU62

See Also

CICS Tables

Program Processing Table

The Program Processing Table (PPT) defines the load module characteristics to CICS.

Each load module is defined using the DFHPPT definition, which includes the name of the load module (the PROGRAM field), and the language in which the module has been written. Examples are PL/I, Assembler, or COBOL (the PGMLANG field).

Sample CICS program processing table entries

Definition	Program name	Language
DFHPPT TYPE=ENTRY	PROGRAM=TRAN0000	PGMLANG=PL/I
DFHPPT TYPE=ENTRY	PROGRAM=TRAN0001	PGMLANG=PL/I
DFHPPT TYPE=ENTRY	PROGRAM=TRAN0002	PGMLANG=PL/I
DFHPPT TYPE=ENTRY	PROGRAM=TRAN0003	PGMLANG=PL/I

See Also

CICS Tables

VTAM Definitions

Each remote system must be defined to VTAM in its table of Network Addressable Units, (NAUs), using logical unit (LU) definitions.

If a LOGAPPL parameter is specified on the LU definition naming the CICS system, CICS will attempt to establish a session to that LU whenever it becomes active. This is necessary if TPs residing in CICS do not use the **ALLOCATE** verb with RETURN_CONTROL=WHEN_SESSION_ALLOCATED to establish sessions. There must also be a VTAM mode table definition present for LU 6.2, although CICS does not use the values specified here.

Sample VTAM network control program (NCP) definition for LU 6.2

Label	Operation	Operands
TPPU62	PU	ADDR=C1,IBLK=03E,IDNUM=01A1A, IRETRY=YES,DISCNT=NO,ISTATUS=ACTIVE, MAXDATA=265,SSCPFM=USSSCS, MODETAB=MRNDS,USSTAB=USSNDN1, MAXOUT=7,PASSLIM=7,PUTYPE=2
TPLU6207	LU	LOCADDR=7,DLOGMOD=LU62, USSTAB=USSNOMSG
TPLU6208	LU	LOCADDR=8,DLOGMOD=LU62, USSTAB=USSNOMSG
TPLU6209	LU	LOCADDR=9,DLOGMOD=LU62, USSTAB=USSNOMSG
TPLU620A	LU	LOCADDR=A,DLOGMOD=LU62, USSTAB=USSNOMSG

The following table shows NCP mode table entries for LU 6.2.

Sample NCP mode table entries for LU 6.2

Label	Operation	Operands
	MODETAB	
LU62	MODEENT	LOGMODE=NORMAL
	. . .	
	MODEEND	

> **Note** It is recommended that the mode used by LU 6.2 be listed first, as shown by the LU62 example in the preceding table.

See Also

TP Coding Requirements

TP Coding Requirements

To work with CICS, TPs must be coded to specify a SYSID parameter on the **ALLOCATE** request that matches the defined SYSIDNT parameter configured in the DFHTCT tables. This request must be in the following format:

```
EXEC CICS ALLOCATE SYSID('DC11')
```

The SYSID field must match the SYSIDNT field specified for a CICS program by the DFHTCT definition in the TCT (Terminal Control Table). The TCT then uses the NETNAME parameter to refer to a specific LU in the VTAM table of the NAUs (Network Addressable Units). This parameter is used by the TP to communicate with the remote system.

See Also

VTAM Definitions

Sense Codes

This section lists the sense codes used by Microsoft® Host Integration Server 2004

Host Integration Server 2004 sense codes are sent on either a negative response to an outbound data stream or an LUSTAT that notifies the host of a change in the secondary logical unit (LU) state. The sense codes generated by a 3270 emulator program are shown in the following tables.

Negative response sense codes

Value	Meaning
0802	Intervention required (LU 1/LU 3 printer soft error).
0814	Bracket bid reject – RTR forthcoming.
081B	Receiver in transmit mode.
081C	Request not executable (hard error).
0821	Invalid session parameters (negotiable BIND request).
0829	Change direction required.
082B	Presentation space integrity lost.
082D	LU busy (usually local copy print in progress).
082E	Intervention required (local copy print soft error).
082F	Request not executable (local copy print hard error).
0843	WCC print command bit not sent (RQD or RQE, CD, EB).
0863	Referenced character set does not exist.
0871	Read partition state error (SLU in retry state).
1003	Function not supported.
1005	Parameter modifying a control function is invalid.
1007	Category not supported (SSCP data for host printer).

LUSTAT sense codes

Value	Meaning
0001 B000	Host initialized local copy soft error recovery.
081C 0000	Soft error changed to hard error (LU 1/LU 3).
081C B000	Soft error changed to hard error (local copy).
082B 0000	LU session changed from SSCP to PLU (SYSREQ).

See Also

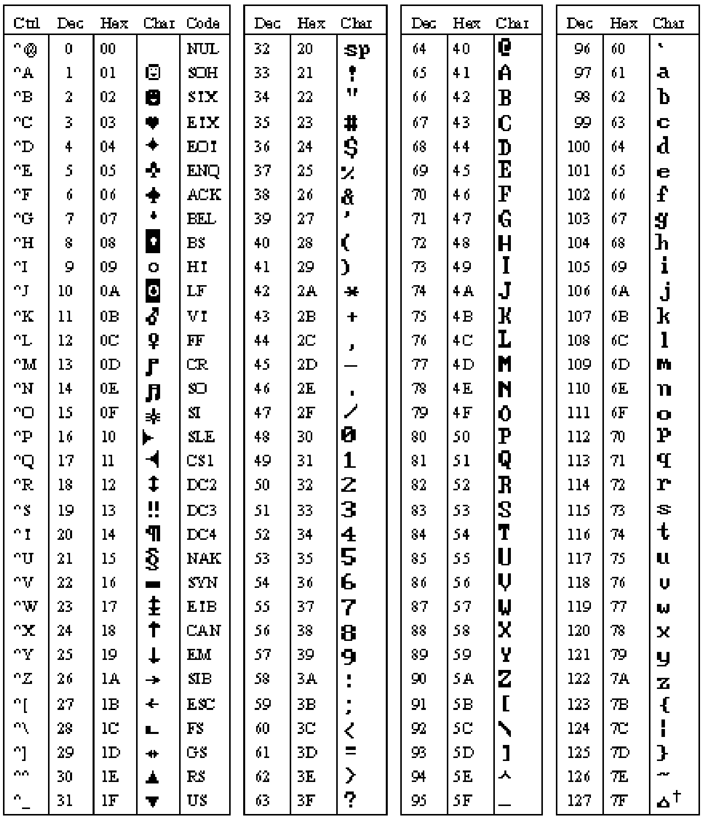
Administrator's Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Character Tables

This section provides tables that show the ASCII, ANSI, and IBM extended character sets.

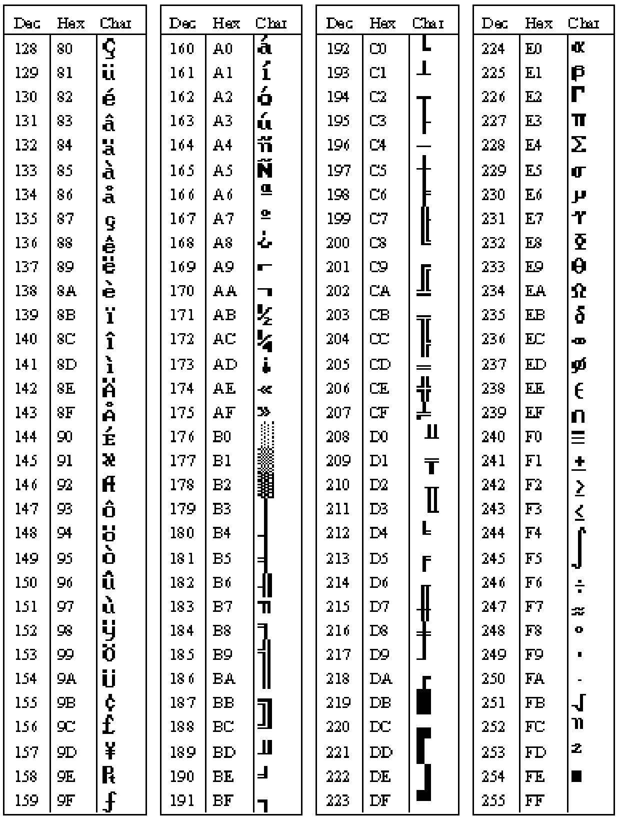
ASCII Character Set



Ctrl	Dec	Hex	Char	Code	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
^@	0	00		NUL	32	20	sp	64	40	@	96	60	`
^A	1	01	☺	SOH	33	21	!	65	41	A	97	61	a
^B	2	02	☻	STX	34	22	"	66	42	B	98	62	b
^C	3	03	♥	ETX	35	23	#	67	43	C	99	63	c
^D	4	04	♦	EOT	36	24	$	68	44	D	100	64	d
^E	5	05	♣	ENQ	37	25	%	69	45	E	101	65	e
^F	6	06	♠	ACK	38	26	&	70	46	F	102	66	f
^G	7	07	•	BEL	39	27	'	71	47	G	103	67	g
^H	8	08	◘	BS	40	28	(	72	48	H	104	68	h
^I	9	09	○	HT	41	29	)	73	49	I	105	69	i
^J	10	0A	◙	LF	42	2A	*	74	4A	J	106	6A	j
^K	11	0B	♂	VT	43	2B	+	75	4B	K	107	6B	k
^L	12	0C	♀	FF	44	2C	,	76	4C	L	108	6C	l
^M	13	0D	♪	CR	45	2D	–	77	4D	M	109	6D	m
^N	14	0E	♫	SO	46	2E	.	78	4E	N	110	6E	n
^O	15	0F	☼	SI	47	2F	/	79	4F	O	111	6F	o
^P	16	10	►	SLE	48	30	0	80	50	P	112	70	p
^Q	17	11	◄	CS1	49	31	1	81	51	Q	113	71	q
^R	18	12	↕	DC2	50	32	2	82	52	R	114	72	r
^S	19	13	‼	DC3	51	33	3	83	53	S	115	73	s
^T	20	14	¶	DC4	52	34	4	84	54	T	116	74	t
^U	21	15	§	NAK	53	35	5	85	55	U	117	75	u
^V	22	16	▬	SYN	54	36	6	86	56	V	118	76	v
^W	23	17	↨	ETB	55	37	7	87	57	W	119	77	w
^X	24	18	↑	CAN	56	38	8	88	58	X	120	78	x
^Y	25	19	↓	EM	57	39	9	89	59	Y	121	79	y
^Z	26	1A	→	SUB	58	3A	:	90	5A	Z	122	7A	z
^[	27	1B	←	ESC	59	3B	;	91	5B	[	123	7B	{
^\	28	1C	∟	FS	60	3C	<	92	5C	\	124	7C	¦
^]	29	1D	↔	GS	61	3D	=	93	5D	]	125	7D	}
^^	30	1E	▲	RS	62	3E	>	94	5E	^	126	7E	~
^_	31	1F	▼	US	63	3F	?	95	5F	_	127	7F	⌂†

† ASCII code 127 has the code DEL. Under MS-DOS, this code has the same effect as ASCII 8 (BS). The DEL code can be generated by the CTRL + BKSP key.

ASCII Character Set (*continued*)



Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	Ç	160	A0	á	192	C0	└	224	E0	α
129	81	ü	161	A1	í	193	C1	┴	225	E1	ß
130	82	é	162	A2	ó	194	C2	┬	226	E2	Γ
131	83	â	163	A3	ú	195	C3	├	227	E3	π
132	84	ä	164	A4	ñ	196	C4	─	228	E4	Σ
133	85	à	165	A5	Ñ	197	C5	┼	229	E5	σ
134	86	å	166	A6	ª	198	C6	╞	230	E6	µ
135	87	ç	167	A7	º	199	C7	╟	231	E7	τ
136	88	ê	168	A8	¿	200	C8	╚	232	E8	Φ
137	89	ë	169	A9	⌐	201	C9	╔	233	E9	Θ
138	8A	è	170	AA	¬	202	CA	╩	234	EA	Ω
139	8B	ï	171	AB	½	203	CB	╦	235	EB	δ
140	8C	î	172	AC	¼	204	CC	╠	236	EC	∞
141	8D	ì	173	AD	¡	205	CD	═	237	ED	φ
142	8E	Ä	174	AE	«	206	CE	╬	238	EE	ε
143	8F	Å	175	AF	»	207	CF	╧	239	EF	∩
144	90	É	176	B0	░	208	D0	╨	240	F0	≡
145	91	æ	177	B1	▒	209	D1	╤	241	F1	±
146	92	Æ	178	B2	▓	210	D2	╥	242	F2	≥
147	93	ô	179	B3	│	211	D3	╙	243	F3	≤
148	94	ö	180	B4	┤	212	D4	╘	244	F4	⌠
149	95	ò	181	B5	╡	213	D5	╒	245	F5	⌡
150	96	û	182	B6	╢	214	D6	╓	246	F6	÷
151	97	ù	183	B7	╖	215	D7	╫	247	F7	≈
152	98	ÿ	184	B8	╕	216	D8	╪	248	F8	°
153	99	Ö	185	B9	╣	217	D9	┘	249	F9	∙
154	9A	Ü	186	BA	║	218	DA	┌	250	FA	·
155	9B	¢	187	BB	╗	219	DB	█	251	FB	√
156	9C	£	188	BC	╝	220	DC	▄	252	FC	ⁿ
157	9D	¥	189	BD	╜	221	DD	▌	253	FD	²
158	9E	₧	190	BE	╛	222	DE	▐	254	FE	■
159	9F	ƒ	191	BF	┐	223	DF	▀	255	FF	

ANSI Character Set

0	▮	32		64	@	96	`	128	▮	160		192	À	224	à
1	▮	33	!	65	A	97	a	129	▮	161	¡	193	Á	225	á
2	▮	34	"	66	B	98	b	TT 130	‚	162	¢	194	Â	226	â
3	▮	35	#	67	C	99	c	TT 131	ƒ	163	£	195	Ã	227	ã
4	▮	36	$	68	D	100	d	TT 132	„	164	¤	196	Ä	228	ä
5	▮	37	%	69	E	101	e	TT 133	…	165	¥	197	Å	229	å
6	▮	38	&	70	F	102	f	TT 134	†	166	¦	198	Æ	230	æ
7	▮	39	'	71	G	103	g	TT 135	‡	167	§	199	Ç	231	ç
8	▮	40	(	72	H	104	h	TT 136	ˆ	168	¨	200	È	232	è
9	▮	41	)	73	I	105	i	TT 137	‰	169	©	201	É	233	é
10	▮	42	*	74	J	106	j	TT 138	Š	170	ª	202	Ê	234	ê
11	▮	43	+	75	K	107	k	TT 139	‹	171	«	203	Ë	235	ë
12	▮	44	,	76	L	108	l	TT 140	Œ	172	¬	204	Ì	236	ì
13	▮	45	-	77	M	109	m	141	▮	173	-	205	Í	237	í
14	▮	46	.	78	N	110	n	142	▮	174	®	206	Î	238	î
15	▮	47	/	79	O	111	o	143	▮	175	¯	207	Ï	239	ï
16	▮	48	0	80	P	112	p	144	▮	176	°	208	Ð	240	ð
17	▮	49	1	81	Q	113	q	145	‘	177	±	209	Ñ	241	ñ
18	▮	50	2	82	R	114	r	146	’	178	²	210	Ò	242	ò
19	▮	51	3	83	S	115	s	TT 147	“	179	³	211	Ó	243	ó
20	▮	52	4	84	T	116	t	TT 148	”	180	´	212	Ô	244	ô
21	▮	53	5	85	U	117	u	TT 149	•	181	µ	213	Õ	245	õ
22	▮	54	6	86	V	118	v	TT 150	–	182	¶	214	Ö	246	ö
23	▮	55	7	87	W	119	w	TT 151	—	183	·	215	×	247	÷
24	▮	56	8	88	X	120	x	TT 152	˜	184	¸	216	Ø	248	ø
25	▮	57	9	89	Y	121	y	TT 153	™	185	¹	217	Ù	249	ù
26	▮	58	:	90	Z	122	z	TT 154	š	186	º	218	Ú	250	ú
27	▮	59	;	91	[	123	{	TT 155	›	187	»	219	Û	251	û
28	▮	60	<	92	\	124	|	TT 156	œ	188	¼	220	Ü	252	ü
29	▮	61	=	93	]	125	}	157	▮	189	½	221	Ý	253	ý
30	▮	62	>	94	^	126	~	158	▮	190	¾	222	Þ	254	þ
31	▮	63	?	95	_	127	▮	TT 159	Ÿ	191	¿	223	ß	255	ÿ

▮ Indicates that this character isn't supported by Windows.

TT Indicates that this character is available only in TrueType fonts.

IBM Extended Character Set

0		32		64	@	96	`	128	Ç	160	á	192	└	224	Ó
1	☺	33	!	65	A	97	a	129	ü	161	í	193	┴	225	ß
2	☻	34	"	66	B	98	b	130	é	162	ó	194	┬	226	Ô
3	♥	35	#	67	C	99	c	131	â	163	ú	195	├	227	Ò
4	♦	36	$	68	D	100	d	132	ä	164	ñ	196	─	228	õ
5	♣	37	%	69	E	101	e	133	à	165	Ñ	197	┼	229	Õ
6	♠	38	&	70	F	102	f	134	å	166	ª	198	ã	230	µ
7	•	39	'	71	G	103	g	135	ç	167	º	199	Ã	231	þ
8	◘	40	(	72	H	104	h	136	ê	168	¿	200	╚	232	Þ
9	○	41	)	73	I	105	i	137	ë	169	®	201	╔	233	Ú
10	◙	42	*	74	J	106	j	138	è	170	¬	202	╩	234	Û
11	♂	43	+	75	K	107	k	139	ï	171	½	203	╦	235	Ù
12	♀	44	,	76	L	108	l	140	î	172	¼	204	╠	236	ý
13	♪	45	-	77	M	109	m	141	ì	173	¡	205	═	237	Ý
14	♫	46	.	78	N	110	n	142	Ä	174	«	206	╬	238	¯
15	☼	47	/	79	O	111	o	143	Å	175	»	207	¤	239	´
16	►	48	0	80	P	112	p	144	É	176	░	208	ð	240	-
17	◄	49	1	81	Q	113	q	145	æ	177	▒	209	Ð	241	±
18	↕	50	2	82	R	114	r	146	Æ	178	▓	210	Ê	242	=
19	‼	51	3	83	S	115	s	147	ô	179	│	211	Ë	243	¾
20	¶	52	4	84	T	116	t	148	ö	180	┤	212	È	244	¶
21	§	53	5	85	U	117	u	149	ò	181	Á	213	ı	245	§
22	▬	54	6	86	V	118	v	150	û	182	Â	214	Í	246	÷
23	↨	55	7	87	W	119	w	151	ù	183	À	215	Î	247	¸
24	↑	56	8	88	X	120	x	152	ÿ	184	©	216	Ï	248	°
25	↓	57	9	89	Y	121	y	153	Ö	185	╣	217	┘	249	¨
26	→	58	:	90	Z	122	z	154	Ü	186	║	218	┌	250	·
27	←	59	;	91	[	123	{	155	ø	187	╗	219	█	251	¹
28	∟	60	<	92	\	124	¦	156	£	188	╝	220	▄	252	³
29	↔	61	=	93	]	125	}	157	Ø	189	¢	221	¦	253	²
30	▲	62	>	94	^	126	~	158	×	190	¥	222	Ì	254	■
31	▼	63	?	95	_	127	⌂	159	ƒ	191	┐	223	▀	255	

Code Page 850 - multilingual (Latin)

See Also

Host Print Service Character Translation Table Format

Host Print Service Character Translation Table Format

The character translation table that can be used by the custom code page option of Host Print service is a 512-byte file, split into two 256-byte regions. Bytes 0–255 are the mapping bytes for data from the host; bytes 256–511 map data to the host.

For example, the following illustrates standard translation tables for the 037 EBCDIC code page:

```
   | 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
---------------------------------------------------
00| 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
10| 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
20| 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
30| 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
40| 20 a0 e2 e4 e0 e1 e3 e5 e7 f1 a2 2e 3c 28 2b 7c
50| 26 e9 ea eb e8 ed ee ef ec df 21 24 2a 29 3b ac
60| 2d 2f c2 c4 c0 c1 c3 c5 c7 d1 a6 2c 25 5f 3e 3f
70| f8 c9 ca cb c8 cd ce cf cc 60 3a 23 40 27 3d 22
80| d8 61 62 63 64 65 66 67 68 69 ab bb f0 fd de b1
90| b0 6a 6b 6c 6d 6e 6f 70 71 72 aa ba e6 b8 c6 a4
a0| b5 7e 73 74 75 76 77 78 79 7a a1 bf d0 dd fe ae
b0| 5e a3 a5 b7 a9 a7 b6 bc bd be 5b 5d af a8 b4 d7
c0| 7b 41 42 43 44 45 46 47 48 49 ad f4 f6 f2 f3 f5
d0| 7d 4a 4b 4c 4d 4e 4f 50 51 52 b9 fb fc f9 fa ff
e0| 5c f7 53 54 55 56 57 58 59 5a b2 d4 d6 d2 d3 d5
f0| 30 31 32 33 34 35 36 37 38 39 b3 db dc d9 da 00
```

Bytes 0-255: Data from Host

Each byte that is received represents a location, that is, a byte offset, in the appropriate table. For example, if the value 0xC1 (the EBCDIC value for the letter A) is received from the host, it is converted to the value in position 0xC1 in the first table; that is, to 0x41 (the ASCII value for the letter A). This is shown in bold in the preceding table.

Similarly, if the letter *Z* (ASCII value 0x5A) is to be transmitted to the host, it is first converted to the value located in position 0x5A in the second table, which is 0xE9 (the EBCDIC value for Z). This is shown in bold in the table below:

```
   | 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
00| 00 01 02 03 37 2d 2e 2f 16 05 25 0b 0c 0d 0e 0f
10| 10 14 24 04 b6 15 32 26 18 19 00 27 1c 1d 1e 1f
20| 40 5a 7f 7b 5b 6c 50 7d 4d 5d 5c 4e 6b 60 4b 61
30| f0 f1 f2 f3 f4 f5 f6 f7 f8 f9 7a 5e 4c 7e 6e 6f
40| 7c c1 c2 c3 c4 c5 c6 c7 c8 c9 d1 d2 d3 d4 d5 d6
50| d7 d8 d9 e2 e3 e4 e5 e6 e7 e8 e9 ba e0 bb b0 6d
60| 79 81 82 83 84 85 86 87 88 89 91 92 93 94 95 96
70| 97 98 99 a2 a3 a4 a5 a6 a7 a8 a9 c0 4f d0 a1 00
80| 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
90| 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
a0| 41 aa 4a b1 9f b2 6a b5 bd b4 9a 8a 5f ca af bc
b0| 90 8f ea fa be a0 b6 b3 9d da 9b 8b b7 b8 b9 ab
c0| 64 65 62 66 63 67 9e 68 74 71 72 73 78 75 76 77
d0| ac 69 ed ee eb ef ec bf 80 fd fe fb fc ad 8e 59
e0| 44 45 42 46 43 47 9c 48 54 51 52 53 58 55 56 57
f0| 8c 49 cd ce cb cf cc e1 70 dd de db dc 8d ae df
```

Bytes 256–511: Data to Host

Currently, only the first table (bytes 0–255) is used by Host Print service. However, the file must be exactly 512 bytes in length, so the final 256 bytes must be present, even if they are set to zero.

See Also

Character Tables

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to

http://go.microsoft.com/fwlink/?linkid=29507.

SDK

This software development kit (SDK) section of Microsoft® Host Integration Server 2004 Help provides information for the programmer writing applications for Host Integration Server 2004.

Using Help in a Developer Environment

Microsoft® Host Integration Server 2004 Help contains features that you can use to display the developer documentation in your preferred language and to link between Host Integration Server 2004 Help and Visual Studio 2003 Help.

Using language filtering

The Host Integration Server 2004 .NET Class Reference and COM Object Reference provide signatures and code examples in multiple programming languages. The following tags denote the language-specific information:

- [C#]
- [Visual Basic]
- [C++]
- [JScript]

You can customize your view of the content in the reference pages to display information only in your preferred programming language. To select a custom language, use the Language Filter button in the upper-left corner of the reference page. After it is enabled, the language filtering is persisted until it is changed. When language filtering is enabled on a page, the name of the language follows the title in the blue bar at the top of the page.

Viewing Host Integration Server Help in Visual Studio

You can view Host Integration Server 2004 Help in three ways:

- In Microsoft Visual Studio® .NET 2003. Select **Contents** on the **Help** menu in Visual Studio .NET 2003.
- In the Microsoft Visual Studio .NET 2003 Documentation. Select **Microsoft Visual Studio .NET 2003** from the **Programs** menu.
- In the standalone Microsoft Host Integration Server 2004 Help. Select **Host Integration Server Documentation** from the **Programs, Microsoft Host Integration Server 2004** menu.

If you are developing in Visual Studio .NET, either of the first two methods are recommended. Using either of these methods enables integration between Host Integration Server Help and Visual Studio .NET Help; this integration is extremely useful when navigating class relationships across the documentation sets. If you view Host Integration Server Help outside of Visual Studio .NET, read the following tip to properly render links to Visual Studio .NET.

Linking between Host Integration Server 2004 Help and Microsoft Visual Studio .NET Help

When a member is inherited from the .NET Framework Base Class Library, two links are provided, as shown in the following example:

Finalize (inherited from **System.Object**)	For additional information about the System namespace, see .NET Framework Help available from Visual Studio .NET or go to http://go.microsoft.com/fwlink/?LinkID=9677.

If you are viewing Host Integration Server Help in Visual Studio .NET or in the Visual Studio .NET Documentation, the link in the left column goes to the exact member page. If you are viewing Host Integration Server 2004 Help outside of Visual Studio, use the link in the right column to go to the System namespace page in MSDN Library. Note that the link will not go to the specific member page.

This section contains:

- Programmer's Guide
- Programmer's Reference
- Samples

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Programmer's Guide

Microsoft® Host Integration Server 2004 provides comprehensive bidirectional services for integrating Microsoft Windows® with legacy systems. Host Integration Server 2004 extends Windows to other platforms by providing interoperability in three areas:

- Application Integration Services
- Data Integration Services
- Network Integration Services

Most of the services provided by Host Integration Server 2004 expose a programming interface, which enables you to extend the functionality of the product and integrate it more tightly in your own environment. This guide describes these interfaces and provides guidance on how to use them.

This section contains:

- Transaction Integrator Programmer's Guide
- Data Integration Programmer's Guide
- Network Integration Programmer's Guide
- Administration and Management Programmer's Guide
- Messaging Programmer's Guide
- Single Sign-On Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Transaction Integrator Programmer's Guide

This section of the Microsoft® Host Integration Server 2004 Software Development Kit (SDK) provides information required to develop software to integrate COM and .NET applications with Customer Information Control System (CICS) and Information Management System (IMS) transactions on IBM mainframe and AS/400 computers.

Transaction Integrator (TI) enables developers to integrate mainframe-based transaction programs (TPs) with component-based Microsoft® Windows® applications. With Transaction Integrator, you can integrate existing mainframe-based TPs with Windows-based COM or distributed COM (DCOM) applications. You may not have to modify your mainframe TP if the business logic is separate from the presentation logic. The wizards available in the TI Designer and TI Manager guide you through the process, step-by-step.

Transaction Integrator is appropriate when you need a synchronous or transactional solution where both systems being integrated are running at all times. For applications only requiring an asynchronous integration solution, a messaging-based solution using the MSMQ-MQSeries Bridge is preferred over Transaction Integrator.

Applications that integrate message queuing and that use MSMQ-MQSeries Bridge in a Host Integration Server 2004 environment can be developed using several different development tools and application programming interfaces including the following:

- C or C++ applications that use the MSMQ-MQSeries Bridge Extensions to extend the MSMQ-MQSeries Bridge.
- Microsoft Visual Basic® applications that use MSMQ-MQSeries Bridge Extensions to extend the MSMQ-MQSeries Bridge.

To use this guide effectively, you should be familiar with the following:

- Microsoft Host Integration Server 2004
- Microsoft Windows® 2000 or later
- Message Queuing
- IBM MQSeries

Depending on the application programming interface and development tools used, you should be familiar with the following:

- Microsoft COM objects
- ASP
- ASP.NET

For API references and other technical information for the Transaction Integrator, see the Transaction Integrator Programmer's Reference in the Programmer's Reference section of the SDK.

For sample code using the Transaction Integrator, see Sample Programs for Transaction Integrator and Transaction Integrator Tutorials in the Samples section of the SDK.

This section contains:

- Transaction Integrator Designer
- Introduction to COM and COM+
- Data Types
- Host and Automation Data
- Programming Windows-Initiated Processing
- Programming Host-Initiated Processing
- Transaction Integrator Security Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Transaction Integrator Designer

Transaction Integrator (TI) Designer is a graphical user interface for creating TI components, which are annotated type libraries or assemblies. It is a stand-alone program that does not need to be connected to the mainframe. You can use TI Designer to export or import the host data declarations used in mainframe Customer Information Control System (CICS) and Information Management System (IMS) programs or AS/400 programs.

TI Designer is hosted within the Microsoft® Visual Studio® .NET environment. You can use it to generate both Windows®-initiated processing (WIP) and host-initiated processing (HIP) objects. TI Designer also supports COM type libraries and .NET assemblies.

This section contains:

- Installing Transaction Integrator Designer
- Application Development Software Requirements
- Creating a New Transaction Integrator Project
- Using Solution Explorer
- Reporting Errors
- Migrating from Earlier Versions of Host Integration Server

Installing Transaction Integrator Designer

Transaction Integrator (TI) Designer is installed and configured by the Microsoft® Host Integration Server 2004 Installation Wizard. You can install and configure TI Designer at the time you first install Host Integration Server 2004, or you can use the Host Integration Server 2004 Installation Wizard at a later time to add TI Designer. The Host Integration Server 2004 Installation Wizard installs everything you need, including program files, Help files, the CedarBank sample application, and other tools. The TI Project template is automatically installed on your computer at <drive>:/Program Files/Microsoft Host Integration Server/System/Projects/.

> **Note** TI Designer is hosted within the Visual Studio .NET development environment and must be registered in Visual Studio at the time of installation. Be sure that Visual Studio .NET is installed on your computer before you install TI Designer.

To install Transaction Integrator Designer

1. Launch Host Integration Server 2004 Setup and accept all defaults until you reach the **Custom Installation** page.
2. On the **Custom Installation** page, expand the **Application Integration** node.
3. Select **Transaction Integrator Designer** and any other options you want to install.
4. Click **Next**, and then follow the on-screen directions.

See Also

Transaction Integrator Designer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Application Development Software Requirements

Use Transaction Integrator (TI) Designer to develop your TI components. A TI component exposes an Automation interface or .NET assembly. To fully support TI Automation servers, use the following additional Windows-based client application software that will call a TI Automation server. If you use these Microsoft tools, keep these requirements in mind:

- To create components with Microsoft® Visual Basic®, use version 5.0 or later. To use all the TI features, such as user-defined types (UDTs), you must use Microsoft Visual Basic version 6.0 or later.
- To create components with Microsoft® Visual C++®, use version 4.2b or later with the Active Template Libraries (ATL) version 1.1 or later. If you use Visual C++ version 4.2, you must have the Win32® software development kit (SDK).
- To create and run Java components, use Microsoft® Visual J++® version 1.0 or later and the Java Virtual Machine installed with Microsoft Internet Explorer version 5.0 or later. You can download the latest version of Internet Explorer from http://go.microsoft.com/fwlink/?LinkId=12773.
- To create Internet applications, use Microsoft Internet Information Server (IIS) version 4.0 or later and Microsoft Internet Explorer version 5.0 or later.

Note If your TI components include recordsets, install the Microsoft Data Access Components (MDAC) on any client computer that uses distributed COM (DCOM) to gain remote access to TI components.

See Also

Transaction Integrator Designer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating a New Transaction Integrator Project

You can create a new Transaction Integrator (TI) Project within the Visual Studio .NET development environment.

To create a TI Project

1. On the **Start** menu, point to **Programs**, and then click **Microsoft Visual Studio .NET**.
2. On the Visual Studio .NET **File** menu, click **New**, and then click **Project**.
3. Under **Project Types,** select **HIS Projects**.
4. Under **Templates,** select **TI Project**.
5. After **Name**, type the name of the project. The name can be a maximum of 256 Unicode characters.
6. After **Location**, type or browse the location to store the project.

See Also

Using Solution Explorer

Using Solution Explorer

The Visual Studio Solution Explorer provides an organized view of projects and their files, as well as access to available commands and toolbars. The files supported by the project are:

- COM Client-Initiated libraries, which are COM type libraries (.tlb).
- .NET Client-Initiated libraries, which are .NET assemblies.
- Host-Initiated libraries which are Transaction Integrator Metadata (.tim).

To open Solution Explorer

- On the **View** menu, click **Solution Explorer**.

See Also

Transaction Integrator Designer

Reporting Errors

TI Designer reports any errors through the output window in Visual Studio. NET. Double-click the error message to view the source of the error in TI Designer (if applicable).

See Also

Transaction Integrator Designer

Migrating from Earlier Versions of Host Integration Server

1. Upgrade all your type libraries at once by dragging them into Microsoft Visual Studio® and then clicking **Save All**. Create new REs that have the same characteristics as the old REs using the TI Manager. Associate the updated type libraries with the new REs. This is the easiest upgrade path.
2. Upgrade your type libraries one-at-a-time by opening them in Visual Studio and then clicking **Save As**. Create new REs that have the same characteristics as the old REs using the TI Manager. Associate the updated type libraries with the new REs.
3. Upgrade your type libraries one-at-a-time by creating new type libraries, and then importing the property settings from the old type library. Use TI Manager to create new REs that have the same characteristics as the old REs. Associate the updated type libraries with the new REs. This is the most time-consuming option because each library is created individually.

When a type library is fully upgraded to HIS 2004, three aspects of the old type library may be updated depending on the upgrade process you used. These are:

- Remote environment class
- Library, interface, coclass, and UDT GUIDs
- Default conversion information defined at the library level. The defaults for converting data types are different in TI than in COMTI.

Depending upon your circumstances and the requirements of your applications, you might want to update one, two, or all three aspects.

User Action	TI Actions	Results	When to use
None. Use existing Type Libraries and REs.	No changes are made to: • RE • Type library GUID • Type library default conversions	• Type library and RE is fully functional in both HIS 2004 and HIS 2000. • The properties within the type library and RE can no longer be modified. • New Type libraries created with TI Project cannot be associated with older REs. • Existing COM client works unmodified.	• Initial upgrade to HIS 2004. • Old type libraries and old REs work and do not need to be modified.

Open and **Save**	- Updates the Remote Environment class. No changes are made to: - Type library GUIDs - Default conversions	- The method property **Include Context Parameter** is automatically set to **True**. Client Applications do not need to support the Client Context and work unchanged as Client Context is an optional parameter in the COM environment. In the Visual Studio TI Project, set **Include Context Parameter** to **False** on the method. - Old type libraries are updated the HIS 2004. The updated type library can only be associated with an RE created with TI Manager. - Existing COM client works unmodified.	- When a new RE needs to be created in the HIS 2004 environment. - Using new HIS 2004 RE features. - Using new Client context features (Client Security, Persistent Connections, and so forth). - Moving to the HIS 2004 supported environment. - Programming model stays the same.

Open and **Save As**	• Updates the Remote Environment class. • Generates new type library GUIDS. Save does not. • No changes made to the type library default conversions	The method property **Include Context Parameter** is automatically set to **True**. Client Applications do not need to support the Client Context and work unchanged as Client Context is an optional parameter in the COM environment. In the Visual Studio TI Project, set **Include Context Parameter** to **False** on the method. If you migrate an old type library to a .NET assembly, TI also migrates all Visual Basic version 6.0 Automation data types to Visual Basic .NET data types, including: • Integer to Short • Long to Integer • Currency to Decimal • Recordset to datatable • UDT to Structure Client Applications using the **NewRecordSet** function to create disconnected recordsets must modify the code. The **NewRecordset** function is not supported in .NET. Existing COM Clients that use early binding need to be recompiled because of GUID changes.	• Creating a new instance of the application for side by side operation with HIS 2004 with the intent of extending the application. • Programming model stays the same.
Import	• Updates the Remote Environment class • Updates the GUIDs • Adds HIS 2004 defaults to the new library	• Same results as **Open** and **Save As** • All methods use new library default defined for HIS 2004 • This is the only way to migrate type libraries to Assemblies.	• Same as **Save As** • Programming model change • Target environment change (CICS, IMS, AS/400) • Initiation change (WIP, HIP) • Platform change (COM, .NET)

See Also

Transaction Integrator Designer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Introduction to COM and COM+

The Component Object Model (COM) is a binary standard that enables software components to interoperate in a networked environment regardless of the language in which they were developed.

Transaction Integrator (TI) is based on COM, which defines a standard way of handling and reporting errors. (COM is the foundation for COM+.) To understand TI behavior and errors, you need to understand how it uses COM.

Objects and clients are the basic building blocks of COM applications. An object is a piece of software that can do a specific task. A client is software that uses and controls objects.

COM can be compared to business relationships. There are many different businesses that provide their customers (clients) with products and services (objects) that the clients can use and control. COM applications are clients that make use of objects that can do specific tasks. For example, in computer technology, Powerpnt.exe depends on several Microsoft® Office and Microsoft Windows® utility objects to do most of the work involved with editing and presenting a presentation. The Powerpnt.exe is just a client to those utility objects and directs them to their tasks. When you want to open a .ppt file, a dialog box appears, from which you choose the file to open. This dialog box is displayed by a Windows utility object that can display a **File Open** dialog box, rather than by Powerpnt.exe.

Dividing software into clients and objects enables you to use those clients and objects as building blocks that can be combined and reused in many different ways by many different clients, just as standard building materials can be used to construct many different structures.

COM and COM+ are the key technologies that provide the infrastructure that enables clients and objects to work together. Other key COM concepts include methods, interfaces, classes, references, and components, which build on the foundation of clients and objects.

This section contains:

- COM Defined
- COM+ Defined
- Component Services Features
- Distributed Applications
- Automation
- COM Objects
- COM Methods
- COM Interfaces
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- COM Component and TI Component
- Viewing COM Classes, Interfaces, and Methods
- Windows Script Host COM Client

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COM Defined

The Component Object Model (COM) is a binary standard that enables software components to interoperate in a networked environment regardless of the language in which they were developed.

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COM+ Defined

Component Services (COM+) consists of the latest version of COM, distributed COM (DCOM), and Microsoft Distributed Transaction Coordinator (DTC), plus additional functionality. With COM+, administrators can deploy and administer COM+ applications through a graphical user interface, or automate administrative tasks using a scripting or programming language. Software developers can use COM+ to visually configure routine component and application behavior, such as security and participation in transactions, and to integrate components into COM+ applications.

To open COM+, click **Start**, point to **Programs**, point to **Administrative Tools**, and then click **Component Services**. Component Services is also available in Transaction Integrator (TI) Manager as follows: Start **TI Manager** and double-click the **Component Services** folder.

Component Services provides standard application functionality for administration, deployment, security, reliability, and scalability. Component Services simplifies the administrator's work by providing a tool for administering all applications visually through a single user interface.

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Introduction to COM and COM+

Component Services Features

Component Services (COM+) builds on COM concepts and adds three major new elements: COM+ applications, increased administrator involvement, and interception. You can gain access to Component Services from within TI Manager.

A COM+ application is a COM component that includes one or more components developed and configured to work together by Component Services to simplify administration of application servers. Each COM+ application unites TI components (type libraries) and COM components with configuration information about how they should be deployed, thus making a single unit for deployment and administration. A wizard helps to deploy COM+ applications. You can easily administer COM+ applications by using Component Services in TI Manager. This feature gives administrators complete control over application server deployment and configuration. COM+ applications also aid in the configuration of an application's presentation tier. Administrators can use Component Services to quickly create application proxies that can be used to configure thousands of client computers.

Component Services expands the role of administrators by empowering administrators to do many tasks that were previously done exclusively by developers. In the application development phase, developers write their own custom type libraries or use TI Designer to create TI component libraries from COBOL transaction programs (TPs). Then developers deploy the TI components in a COM+ application and configure the application settings as needed. The COM+ application is a deployable unit that the developer can pass to the administrator to deploy.

The administrator receives a COM+ application file from a developer, and then uses Component Services to deploy that application on the server computer. Next, the administrator configures permissions to use the application, as well as other settings. Then, the administrator creates an application proxy, which is a file used to configure each client computer in the presentation tier. After using Microsoft® Active Directory® directory service and IntelliMirror® to complete the client configuration, the administrator continues to use Component Services to monitor the application's behavior.

Component Services intercepts all calls from clients to objects, and you can use it to manage objects and their interaction with clients. Because of this interception capability, Component Services governs the interaction between objects and their clients, and does a lot of the work that would be done by objects themselves. You can design objects to do business logic only; Component Services handles everything else by tracking object behaviors and needs and by managing everything the objects do.

The following are the major features of Component Services that are supported by Transaction Integrator (TI):

- **Administration.** You can use the powerful Component Services user interface to administer the application server tier. You can use Component Services to ease deployment, configuration, monitoring, and upgrades. Component Services also gives administrators the ability to use scripts to control all administration.
- **Scalability.** Component Services achieves high scalability by pooling server resources so that when one person is not using them, another person can. When a resource is needed, it is taken from a shared pool. When the resource is no longer needed, it is returned to the pool. Component Services pools many resources, including threads, ODBC connections, OLE DB connections, and COM objects.

  > **Note** TI supports the Microsoft® Windows Server™ 2003 and Windows® 2000 COM+ feature known as object pooling. To enable object pooling for a TI component, right-click the component, and click **Properties**. Then select the **Enable Object Pooling** check box on the **Activation** tab. There are overall system manageability benefits from enabling this feature for TI components because you can then specify the number of instances to be pre-initialized when the application starts by using the **Minimum Pool Size** field. You can also set an upper limit on the number of active instances by using the **Maximum Pool Size** field to prevent the server running Windows Server 2003 or Windows 2000 from flooding the host system.

- **Transaction Support for Reliability and Data Integrity.** Enterprise applications must have high levels of reliability and data integrity. Component Services provides reliability by offering transaction support. That is, either all the actions in a transaction occur, or none of them occurs. If all of the actions cannot take place, Component Services rolls back all of your object's work so that the databases are left in their original state.
- **Security.** Because Component Services acts as an intermediary between clients and objects, it is able to regulate access to application server functionality. By using the Component Services console, the administrator can give different users different access rights to the application.
- **Queued Components.** Component Services is integrated with another feature of Windows called Message Queuing (also known as MSMQ). Message Queuing gives enterprise applications the ability to continue running even when a server is unavailable. Clients can call COM objects when the COM object is currently unavailable, and the call is stored as a message in Message Queuing. After the server is available again, it retrieves the message from the message queue and processes the call to the COM object.

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Distributed Applications

Applications that run partly on the Windows platform and partly on the mainframe are known as distributed applications. Transaction Integrator (TI) components support all local and distributed applications that adhere to the Automation specifications and the distributed COM (DCOM) specifications. DCOM supports communication between objects on different computers on a network by handling the low-level details of network protocols. This enables use of distributed programs that consist of multiple processes working together to accomplish a single task. The Distributed Transaction Coordinator (DTC) is the part of Component Services that coordinates external or two-phase transactions.

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Automation

Automation is COM-based technology that enables dynamic binding to COM objects at run time. An Automation server is an application that allows its objects, methods, and properties to be controlled by other applications through Automation. An Automation client (also called an Automation controller) is an application that manipulates the objects, methods, and properties of another application (the Automation server) through Automation. An Automation object is an object that is exposed to other applications or programming tools through Automation interfaces.

A Transaction Integrator (TI) component is a type library that exposes an Automation interface. When you deploy a TI component in a COM+ application, you create an Automation server that can be used by any other COM-based application (Automation client). The Automation client application can call the methods on the Automation interface of a TI Automation server (for example, a TI component deployed in a COM+ application) to invoke a CICS or IMS transaction program (TP) on a mainframe host computer.

An Automation client application connects to a TI Automation server application in one of two ways, early binding or late binding:

- Early binding is similar to programming the speed dialer on your phone. You look up the number once, and program it into the phone. After you verify that it is valid, a single button dials the number.
- Late binding is similar to looking up the phone number in a phone book before each call, and then dialing the phone.

Both early binding and late binding produce the intended result. However, the speed dialer (early binding) is more efficient when you make a call, but looking up the number each time (late binding) ensures that the number you are calling is still correct.

In early binding, you declare a variable as an application-defined object type. A type library, object library, or dynamic-link library is then referenced in the Automation client Tools Reference. Early binding is another name for virtual function table binding or vtable binding. A vtable is a data structure that holds the addresses for the methods and properties of each object in an Automation server. The vtable is contained within the referenced library.

Late binding allows you to create an Automation object as an Object or Variant data type. Late binding uses the **IDispatch** interface. **IDispatch** has no preexisting information about the server that it is calling. It assumes during its compile phase that the code is correct. It then attempts at run time to execute the code and trap for run-time errors.

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COM Objects

COM objects are entities in memory that can do specific tasks. Each COM object is an instance of a COM class. COM objects are not files, but can manage or represent files. (A COM objects does not usually represent any particular file.) Their lifetimes are short. COM objects are deleted when program execution is terminated.

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COM Methods

A COM method is a specific task that a COM object can perform. When a client requests that an object complete a specific task, that client calls a method of the object. For example, Winword.exe (a client) can call the **Spellchecker** method of a **Word.Document** (object) to run a spell-checking session. A TI Automation client application can call a method of an Automation server to run a mainframe transaction program (TP) and return the results.

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COM Interfaces

A COM interface is a specific, immutable set of COM methods. COM clients cannot detect the internal workings of the objects they are using. Therefore, it is important for clients and objects to communicate about and agree on the functionality that an object supplies to a client. This agreement, frequently called a contract, is implemented in software by a COM interface.

To facilitate communication, the COM interface supplies a way for clients to query objects whether they implement specific sets of methods. For example, by way of the interface, COM allows a client to query an object whether it implements a set of file management methods, **FileSave** and **FileOpen**. An interface is named by an Interface ID (IID), which is a globally unique identifier (GUID), a 16-byte number. It is a COM rule that an object must either implement an interface or not implement it. There is no in-between state.

COM rules require that all COM objects must implement the **IUnknown** interface. **IUnknown** is used for:

- **Lifetime management.** To determine when objects are no longer in use and thus can be destroyed.
- **Versioning.** To determine which specific interfaces an object supports.

Objects that implement the **IDispatch** interface are scriptable, or Automation compatible; scripting clients such as Windows Script Host (WSH) can use them. Objects that do not implement **IDispatch** cannot be scripted; that is, scripts cannot call them. Objects that do not implement **IDispatch** cannot be Automation servers*;* client applications cannot use their services. In both cases, this inability is due to the clients' need to know certain details about objects before they can call them.

Automation is COM-based technology that enables dynamic binding to COM objects at run time. When a client COM application is compiled, it does not have all the information about the services offered by the Automation servers that it will be using. Later, during run time, the client application uses an Automation server's **IDispatch** interface to find detailed information about the services that the Automation server offers.

After a TI component is associated with a specific remote environment (RE), and then dropped into a COM+ application, that application (or package) becomes an Automation server with an **IDispatch** interface. Then a client COM application can call upon the TI Automation server to operate (automate) a mainframe-based transaction program (TP) and return the results to the calling client COM application.

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COM Classes

A COM class is a definition in source code that can be used as a template for creating objects that implement the **IUnknown** interface and expose only their interfaces to clients.

Different objects implement different methods. COM classes ensure that a given client connects to exactly the right kind of object. Because each COM object is an instance of a specific COM class, COM classes actually classify objects. For example, one class of object is the **Word.Document** class. Any object in this class can manage Microsoft Word .doc files.

Each COM class has two identifiers, the programmatic identifier (ProgID) and the class ID (CLSID). When a client tells COM that it needs use an object, the client always specifies a ProgID or CLSID so that COM knows which class of object to create.

A ProgID is a human-readable registry entry that can be associated with a CLSID. You can use the ProgID within programs to create an instance of a COM class. For example, to create an instance of a COM class that has a ProgID of **Component.MyComponent**, use the following Microsoft® Visual Basic® statement:

```
Set Component = CreateObject("Component.MyComponent")
```

A ProgID must not contain more than 39 characters, start with a digit, nor contain any punctuation (including underscores) other than periods. The pieces are separated by periods; no spaces occur within the ProgID. For example, *Word.Document.6* is a valid ProgID. The typical format of a ProgID is:

```
<Library>.<ComponentName>.<VersionNumber>
```

Although the ProgID is human-readable, it should be used only in programs, and not displayed in the user interface. If you need a short displayable string for an object, call **IOleObject::GetUserType**.

A ProgID identifies a class, but with less precision than does a CLSID. The registry entry appears as follows:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Classes\<ProgID> = <CLSID>
```

You can use a ProgID in programming situations where it is not possible to use a CLSID. The ProgID is not guaranteed to be unique, so use them only where name collisions are manageable.

The CLSID is a globally unique identifier (GUID), such as the following that uniquely identifies the COM class:

```
{71AFDE33-F81B-11d2-B12B-00C04F8C2F72}
```

You can generate a GUID with a program such as Uuidgen.exe.

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COM Component and TI Component

A COM component is a binary file (.dll or .exe) containing code for creating a COM object and servicing method calls to it. The COM component can contain code for one or more Transaction Integrator (TI) components, class factories, COM classes, registry-entry mechanisms, type libraries, and so on.

COM-based programs and applications are distributed and deployed as COM components. Each COM component uses interfaces to interoperate with each other in much the same way that a person uses an application user interface to interoperate with an application. Each COM interface contains one or more methods.

A TI component is a type library that acts as a proxy for a mainframe transaction program (TP). You can easily change a TI component into a true COM component by deploying it in a COM+ application. TI components all share the same implementation DLLs but are distinguished by their type libraries. Therefore, when you deploy a TI component in a COM+ application, it is the specific type library (.tlb file) that is registered.

The basic unit of distribution for COM is a component. You can deploy COM components on a computer other than your own. This is what distinguishes COM components from COM objects, which reside in memory and thus cannot be copied from computer to computer.

Deploying a COM component is a two-step process. First, copy the component onto the target computer. This is a file copy operation. Then register the component, that is, configure COM to recognize the component. This configuration information is stored in the registry (and in certain cases in a database called regdb.) In TI, registration is automatic. As soon as you drop a TI component into a COM+ application, the resulting TI Automation server is automatically registered on that computer.

Because TI Manager includes Component Services to deploy or remove TI components, TI component deployment is a matter of dragging your TI component into a COM+ application.

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Viewing COM Classes, Interfaces, and Methods

Several tools are available for viewing the COM classes, interfaces, and methods that are deployed on your computer:

- **Component Services (COM+) in Windows 2000**

  Component Services (COM+) is a core part of Windows 2000. A class that has not been configured to use Component Services does not show up in Component Services.

- **OLE/COM Object Viewer (OLE View)**

  This tool shows all the deployed classes and gives comprehensive information about each class, with the exception of Component Services configuration information. It is available free at http://go.microsoft.com/fwlink/?LinkId=12793.

- **DCOMCNFG**

  This tool is present on any computer that has distributed COM (DCOM) installed, including all installations of Windows Server™ 2003, Windows® XP Professional, and Windows 2000 Server. DCOMCNFG displays only a subset of the deployed classes, and shows much less information about each class than does OLEVIEW. Its main advantages are that it is automatically installed with DCOM and its graphical user interface (GUI) is less cluttered than the OLEVIEW GUI.

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Windows Script Host COM Client

Microsoft® Windows is filled with utility COM objects that you can use to manage system configuration, users, printers, Active Directory® directory service, and so on. Windows Script Host is a client that controls those Windows objects through scripts. Scripts give administrators much more administrative power than batch (.bat) files afford. The administrator writes a script, a file ending with .vbs or .jvs, with content much like a .bat file. The administrator then double-clicks the script to load Windows Script Host and run the script.

The following is an example of a short Microsoft Visual Basic® Scripting Edition (VBScript) client script. This script has only three lines. The first line establishes a connection to the COM object. The second line calls a method, and the third line displays the result.

```
Set SaySvrObject = CreateObject("Saysvr.Sayclass")
Speech = SaySvrObject.SaySomething
MsgBox Speech
```

In this script:

- **Saysvr.Sayclass** specifies the COM class.
- **CreateObject** is the script's way of requesting that COM give it a reference to the object.
- **SaySvrObject** represents the reference to the object. After this line is completed, the script will have a live reference to the COM object.
- On the right side of the second line, the script uses its SaySvrObject reference to call the **SaySomething** method, which returns a string to the script.
- Speech represents the string returned by the script.
- The third line displays the Speech string in a Message Box.

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Data Types

The Transaction Integrator (TI) run-time environment manages the process of converting host data types used by a host-based transaction program (TP) to and from the Automation data and data types used by a Microsoft® Visual Basic® or other Windows®-based programming language.

The topics in this section give you tips for handling different types of data, and they explain how data types are converted and used in both IBM host and Automation programming languages.

TI supports Automation, COM aggregate, and mainframe data types. For a complete listing of the supported data types, see Supported TI Data Types

This section contains:

- Supported TI Data Types
- Data Type Conversion
- Integer Data Type
- Decimal Data Type in Visual Basic
- Variant Data Type
- Recordsets and Datatables
- Arrays
- User-Defined Types (UDTs)
- Transaction Request Messages
- Overriding Settings in the Type Library
- Persistent Connections with the Mainframe

Supported TI Data Types

Transaction Integrator (TI) supports the data types used by COM, .NET, COBOL, and Report Program Generator (RPG).

This section contains:

- Supported Automation Data Types
- Supported COM Aggregate Data Types
- Supported .NET Aggregate Data Types
- Supported COBOL Data Types
- Supported RPG Data Types
- Supported RPG Keywords

Supported Automation Data Types

Automation data types are simple types that you can put into a Variant data type.

1-byte unsigned Integer (BYTE)

An Integer data type that has a positive value ranging from 0 through 255.

2-byte signed Integer

An Integer data type that can be either positive or negative. The most significant bit is the sign bit: 1 for negative values and 0 for positive values. The storage size of the integer is 2 bytes. A 2-byte signed Integer can have a range from –32,768 through 32,767.

4-byte signed Integer

An Integer data type that can be either positive or negative. The most significant bit is the sign bit: 1 for negative values and 0 for positive values. The storage size of a 4-byte signed Integer is 4 bytes. A 4-byte signed Integer can have a range from –2,147,483,648 through 2,147,483,647.

4-byte Real (Single)

A single-precision 32-bit (4-byte) floating-point Real data type (often called a Single). It ranges in value from –3.402823E38 through –1.401298E-45 for negative values, from 1.401298E-45 through 3.402823E38 for positive values, including 0.

8-byte Real (Double)

A double-precision 64-bit (8-byte) floating-point Real data type (often called a Double). It ranges in value from –1.79769313486232E308 through –4.94065645841247E-324 for negative values, from 4.94065645841247E-324 through 1.797693134862325E308 for positive values, including 0.

Boolean

An expression that can be evaluated either true (nonzero) or false (0). (You can use the keywords True and False to supply the values of –1 and 0, respectively.) The field data type Yes/No is Boolean and has the value of –1 for Yes and 0 for No. Several property page settings are Boolean, including Yes/No, True/False, and On/Off.

Variable-length String (BSTR)

A fundamental data type that holds character information. A String value can contain approximately 65,535 bytes (64 KB). It can be fixed-length or variable-length, and it contains one character per byte. Fixed-length Strings are declared to be a specific length. Variable-length Strings can be any length up to 64 KB, less a small amount of storage overhead. A variable length string can range from 0 to approximately 2 billion bytes (characters).

Currency

An 8-byte fixed-point data type that is useful for calculations involving money or for fixed-point calculations in which accuracy is extremely important. This data type is used to store numbers with up to 15 digits to the left of the decimal point and 4 digits to the right. Currency values can range from –922,337,203,685,477.5808 to 922,337,203,685,477.5807.

Date

A data type that is used to store a date, a time, or a date and time as a 64-bit Real number. The value to the left of the decimal point represents a date, and the value to the right of the decimal point represents a time. The Date data type values can range from January 1, 1000 to December 31, 9999.

Decimal

A data type that stores a signed, exact numeric value described as the number of digits appearing before and after a decimal point, with a maximum total of 18 digits.

See Also

Supported COM Aggregate Data Types

Supported .NET Aggregate Data Types

Supported COBOL Data Types

Supported RPG Data Types

Supported RPG Keywords

Supported TI Data Types

Supported COM Aggregate Data Types

Array

A set of sequentially indexed elements having the same intrinsic data type. Transaction Integrator (TI) supports an array of any of the Automation data types. Each element of an array has a unique identifying index number. Changes made to one element of an array do not affect the other elements. TI supports multidimensional arrays. However, only the outermost array of a multidimensional array can vary in size; all the other arrays must be fixed in size. For more information, see Arrays.

User-Defined Type (UDT)

A data type that is defined in a program. A UDT can contain any of the Automation data types as well as arrays of those data types, recordsets, and nested UDTs. A UDT generally contains many different data types that are defined by the programming language used. In COBOL, UDTs are called RECORDS as are any declarations that contain lower-level numbers. For more information, see User-Defined Types (UDTs).

Recordset

An Automation object, also known as an ActiveX® Data Object (ADO) recordset, is the equivalent of a fixed or unbounded table that contains simple types in COBOL or report program generator (RPG) data declarations. After you have a recordset object, you can call methods on that object to gain access to its rows. Recordsets supported by TI have disconnected client-side cursors. For more information, see Recordsets and Datatables.

See Also

Supported Automation Data Types

Supported .NET Aggregate Data Types

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Supported RPG Data Types

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Supported .NET Aggregate Data Types

Datatable

A .NET object that is the equivalent of a fixed or unbounded table that contains simple types in COBOL or Report Program Generator (RPG) data declarations. After you have a **DataTable** object, you can call methods on that object to gain access to its rows. Datatables supported by TI have disconnected, client-side cursors. For more information, see Recordsets and Datatables.

Structures

A user-defined value type. Like a class, structures can contain constructors, constants, fields, methods, properties, indexers, operators, and nested types. Unlike classes, however, structures do not support inheritance.

The distributed program call (DPC) programming model for the AS/400 supports:

- Only single-level .NET structures.
- Arrays of .Net structures.

The DPC programming model for the AS/400 does not support:

- Nesting of structures.
- Arrays within structures.
- Variable sized structures in which the last parameter is a string.

Array

A set of sequentially indexed elements that have the same intrinsic data type. Transaction Integrator (TI) supports an array of any of the .NET data types in this topic. Each element of an array has a unique identifying index number. Changes made to one element of an array do not affect the other elements. TI supports multidimensional arrays. However, only the outermost array of a multidimensional array can vary in size; all the other arrays must be fixed in size. For more information, see Arrays.

See Also

Supported Automation Data Types

Supported COM Aggregate Data Types

Supported COBOL Data Types

Supported RPG Data Types

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Supported TI Data Types

Supported COBOL Data Types

COMP-1

A 4-byte, single precision, floating-point Real data type that specifies internal floating-point items. The sign is contained in the first bit of the leftmost byte, and the exponent is contained in the remaining seven bits of that byte. The remaining three bytes hold the mantissa.

COMP-2

An 8-byte, double precision, floating-point Real data type that specifies internal floating-point items. The sign is contained in the first bit of the leftmost byte, and the exponent is contained in the remaining seven bits of the first byte. The remaining seven bytes hold the mantissa.

COMP-3 Packed Decimal

A packed decimal data type that specifies internal decimal items stored in packed decimal format. In the packed decimal format, each byte in a field represents two numeric digits except for the rightmost byte. The rightmost byte holds one digit and the sign. In other words, there are two digits in each character position except for the trailing character position that is occupied by the low-order digit and sign. The item can contain any of the digits from 0 through 9, plus a sign, to represent a value not exceeding 18 decimal digits. For example, the decimal value +123 is represented in two bytes as 0001 0010 0011 1100 in packed decimal format. For more information see, Zoned Decimal or Packed Decimal Data Types.

DISPLAY Zoned Decimal

An unpacked decimal data type that specifies internal decimal items stored in zoned decimal format. Zoned decimal format is synonymous with unpacked decimal format, which is a format for representing numbers where each digit is contained in bits 4 through 7 and the sign is contained in bits 0 through 3 of the least significant byte. Bits 0 through 3 of all bytes other than the least significant byte contain 1s (hex F). For example, the decimal value +123 is represented in three bytes as 1111 0001 1111 0010 1100 0011 in zoned decimal format. For more information see, Zoned Decimal or Packed Decimal Data Types.

DATE and TIME

Specifies a date and time by using group item of two PIC 9(7) COMP-3 Packed Decimal value.

TIME only

Specifies a time by using a PIC 9(7) COMP-3 Packed Decimal value.

DATE only

Specifies a date by using a PIC 9(7) COMP-3 Packed Decimal value.

PIC X

Specifies a single character in an Extended Binary Coded Decimal Interchange Code (EBCDIC) character string. EBCDIC is the native representation for character data on mainframes and AS/400s. Unicode is the native representation for character data on Windows-based platforms.

PIC X No Translation

Specifies a single COBOL character in an EBCDIC character string that is handled as if it were binary data. In other words, there is no translation from EBCDIC to Unicode or from Unicode to EBCDIC.

PIC G

Specifies a double-byte EBCDIC string.

PIC S9(4) COMP (Integer 16-bit)

Specifies an integer that is 16 bits, or 2 bytes, in length.

PIC S9(9) COMP (Integer 32-bit)

Specifies an integer that is 32 bits, or 4 bytes, in length.

See Also

Supported Automation Data Types

Supported COM Aggregate Data Types

Supported .NET Aggregate Data Types

Supported RPG Data Types

Supported RPG Keywords

Supported TI Data Types

Supported RPG Data Types

Transaction Integrator (TI) supports the data types in Report Program Generator (RPG) IV. The letter in parentheses is the internal representation of the data type.

- Character (A)
- Graphic (G)
- Numeric - Integer format (I)
- Numeric – Packed decimal format (P)
- Numeric - Zoned format (S)
- Numeric - Unsigned format (U)
- Float (F)
- Date (D)
- Time (T)
- Timestamp (Z)

See Also

Supported Automation Data Types

Supported COM Aggregate Data Types

Supported .NET Aggregate Data Types

Supported COBOL Data Types

Supported RPG Keywords

Supported TI Data Types

Supported RPG Keywords

Transaction Integrator (TI) supports the following Report Program Generator (RPG) keywords:

- CONST
- DATFMT
- DIM
- LIKE
- LIKEDS
- OCCURS
- PACKEVEN
- TIMFMT

TI does not support the following RPG keywords:

- ALIGN
- ALT
- ALTSEQ(*NONE)
- ASCEND
- BASED
- CTDATA
- DESCEND
- DTAARA
- EXPORT
- EXFLD
- EXTFMT
- EXTNAME
- EXTPGM
- EXTPROC
- FROMFILE
- IMPORT
- INZ
- NOOPT
- OPDESC
- OVERLAY
- PERRCD
- PREFIX
- PROCPTR
- STATIC
- TOFILE
- VALUE

See Also

Supported Automation Data Types

Supported COM Aggregate Data Types

Supported .NET Aggregate Data Types

Supported COBOL Data Types

Supported RPG Data Types

Supported TI Data Types

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Data Type Conversion

The Transaction Integrator (TI) run-time environment automatically converts data types between host-based COBOL or Report Program Generator (RPG) data types and the COM-based Automation data types that a Windows-based programming language like Visual Basic uses. The automatic conversion is based on information that you define in TI Project when you design and create a TI component (type library). This information is stored with the TI component and used by the TI runtime to convert the parameters of a method from the representation understandable by a COM-based or .NET-based programming language into the representation understandable by a host transaction program (TP).

Use TI Project to associate each Automation data type with each COBOL or RPG data type used in the host TP. TI provides default mappings between standard Automation data types and COBOL or RPG data types. You can either accept the default mappings or override the default with other mappings supported by TI. TI Project stores the conversion map in the TI component type library (.tlb) file. This conversion map is used to:

- Handle data moving between the TP and the TI component.
- Convert a TI component into a TP (export the host definition).
- Convert a TP into a TI component (import the host definition).

If a parameter used in a method call is not strictly typed, the TI run-time environment attempts to coerce the data type it receives into the data type it expects. If that coercion is successful, the call proceeds. If it is unsuccessful, an error is returned.

At run time, when a client application uses the TI Automation interface to call a method of the TI Automation server, the TI run-time environment uses the conversion map to handle the actual data conversion of the in and in/out parameters being sent to the mainframe TP. After TI converts the Microsoft® Windows® data, TI reformats the method call as a host system APPC/LU 6.2 or TCP/IP message. Then TI uses Microsoft Host Integration Server 2004 SNA or TCP/IP connectivity to forward the message to the mainframe. When the mainframe TP returns the in/out and out parameters, TI reformats the message for the return to Windows, converts the host data into Windows data, and returns the return value and parameters to the client application.

The choice of language or code page you made in TI Manager when you defined the remote environment (RE) determines which code page is used to convert from UNICODE (on the Automation side) to Extended Binary Coded Decimal Interchange Code (EBCDIC) (on the mainframe side). When you create an RE in TI Manager, you can either select a language to accept the default code page for that language, or select a specific code page.

If you need to convert to different target code pages (if you have, for example, target mainframes in different countries or regions), you need to set up an RE for each target because TI does not support conversions requiring the use of locale.

You can use TI Project to import COBOL or RPG, or to manually enter method descriptions to create Automation methods. When you import COBOL or RPG, each supported COBOL data type has a default Automation type. When you manually create a method, each Automation data type has a default host data type associated with it.

If you do not want to use a default Automation data type, you can use TI Project to change the Automation data type manually. If the new Automation type is compatible with the existing host data type, the existing COBOL or RPG data type is left unchanged. If it is not compatible, the host data type is changed, thus affecting your mainframe program.

This section contains:

- Converting Data Types from Automation to OS/390 COBOL
- Converting Data Types from OS/390 COBOL to Automation
- Converting Data Types from Automation to RPG
- Converting Data Types from RPG to Automation
- Converting Data Types from COM to .NET
- Converting Data Types from .NET to COM
- Zoned Decimal or Packed Decimal Data Types
- Converting Data Types from RPG to OS/400 COBOL

Converting Data Types from Automation to OS/390 COBOL

Use the tables in this topic as a guide to specify how you want TI to handle conversions from Automation data types to COBOL data types. For more information about the specific data types, see Supported TI Data Types.

Use the following code key to interpret the codes in the **Possible Conversion Errors** and **Required Property Settings** columns in each table.

Code	Description
r	Range errors possible.
b	Possible loss of precision due to base 2 to base 16 conversion.
p	Possible loss of precision due to picture format scale specification.
m	Mapping errors possible.
f	yyyyddd and hhmmss.
A	You must specify **Truncate**, **Round**, or **Error** under **Error handling** on the **COBOL Definition** tab of the property page.
C	You must specify the precision and scale by filling in the **Digits left** and **Digits right** boxes on the **COBOL Definition** tab of the property page.
D	You must specify the string width by filling in the **Size** box on the **COBOL Definition** tab of the property page.
E	Unicode or EBCDIC mapping information is required, such as a code page.
F	For arrays whose length is less than the maximum specified, you must specify **Size of Filler** under **Trailing filler** on the **COBOL Definition** tab of the property page.
G	You must specify how to deal with strings. Click **Space Padded** or **Null terminated** under **String Delimiting** on the **COBOL Definition** tab of the property page. Then click **Truncate** or **Error** under **Error handling** on the **COBOL Definition** tab of the property page to specify what TI should do if the string is too long.
H	Maximum size is required.
I	Localization is required.
J	Optional SO and SI insertion and deletion is supported.

The following table shows the defaults that TI uses for converting Automation data types to COBOL data types.

Default (occurs unless overridden by developer)

From Automation data type	To OS/390 COBOL data type	Possible conversion errors	Required property settings
1-byte unsigned Integer	PIC X No Translation	None	None
2-byte signed Integer	PIC S9(4) COMP (Integer 16-bit)	None	None
4-byte signed Integer	PIC S9(9) COMP (Integer 32-bit)	None	None
4-byte Real (Single)	COMP-1	br	None
8-byte Real (Double)	COMP-2	br	None
Boolean	PIC S9(4) COMP (Integer 16-bit)	None	None
Variable-length String	PIC X	m	DEG
Currency	COMP-3 Packed Decimal	pr	C
Date (date and time)	COMP-3 Packed Decimal	pf	CI
Date (date only)	COMP-3 Packed Decimal	pf	CI
Date (time only)	COMP-3 Packed Decimal	pf	CI
Decimal	COMP-3 Packed Decimal	pr	C
Array (any data type)	OCCURS fixed TIMES	None	FH

> **Warning** When you convert whole or fractional numbers from Visual Basic Single or Visual Basic Double data types to Packed Decimal or distributed program call (DPC) Zoned Decimal data types, TI is limited to a precision from 1 through 18 digits left of the decimal point (for example, 1.2345678901234567E+17). When you convert fractional numbers Packed Decimal or DPC Zoned Decimal data types, you should convert to Visual Basic Decimal data type.

The following table shows the other supported data type mappings that you can set in TI Project to override the defaults presented in the previous table.

Supported in Transaction Integrator (can be specified by the developer)

From Automation data type	To OS/390 COBOL data type	Possible conversion errors	Required property settings
1-byte unsigned Integer	PIC S9(4) COMP (Integer 16-bit)	None	None
1-byte unsigned Integer	COMP-3 Packed Decimal	None	C
2-byte signed Integer	COMP-3 Packed Decimal	None	C
2-byte signed Integer	DISPLAY Zoned Decimal	None	C
4-byte signed Integer	COMP-3 Packed Decimal	None	C
4-byte signed Integer	DISPLAY Zoned Decimal	None	C
4-byte Real (Single)	PIC S9(4) COMP (Integer 16-bit)	p,r	None
4-byte Real (Single)	PIC S9(9) COMP (Integer 32-bit)	p,r	None
4-byte Real (Single)	COMP-3 Packed Decimal	p,r	C
4-byte Real (Single)	DISPLAY Zoned Decimal	p,r	C
8-byte Real (Double)	PIC S9(4) COMP (Integer 16-bit)	p,r	None
8-byte Real (Double)	PIC S9(9) COMP (Integer 32-bit)	p,r	
8-byte Real (Double)	COMP-3 Packed Decimal	p,r	C
8-byte Real (Double)	DISPLAY Zoned Decimal	p,r	C
Boolean	PIC S9(9) COMP (Integer 32-bit)	None	None
Boolean	COMP-3 Packed Decimal	None	C
Variable-length String	PIC G	m	DEGJ
Currency	PIC S9(?)V9(?) COMP (16-bit)	pr	None
Currency	PIC S9(?)V9(?) COMP (32-bit)	pr	None
Currency	DISPLAY Zoned Decimal	pr	C
Decimal	PIC S9(?)V9(?) COMP (16-bit)	pr	None
Decimal	PIC S9(?)V9(?) COMP (32-bit)	pr	None
Decimal	DISPLAY Zoned Decimal	pr	C
Array (any data type)	OCCURS DEPENDING ON	None	FH

> **Warning** When you convert whole or fractional numbers from Visual Basic Single or Visual Basic Double data types to Packed Decimal or DPC Zoned Decimal data types, TI is limited to a precision of 1 to 18 digits left of the decimal point (for example, 1.2345678901234567E+17).

The following table shows additional supported data type mappings that the TI run-time environment supports.

Supported only by the TI run-time environment

From Automation data type	To OS/390 COBOL data type	Possible conversion errors	Required property settings
1-byte unsigned Integer	PIC S9(9) COMP (Integer 32-bit)	None	None
1-byte unsigned Integer	DISPLAY Zoned Decimal	None	C
Boolean	DISPLAY Zoned Decimal	None	C

No other data type conversions from Automation to COBOL are supported by TI at this time.

> **Note** When the COBOL usage is DISPLAY without a sign and you change the Automation type to String, the COBOL picture is changed to PIC X, which has the same internal data representation. The length remains the same and therefore does not affect your mainframe program.

See Also

Supported TI Data Types

Converting Data Types from OS/390 COBOL to Automation

Data Type Conversion

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Converting Data Types from OS/390 COBOL to Automation

Use the tables in this topic as a guide when you set up the way you want Transaction Integrator (TI) to handle conversions from COBOL data types to Automation data types. For more information about the specific data types, see Supported TI Data Types.

Use the following code key to interpret the codes in the **Possible Conversion Errors** and **Required Property Settings** columns in each table.

Code	Description
r	Range errors possible.
b	Possible loss of precision due to base 2 to base 16 conversion.
p	Possible loss of precision due to picture format scale specification.
m	Mapping errors possible.
f	yyyyddd and hhmmss.
A	You must specify **Truncate**, **Round**, or **Error** under **Error handling** on the **COBOL Definition** tab of the property page.
C	You must specify the precision and scale by filling in the **Digits left** and **Digits right** boxes on the **COBOL Definition** tab of the property page.
D	You must specify the string width by filling in the **Size** box on the **COBOL Definition** tab of the property page.
E	Unicode or EBCDIC mapping information is required, such as a code page.
F	For arrays whose length is less than the maximum specified, you must specify **Size of Filler** under **Trailing filler** on the **COBOL Definition** tab of the property page.
G	You must specify how strings should be dealt with. Click **Space Padded** or **Null terminated** under **String Delimiting** on the **COBOL Definition** tab of the property page. Then click **Truncate** or **Error** under **Error handling** on the **COBOL Definition** tab of the property page to specify what TI should do if the string is too long.
H	Maximum size is required.
I	Localization is required.
J	Optional SO and SI insertion and deletion is supported.

The following table shows the defaults that TI uses when you import COBOL source code.

Default (occurs unless overridden by developer)

From OS/390 COBOL data type	To Automation data type	Possible conversion errors	Required property settings
COMP-1	4-byte Real (Single)	b,r	None
COMP-2	8-byte Real (Double)	b,r	None
COMP-3 Packed Decimal	Currency	p	AC
COMP-3 Packed Decimal	Decimal	p	AC
DATE and TIME	Date	None	I
TIME only	Date	None	I
DATE only	Date	None	I
PIC X	Variable-length String	m	DEG
PIC X No Translation	1-byte unsigned Integer	None	None
PIC S9(4) COMP (Integer 16-bit)	2-byte signed Integer	None	None
PIC S9(4) COMP (Integer 16-bit)	Boolean	None	None
PIC S9(9) COMP (Integer 32-bit)	4-byte signed Integer	None	None
OCCURS fixed TIMES	Array	None	None

> **Note** When you convert fractional numbers from Packed Decimal or distributed program call (DPC) Zoned Decimal data types, you should convert to Visual Basic Decimal data type.

For COMP, COMP-3, and DISPLAY numeric COBOL data types, the default is based on the precision and scale shown in the following table. When COBOL uses DISPLAY without a sign and you change the Automation type to String, the COBOL picture is changed to PIC X, which has the same internal data representation. The length remains the same and therefore does not affect your mainframe program.

Precision and scale for OS/390 COBOL	To Automation data type

Precision 1-4, scale 0	2-byte signed Integer
Precision 5-9, scale 0	4-byte signed Integer
Precision 5-7, scale 3-7	4-byte Real
Precision 8-18, scale 3-18	8-byte Real
Precision 1-18, scale 1-2	Currency
Precision 10-18, scale 0	Decimal

The following table shows the other supported data type mappings that you can set in TI Project to override the defaults presented previously in this topic.

Supported in Transaction Integrator (can be specified by the developer)

From OS/390 COBOL data type	To Automation data type	Possible conversion errors	Required property settings
COMP-1	Array	None	None
COMP-2	Array	None	None
COMP-3 Packed Decimal	2-byte signed Integer	p,r	AC
COMP-3 Packed Decimal	4-byte signed Integer	p,r	AC
COMP-3 Packed Decimal	4-byte Real (Single)	p,r	AC
COMP-3 Packed Decimal	8-byte Real (Double)	p	C
COMP-3 Packed Decimal	Boolean	None	None
COMP-3 Packed Decimal	1-byte unsigned Integer	r	None
COMP-3 Packed Decimal	Array	None	None
DISPLAY Zoned Decimal	2-byte signed Integer	p,r	AC
DISPLAY Zoned Decimal	4-byte Real (Single)	p,r	AC
DISPLAY Zoned Decimal	8-byte Real (Double)	p,r	AC
DISPLAY Zoned Decimal	Currency	p,r	AC
DISPLAY Zoned Decimal	Decimal	p,r	AC
DATE and TIME	Array	None	None
TIME only	Array	None	None
DATE only	Array	None	None
PIC X	Array	None	None
PIC X No Translation	Array	None	None
PIC G	Variable-length String	m	DEGJ
PIC G	Array	None	None
PIC S9(4) COMP (Integer 16-bit)	1-byte unsigned Integer	r	None
PIC S9(4) COMP (Integer 16-bit)	Array	None	None
PIC S9(9) COMP (Integer 32-bit)	Boolean	None	None
PIC S9(9) COMP (Integer 32-bit)	1-byte unsigned Integer	r	None
PIC S9(9) COMP (Integer 32-bit)	Array	None	None
PIC S9(?)V9(?) COMP (16-bit)	4-byte Real (Single)	p,r	None
PIC S9(?)V9(?) COMP (16-bit)	8-byte Real (Double)	p,r	None
PIC S9(?)V9(?) COMP (16-bit)	Currency	p,r	None
PIC S9(?)V9(?) COMP (16-bit)	Decimal	p,r	None
PIC S9(?)V9(?) COMP (32-bit)	4-byte Real (Single)	p,r	None
PIC S9(?)V9(?) COMP (32-bit)	8-byte Real (Double)	p,r	None
PIC S9(?)V9(?) COMP (32-bit)	Currency	p,r	None
PIC S9(?)V9(?) COMP (32-bit)	Decimal	p,r	None
OCCURS DEPENDING ON	Array	None	None

> **Note** When you convert fractional numbers from Packed Decimal or DPC Zoned Decimal data types, you should convert to Visual Basic Decimal data type.

The following table shows additional supported data type mappings that the TI run-time environment supports.

Supported only by the TI run-time environment

From OS/390 COBOL data type	To Automation data type	Possible conversion errors	Required property settings
DISPLAY Zoned Decimal	1-byte unsigned Integer	None	AC

DISPLAY Zoned Decimal	4-byte signed Integer	None	AC
DISPLAY Zoned Decimal	Boolean	None	AC

No other data type conversions from COBOL to Automation are supported by TI at this time.

See Also

Supported TI Data Types

Converting Data Types from Automation to OS/390 COBOL

Data Type Conversion

Converting Data Types from Automation to RPG

Use the following table as a guide when you specify the way you want Transaction Integrator (TI) to handle conversions from Automation data types to Report Program Generator (RPG) data types.

TI Project default	RPG data type	Spec-ification	Field length	Field length meaning	Decimal places
Boolean (default)	Integer	I	5	digits	Blank
Boolean	Integer	I	10	digits	Blank
Boolean	Packed	P	3	digits	Blank,0
Byte (default)	Character	A	1	bytes	Blank
Byte	Unsigned	U	3-9	digits	Blank
Byte	Packed	P	3	digits	Blank,0
Byte	Integer	I	3-9	digits	Blank
Currency (default)	Packed	P	1-30	digits	Blank,0-4
Currency	Zoned	S	1-30	bytes	Blank,0-4
Currency	Binary	B	1-4	digits	Blank,0-4
Currency	Binary	B	5-9	digits	Blank,0-4
Date (Date)	*MDY	None	8	bytes	Blank
Date (Date)	*DMY	None	8	bytes	Blank
Date (Date)	*YMD	None	8	bytes	Blank
Date (Date)	*JUL	None	6	bytes	Blank
Date (Date)	*ISO	None	10	bytes	Blank
Date (Date)	*USA	None	10	bytes	Blank
Date (Date)	*EUR	None	10	bytes	Blank
Date (Date)	*JIS	None	10	bytes	Blank
Date (Time)	*HMS	None	8	bytes	Blank
Date (Time)	*ISO	None	8	bytes	Blank
Date (Time)	*USA	None	8	bytes	Blank
Date (Time)	*EUR	None	8	bytes	Blank
Date (Time)	*JIS	None	8	bytes	Blank
Date	Timestamp	Z	Number?	bytes	Blank
Decimal	Float	F	4	Bytes	Blank
Decimal	Float	F	8	Bytes	Blank
Decimal (default)	Packed	P	1-30	digits	Blank,0-30
Decimal	Zoned	S	1-30	bytes	Blank,0-30
Decimal	Binary	B	1-4	digits	Blank,0-4
Decimal	Binary	B	5-9	digits	Blank,0-9
Double (default)	Float	F	8	bytes	Blank
Double [1]	Packed	P	1-30	digits	Blank,0-30
Double [1]	Zoned	S	1-30	bytes	Blank,0-30
Double	Binary	B	1-4	digits	Blank,0-4
Double	Binary	B	5-9	digits	Blank,0-9
Integer (default)	Integer	I	1-5	digits	Blank
Integer	Packed	P	1-30	digits	Blank,0
Integer	Zoned	S	1-30	bytes	Blank,0
Integer	Binary	B	1-5	digits	Blank,0
Long (default)	Integer	I	1-9	digits	Blank
Long	Packed	P	1-30	digits	Blank,0
Long	Zoned	S	1-30	bytes	Blank,0
Long	Binary	B	1-9	digits	Blank,0
Single (default)	Float	F	4	bytes	Blank
Single [1]	Packed	P	1-30	digits	Blank,0-30
Single [1]	Zoned	S	1-30	bytes	Blank,0-30
Single	Binary	B	1-9	digits	Blank,0-9

String (default)	Character	A	1-32755	Bytes==Char	Blank
String	Graphic	G	1-16371	Char	Blank

Warning Note [1] in the preceding table indicates that when you convert whole or fractional numbers from Visual Basic Single or Visual Basic Double data types to Packed Decimal or distributed program call (DPC) Zoned Decimal data types, TI is limited to a precision from 1 through 18 digits to the left of the decimal point (for example, 1.2345678901234567E+17).

Note While TI left-justifies all strings, the RPG MOVE command right-justifies all strings. If you are programming an RPG application, use the MOVEL or EVAL commands to perform the equivalent operation in RPG while manipulating a string.

See Also

Supported TI Data Types

Converting Data Types from RPG to Automation

Data Type Conversion

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Converting Data Types from RPG to Automation

Use the following tables as a guide when you set up the way you want Transaction Integrator (TI) to handle conversions from report program generator (RPG) data types to Automation data types. For more information about the specific data types, see Supported TI Data Types.

The following table describes the TI Project property abbreviations used in the data type tables that follow.

Abbreviation	Description
t	Truncate
e	Error
r	Round
sp	Space pad
nt	Null terminate
SO	Add leading shift in
SI	Add trailing shift out
PE	Pack even
TIP	TI Project

Pack even (PE) indicates that the definition specification uses the pack even option for RPG. PE indicates that the precision is an even number of digits when the From and To specification positions are used, which implies a byte count instead of a digit count and which might mean that the high-order digit position is ignored. For example, the following table shows how the number 256 in an RPG packed field is represented in internal memory.

> **Note** For purposes of this example, the number 256 fits in 2 bytes of memory in both the PE and No PE option.

Packed data type option	Byte 1		Byte 2	
	High-order byte high-order nibble	High-order byte low-order nibble	Low-order byte high-order nibble	Low-order byte Sign
No PE	2	5	6	0xf
PE	ignored	5	6	0xf

RPG data type	Spec-ification	RPG field length	TIP data type	TIP default error handling	TIP default field length	TIP default decimals	TIP default string handling
Character	A	1	Byte	None	None	None	None
Character	A	1-32755	String	t,e	80	None	sp,nt
Graphic	G	1-16371	String	t,e	80	None	sp
Binary	B	1-4	Currency	t,r,e	4	2	None
Binary	B	5-9	Currency	t,r,e	9	2	None
Binary	B	1-4	Decimal	t,r,e	4	2	None
Binary	B	5-9	Decimal	t,r,e	9	2	None
Binary	B	1-4	Double	t,r,e	4	2	None
Binary	B	5-9	Double	t,r,e	9	2	None
Binary	B	1-5	Integer	t,r,e	4	None	None
Binary	B	1-9	Long	t,r,e	9	None	None
Binary	B	1-9	Single	t,r,e	4	2	None
Integer	I	5	Boolean	None	None	None	None
Integer	I	10	Boolean	None	None	None	None
Integer	I	3-9	Byte	t,r,e	3	None	None
Integer	I	1-5	Integer	t,r,e	4	None	None
Integer	I	1-5	Long	t,r,e	9	None	None
Packed	P	3	Boolean	None	None	None	None
Packed	P	3	Byte	t,r,e,npe	3	None	None
Packed	P	1-30	Currency	t,r,e	8	2	None
Packed	P	1-30	Decimal	t,r,e	8	2	None
Packed	P	1-30	Double	t,r,e	8	2	None

Packed	P	1-30	Integer	t,r,e	3	None	None
Packed	P	1-30	Long	t,r,e	5	None	None
Packed	P	1-30	Single	t,r,e	8	2	None
Zoned	S	1-30	Currency	t,r,e	15	2	None
Zoned	S	1-30	Decimal	t,r,e	15	2	None
Zoned	S	1-30	Double	t,r,e	15	2	None
Zoned	S	1-30	Integer	t,r,e	5	None	None
Zoned	S	1-30	Long	t,r,e	9	None	None
Zoned	S	1-30	Single	t,r,e	15	2	None
Unsigned	U	3-9	Byte	t,r,e	3	None	None
Float	F	4	Decimal	t,r,e	None	None	None
Float	F	8	Decimal	t,r,e	None	None	None
Float	F	8	Double	t,r,e	8	None	None
Float	F	4	Single	t,r,e	4	None	None
Date	D	None	Date	None	None	None	None
Time	None	None	None	None	None	None	None
Time-stamp	None	None	None	None	None	None	None

RPG Date format name	Format	Range	Bytes
*MDY	mm/dd/yy	01/01/40 to 12/31/39	8
*DMY	dd/mm/yy	01/01/40 to 31/12/39	8
*YMD	yy/mm/dd	40/01/01 to 39/12/31	8
*JUL	yy/ddd	40/001 to 39/365	6
*ISO	yyyy-mm-dd	0001-01-01 to 9999-12-31	10
*USA	mm/dd/yyyy	01/01/0001 to 12/31/0000	10
*EUR	dd.mm.yyyy	01.01.0001 to 31.12.9999	10
*JIS	yyyy-mm-dd	0001-01-01 to 9999-12-31	10

RPG Time format name	Format	Range	Bytes
*HMS	hh:mm:ss	00:00:00 to 24:00:00	8
*ISO	hh.mm.ss	00:00:00 to 24:00:00	8
*USA	hh:mm AM or hh:mm PM	00:00 AM to 12:00 AM	8
*EUR	hh.mm.ss	00.00.00 to 24.00.00	8
*JIS	hh:mm:ss	00:00:00 to 24:00:00	8

RPG Timestamp Format	Bytes
yyyy-mm-dd-hh.mm.ss.mmmmmm	26

See Also

Supported TI Data Types

Converting Data Types from Automation to RPG

Data Type Conversion

Converting Data Types from COM to .NET

Transaction Integrator (TI) supports the following COM data types.

COM data type	.NET data type
Boolean	Boolean
Byte	Byte
Char	Char
Currency	<No corresponding type>
Date	DateTime
Decimal	Decimal
Double	Double
Integer	Int16
Long	Int32
Recordset	Datatable
Single	Single
String	String
User-defined type	Structure
Variant	Object

See Also

Supported TI Data Types

Converting Data Types from .NET to COM

Data Type Conversion

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Converting Data Types from .NET to COM

Transaction Integrator (TI) supports the following .NET common language runtime (CLR) data types.

.NET data type	COM data type
Boolean	Boolean
Byte	Byte
Char	Char
Datatable	Recordset
DateTime	Date
Decimal	Decimal
Double	Double
Int16	Integer
Int32	Long
Object	Variant
Single	Single
String	String
Structure	User-defined type

See Also

Supported TI Data Types

Converting Data Types from COM to .NET

Data Type Conversion

Zoned Decimal or Packed Decimal Data Types

When it imports a host data declaration, Transaction Integrator (TI) converts Zoned Decimal (COBOL numeric PIC with DISPLAY or no USAGE, or RPG S data type) or Packed Decimal data types to Decimal or Currency Automation data types, respectively. Depending on the development application you are using, there might not be an equivalent for Decimal or Currency data types. If this is the case, use one of the following techniques to ensure that the data type works correctly with TI:

- Use language-supplied functions to manipulate the Automation types for Decimal or Currency.
- Within TI Project, if the data type has a fractional component, modify the method's parameter from the Decimal or Currency data type to the Floating Point Binary data type (double or single precision as appropriate). You can substitute a 16-bit or 32-bit binary Integer data type if the data declaration has no fractional component and the number of data declaration digits fits within the expected range.

  Note When you use the Floating Point Binary data type, the likelihood of a data conversion precision problem increases if fractions are involved. TI offers three options to handle data precision errors: Round (default), Truncate, or Error. The double-precision Floating Point Binary data type can handle host data declarations of up to fifteen digits.

See Also

COBOL FILLER

Using REDEFINES in COBOL

Converting Data Types from RPG to OS/400 COBOL

The Transaction Integrator (TI) run-time environment supports the use of OS/400 COBOL running on an AS/400 computer. The following table lists the Report Program Generator (to data type conversions supported by the TI run-time environment.

RPG data type	OS/400 COBOL data type
Type A	PIC X
Type G	PIC G
Type S	PIC S99v99 Display
Type L **Note** Type L is not supported by the TI run-time environment.	PIC S99v99 Display Sign Leading Separate
Type R **Note** Type R is not supported by the TI run-time environment.	PIC S99v99 Display Sign Trailing Separate
Type P	PIC S99v99 Comp
Type B **Note** Type B is not supported by the TI run-time environment.	PIC S99V99 Comp
Type I 5 digits	PIC S9(1) to S9(4) Comp-3
Type U 5 digits **Note** Type U 5 is not supported by the TI run-time environment. Use Type I 5 instead.	PIC 9(1) to 9(4) Comp-3
Type I 10	PIC S9(5) to S9(9) Comp-3
Type U 10 **Note** Type U 10 is not supported by the TI run-time environment. Use Type I 10 instead.	PIC 9(5) to 9(9) Comp-3
Type F 4	COMP-1
Type F 8	COMP-2
Type D	None
Type T	None
Type Z	None

See Also

Supported TI Data Types

Data Type Conversion

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Integer Data Type

Binary Integer data types apply to COBOL COMP and Report Program Generator (RPG) Integer data types. Automation data types support only a 16-bit or 32-bit Integer. Therefore, you should ensure that your client application is passing binary integer equivalents to the Transaction Integrator (TI) Automation server.

See Also

Data Types

Decimal Data Type in Visual Basic

If the client application uses Visual Basic 6.0 and includes the DECIMAL data type, the decimal value in Visual Basic must be defined as a Variant, and then assigned a decimal value by the Visual Basic function **CDec**. This must be done for the component to execute properly within the TI component.

The following is an example:

```
Dim xxx as Variant
xxx = CDec(27)
```

If the client application uses Visual Basic .NET, the DECIMAL data type is defined directly.

See Also

Data Types

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Variant Data Type

The type of each element in a message is fixed and defined by the information in the component library. Because mainframe programs do not support the Variant data type, you must fix the type of each parameter at design time in Transaction Integrator (TI) Project. Microsoft Visual Basic Scripting Edition (VBScript), which is often used to create Active Server Pages (ASP) in Web-based applications, supports only the Variant data type. It does not accept declared variables. As a result, if your COM+ client application calls a TI Automation server and passes parameters with Variant data types, the TI run-time environment forces each Variant data type into the type for each parameter as defined in the TI component library.

The Variant data type is not supported in Visual Basic .NET. Visual Basic .NET supports defining data types as objects, and then casting the objects as data types. TI does not support variables defined as objects cast to data types. All method parameters must be defined initially as data types, not objects.

See Also

Data Types

Recordsets and Datatables

A recordset is an Automation object that is a fixed-size, bounded, or unbounded table that contains simple rows of host data declarations (data types). A datatable is a .NET object that is identical to a recordset in every regard, except that you cannot use the **NewRecordset** function with datatables. After you have a recordset or datatable object, you can call methods on that object to gain access to its rows.

A recordset or datatable is implemented on top of row sets by Remote Data Service (RDS), which is a part of Microsoft Data Access Components (MDAC) version 2.5. You can use the **RDSServer.DataFactory** object to create a recordset or datatable and use ActiveX® Data Objects (ADO) to update or read the recordset.

A recordset or datatable provides a means of presenting and manipulating tabular data. Currently, recordsets cannot be nested, cannot contain arrays, and cannot contain user-defined types (UDTs).

Support for recordsets and databales enables TI to support what is effectively an array of a structure (or a record, in COBOL terminology) as well as a structure. A structure is represented as a fixed-size recordset or datatable where each column in the row contains a single data element. To deal with mainframe programming issues, TI classifies recordsets and datatables as fixed-size, bounded, or unbounded, in reference to the number of rows contained in the recordset or datatable.

> **Important** The OS/400 distributed program calls (DPC) programming model supports only fixed size recordsets and datatables. The programming model does not support unbounded recordsets and datatables, nor does it support the use of the OCCURS DEPENDING ON clause, or variably-sized recordsets and datatables.

For fixed-size, bounded, and unbounded TI recordsets and datatables, the layout of all rows in a particular recordset is the same and is defined at design time by using TI Project. If a recordset or datatable is an output or return value from the mainframe, TI run-time environment uses the **RDSServer.DataFactory** object to create a recordset or datatable and ADO to fill the recordset or datatable with the rows of data returned from the mainframe program.

Such a recordset is a disconnected recordset with a cursor type of adOpenForwardOnly. To scan the recordset requires calling **MoveFirst** and **MoveNext** to move through the rows. The recordset can be updated in place, but because it is disconnected from the true data source (the data source manipulated by the mainframe program that returned the data), the updates are not propagated to the original data source.

NewRecordset is a function that is supplied automatically for all TI components. This function is called to create a disconnected recordset object that can be passed into a TI method call. **NewRecordset** is provided as a convenience for TI client applications; it is not required to pass a recordset to a TI component's methods. The function can be called only for input or input/output recordset objects. The TI run-time environment creates a recordset object when the parameter is an output recordset object.

This section contains:

- Example Using the New Recordset Call
- Fixed-Size Recordsets
- Bounded Recordsets
- Unbounded Recordsets
- RDS Recordset Requirements for Web Clients
- Recordset Creation When Importing COBOL

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Example Using the New Recordset Call

The following example code uses the **NewRecordset** property to create a new disconnected recordset object, and it passes the object as an input parameter to a Transaction Integrator (TI) method by way of the **IDispatch** interface. The *bstrName* parameter in the **IDispatch** call is the name of the recordset object (for example, **Recordset1**) as specified in TI Project. The call returns the dispatch pointer to an ActiveX® Data Objects (ADO) database recordset object if the call is successful. If the call is not successful, a NULL pointer is returned.

```
IDispatch * NewRecordset(
  BSTR bstrName);

Dim pMyRecord as Object
Dim pMyComponent as Object
Dim varFields(2) as Variant
Dim varValues(2) as Variant
On Error Goto SomeErrorHandler

' Create an instance of the TI object
set pMyComponent = CreateObject("MyComponent.Interface1")

' Create an instance of a recordset object
set pMyRecord = pMyComponent.NewRecordset("Recordset1")

' Fill in some recordset fields
varFields(0) = CStr("member1")
varFields(1) = CStr("member2")
varValues(0) = CInt(99)
varValues(1) = CLng(999)

' Add the recordset fields and values to the recordset object
pMyRecord.AddNew varFields, varValues

' Call the method with the recordset object as a parameter
pMyComponent.Method1(pMyRecord)
```

The TI run-time environment performs some compatibility checks between the structure definition for the recordset in the component library and the recordset object seen at run time. Any incompatibility will result in an Automation exception.

> **Note** Because a recordset cannot be nested, cannot contain arrays, and cannot contain user-defined types (UDTs), a COBOL data structure that is imported into TI Project might be flattened, resulting in an increase in the number of parameters that must be handled on the Automation side.

See Also

Fixed-Size Recordsets

Bounded Recordsets

Unbounded Recordsets

RDS Recordset Requirements for Web Clients

Recordset Creation When Importing COBOL

Fixed-Size Recordsets

A fixed-size recordset holds a fixed number of rows that is exactly equal to the maximum number of rows that you specified at design time in Transaction Integrator (TI) Project. A parameter or return value can be defined as a fixed-size recordset for any of the TI programming models.

Among the three possible types of recordsets or datatables (fixed-size, bounded, or unbounded), the TI default is fixed-size.

If the COBOL data declaration contains an OCCURS DEPENDING ON clause, each OCCURS DEPENDING ON clause requires two parameters:

- The size of the OCCURS DEPENDING ON clause.
- The data representation (a single element or a COBOL record) within the OCCURS DEPENDING ON clause.

If the COBOL contains an OCCURS DEPENDING ON clause, when the recordset or datatable is returned to TI and processed at run time, the TI run-time environment looks for the value of the size parameter corresponding to the named parameter (from the OCCURS DEPENDING ON clause). When it sends a fixed-size recordset as an input parameter to the mainframe, the TI run-time environment sets the COBOL size parameter with the actual number of rows in the recordset.

The DPC programming model on the AS/400 platform supports a modified version of OCCURS DEPENDING. By using the OCCURS DEPENDING property to select a parameter to specify size for the array, DPC-invoked programs can receive and send arrays that are partially populated. For example, you might have a structure that is defined to occur 10 times and that you want to return to the client. However, there might be fewer than 10 occurrences that actually contain valid data (for example, if the array was filled from a database table that contained fewer than 10 rows). If you define the array using the OCCURS DEPENDING property, you do not have to fill the remaining occurrences with dummy data. The TI run-time environment will pass only the filled occurrences back to the client.

See Also

Example Using the New Recordset Call

Data Transfer Options

Bounded Recordsets

Unbounded Recordsets

Using the OCCURS DEPENDING Clause to Define Variable-length Table

Using Variably Sized Rows

Using Bounded Final Fields

RDS Recordset Requirements for Web Clients

Recordset Creation When Importing COBOL

Bounded Recordsets

A recordset that is the last input parameter or the last output parameter in a method can be bounded. This means its actual size (number of rows) can vary from zero up to the maximum number of rows specified at design time. A parameter or return value can be defined as a bounded recordset for all of the Transaction Integrator (TI) programming models except OS/400 distributed program calls (DPCs). The DPC programming model does not support bounded recordsets, datatables, or arrays.

A bounded recordset, datatable, or array must be the last parameter in a particular direction. The last input parameter can be bounded if it is a recordset or an array and there are no following input/output parameters. The last output parameter can be bounded if it is a recordset or an array and there are no following input/output parameters. An input/output parameter can be bounded if it is a recordset or an array and is the final parameter. The mainframe transaction program (TP) is responsible for sending a table of the correct size, depending on the number of elements or rows in use.

Whereas a fixed-size recordset must send the exact number of rows defined as the maximum within the recordset, the number of rows in a bounded recordset can vary from zero to the maximum.

Among the three possible types of recordsets (fixed-size, bounded, or unbounded), the TI default is fixed-size. To change a fixed-size recordset into a bounded recordset within Designer, set the property "variable sized final field" on the method that contains the parameter defined as a recordset to be bounded, to true.

See Also

Example Using the New Recordset Call

Fixed-Size Recordsets

Unbounded Recordsets

RDS Recordset Requirements for Web Clients

Recordset Creation When Importing COBOL

Unbounded Recordsets

The number of rows in an unbounded recordset or datatable is not specified (defined) before run time. A parameter or return value can be defined as an unbounded recordset or datatable for any of the following Transaction Integrator (TI) programming models:

- CICS User Data LU 6.2
- TCP Transaction Request Message User Data
- IMS User Data LU 6.2
- IMS Implicit
- IMS Explicit
- IMS Connect

  Note In the IMS Connect programming model, TI supports only output parameters as unbounded recordsets or datatable. In other words, you cannot send unbounded recordsets or datatables to the host from TI if you are using the IMS Connect model.

An unbounded recordset or datatable is always transmitted to or from the mainframe after all other data. TI supports at most one unbounded input parameter and one unbounded output parameter, and each must be the last parameter in a direction.

To make a fixed size recordset or database unbounded, use the designer to set the **Unbounded** property of the recordset to true. The property **Variable Sized Final Field** on the method associated with the unbounded recordset must be false.

After defining a recordset or datatable as unbounded, the designer **recordset** property class will contain a property called **variably sized rows**. Use this property to determine how the length of the row will be represented.

Unbounded recordsets or datatable that contain variably sized rows must receive the size of the recordset or datatable first, and then receive the data. Therefore, the size of the recordset or datatable must be sent first followed by a second send that contains the data. If TI expects to receive an unbounded recordset or datatable with variably sized rows, CICS must first send the length of the row, and then send the data for that row. These two steps are repeated for each row of the recordset or datatable. TI detects that there is no more data because CICS stops sending and an unbounded recordset or datatable must always be the last parameter sent to TI.

See Also

Example Using the New Recordset Call

Fixed-Size Recordsets

Bounded Recordsets

RDS Recordset Requirements for Web Clients

Recordset Creation When Importing COBOL

RDS Recordset Requirements for Web Clients

If you have a Web-based Automation client application that uses a Remote Data Service (RDS) recordset control (most likely bound to a grid control) to display a table returned from a mainframe transaction program (TP), RDS requires that:

- The returned table be described as a recordset when you import your host data declaration into Transaction Integrator (TI) Project.
- The recordset be the return value from the method. The RDS control uses the HTTP protocol to marshal the recordset from the TI component on the server to the Web browser.

When you import a host data declaration, you must describe the table as a recordset. For more information, see Recordset Creation When Importing COBOL.

When you create the Automation method for your TI component in TI Project, be sure to have the method return the recordset as a return type instead of defining the recordset as a parameter. If you are importing the host code, when TI Project requests that you select the return value item, select the group item level for your table in the host declaration. To manually create a method, first manually describe or import the recordset in TI Project. Then use the **Insert** menu item to add the method that the Web client will call. Select the recordset you just described from the data type submenu list.

There are other properties that you can set on the recordset that is being returned. For details, see the shortcut Help for the **Recordsets** property page.

See Also

Example Using the New Recordset Call

Fixed-Size Recordsets

Bounded Recordsets

Unbounded Recordsets

Recordset Creation When Importing COBOL

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Recordset Creation When Importing COBOL

When you import COBOL in Transaction Integrator (TI) Project, you can choose between two ways to create recordsets and datatables: automatically and explicitly.

When you import COBOL to create or update an Automation method, TI Project automatically creates recordsets and datatables when it encounters a fixed or variable-length table (OCCURS clause). The value for the OCCURS clause's length specifier can be any value greater than or equal to 1. The table must conform to recordset rules, which means that it cannot contain arrays, and it cannot contain nested tables that cannot be flattened.

When you import COBOL to explicitly create or update a recordset or datatable, you can select any group item that conforms to recordset rules. For importing recordsets and datatables, the group item does not need to have an OCCURS clause. If an OCCURS clause is present, it is ignored.

Example

The following COBOL source code was imported using the Import COBOL Wizard. The INVOICES table was selected as the return value for the method.

```
01 CUSTOMER-DATA.
    05 CUSTOMER-NUMBER                PIC 9(9).
    05 INVOICES OCCURS 50 TIMES.
       10 INVOICE-NUMBER              PIC 9(9).
       10 INVOICE-DATE                PIC 9(7) COMP-3.
       10 INVOICE-AMOUNT              PIC S9(13)V9(2) COMP-3.
       10 INVOICE-DESCIPTION          PIC X(40).
    05 LAST-NAME                      PIC X(20).
    05 FIRST-NAME                     PIC X(20).
```

The resulting method was imported as:

```
GetInvoices(lCustomerNumber As Long, strLastName As String, strFirstName As String) As Object
```

The following Visual Basic code demonstrates how to call this method:

```
Dim objCustomer As Object   'Uses late binding
Dim objInvoices As ADODB.Recordset
Dim lCustomerNumber As Long
Dim iRow As Integer
Dim iCol As Integer
Dim strLastName As String
Dim strFirstName As String

'create an instance of the invoicing object
On Error GoTo ErrorHandler1
Set objCustomer = CreateObject("Customer.Invoicing.1")

lCustomerNumber = CLng(txtCustomerNumber)
'See the WebSite folder under the CedarBank Tutorial folder
'for an example of returning recordsets into an RDS
'recordset on a web site

'invoke the GetInvoices method
On Error GoTo ErrorHandler2
Set objInvoices = objCustomer.GetInvoices(lCustomerNumber _
    , strLastName, strFirstName)
'
' Transfer the Recordset data to a variant array in a single operation.
' This is efficient, but may not be suitable for larger Recordsets.
'
Dim Data As Variant
```

```
Data = objInvoices.GetRows
grdInvoices.Rows = UBound(Data, 2) + 1
grdInvoices.Cols = UBound(Data, 1) + 1
For iRow = 0 To UBound(Data, 2)
    grdInvoices.Row = iRow
    For iCol = 0 To UBound(Data, 1)
        grdInvoices.Col = iCol
        grdInvoices.Text = Data(iCol, iRow)
    Next iCol
Next iRow
```

See Also

Example Using the New Recordset Call

Fixed-Size Recordsets

Bounded Recordsets

Unbounded Recordsets

RDS Recordset Requirements for Web Clients

Arrays

Transaction Integrator (TI) supports multidimensional arrays for all programming models except the OS/400 distributed program calls (DPCs). Only the outermost array of a multidimensional array can vary in size. All other arrays must be fixed-sized. For the OS/400 DPC programming model, TI supports only single-dimension arrays.

Arrays in Automation are actually SAFEARRAYs that contain information about their bounds as well as the data for the array elements. SAFEARRAYs are mapped to fixed-size arrays on the mainframe. SAFEARRAYs have a variable size and require custom information to be marshaled to and from fixed-size arrays on the mainframe.

Arrays are created on the mainframe during the import process when a simple data type has one or more OCCURS clauses or DIM keywords. The OCCURS clause can represent a fixed or variable-length table. Although it is possible in COBOL to have nested OCCURS DEPENDING clauses, only the OCCURS DEPENDING length specifier for the outermost table dimension is supported by TI. TI Project ignores nested length specifiers.

The mainframe developer might want to reflect the fixed nature of the array through to the COM object. The error-handling features of the TI run-time environment allow the developer to specify that an exception be raised if an array is not of the expected size. However, the mainframe developer might also want to take advantage of the flexible nature of SAFEARRAYs. TI supports an additional parameter that specifies the actual run-time size of the array. This parameter is supported with the same behavior as the OCCURS DEPENDING ON clause in COBOL. The maximum size of the array remains fixed, but the developer can determine the actual number of elements in the array received from the client.

The following custom information can be associated with either single or multidimensional arrays:

- Maximum size (on each dimension) (Integer: default 10). This value is automatically set to "x" if the COBOL imported into TI Project contains an OCCURS DEPENDING x TIMES clause.
- If the COBOL imported into TI Project contains an OCCURS DEPENDING ON clause, the actual size of the array is associated with the parameter specified by "name".

This section contains:

- Visual Basic and Arrays

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Visual Basic and Arrays

When you develop client applications with Microsoft Visual Basic Scripting Edition (VBScript), you cannot define methods that return arrays. If it is necessary to pass back array information, define an output parameter.

Transaction Integrator (TI) deals with multidimensional arrays in row major order. The outermost dimension of an array in COBOL equates to the leftmost dimension in an array on the Automation side. In Visual Basic, the convention is to use column major order for multidimensional arrays. Therefore, when you access multidimensional arrays in Visual Basic, remember that the array will be row major for TI purposes. This can be a problem if you use Visual Basic functions that deal with multidimensional arrays and expect those arrays to be in column major order. When you access individual array elements, however, this should not be a problem.

> **Warning** Manually re-dimensioning a multidimension array that was generated by TI yields might cause the component to function incorrectly.

> **Note** The Visual Basic command Option Base has no effect on COM SAFEARRAYs, such as those returned as Out or In/Out arrays from TI methods. These SAFEARRAYs always have a base value of 0, regardless of the option base setting.

Example

The following COBOL sample shows a variable-length table:

```
01 UPDATEARRAY-INPUT-AREA.
   05 CUSTOMER-NUMBER                    PIC 9(9) DISPLAY.
   05 LAST-NAME                          PIC X(20).
   05 FIRST-NAME                         PIC X(20).
   05 TABLE-LENGTH                       PIC 9(7) COMP-3.
   05 TABLE OCCURS 10 TIMES
         DEPENDING ON TABLE-LENGTH
         OF UPDATEARRAY-INPUT-AREA
                                         PIC S9(4) COMP.
```

TI Project creates the following method when you import the COBOL sample:

```
UpdateArray(lCustomerNo As Long, strLastName As String, strFirstName As String _
     , lcElements As Long, rgTable() As Integer)
```

The following Visual Basic code shows how to send and receive the table:

```
    Dim objCustomer As Object
    Dim i
    Dim rgTable() As Integer
    Dim lCustomerNo As Long
    Dim strLastName As String
    Dim strFirstName As String
    Dim lcElements As Long

    'create an instance of the invoicing object
    On Error GoTo ErrorHandler1
    Set objCustomer = CreateObject("Customer.Invoicing.1")

    lCustomerNo = 100231001
    strLastName = "Doe"
    strFirstName = "John"

    'Send over 5 elements
    lcElements = 5
    ReDim rgTable(lcElements)
    For i = 0 To lcElements - 1
        rgTable(0) = i
    Next i

    'invoke the UpdateArray method
    On Error GoTo ErrorHandler2
    objCustomer.UpdateArray lCustomerNo, strLastName, strFirstName _
        , lcElements, rgTable

    'lcElements now contains the number of elements returned in rgTable
```

See Also

Arrays

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User-Defined Types (UDTs)

In general, a user-defined type (UDT) is equivalent to a structure in C, C++, or Report Program Generator (RPG) records or group item levels in COBOL, and UDTs in Visual Basic. UDTs can contain primitive elements, arrays of elements, recordsets, and nested UDTs.

You can use UDTs to define parameters. A parameter can be defined as a single UDT or as an array of UDTs. Likewise, UDTs can describe a method's return value. A method's return value can be defined as a single UDT or as an array of UDTs. However, you cannot use a UDT to describe a column within a recordset.

TI requires that if you use Visual Basic to build your UDTs, you must use Visual Basic version 6.0 or later.

Before you compile a Visual Basic application that calls a TI component that defines a UDT and that references that UDT within the Visual Basic application, you need to deploy the TI component to register it. If you compile the application before you deploy the TI component or if you fail to deploy the component at all, the Visual Basic client application will not start.

The distributed program call (DPC) programming model for the AS/400 supports:

- Only single-level UDTs and .NET structures.
- Arrays of UDTs and structures.

The DPC programming model for the AS/400 does not support:

- Nesting of UDTs and structures.
- Arrays within UDTs and structures.
- Variable sized UDTs in which the last parameter is a string.

This section contains:

- Requirements for UDT Support in Windows 2000
- Using TI Project to Create UDTs
- Creating UDTs by Importing Host Definitions
- Arrays Defined in UDTs with Visual Basic

Requirements for UDT Support in Windows 2000

When Windows 2000 is installed, Transaction Integrator (TI) offers full functionality. Otherwise, TI restricts the use of user-defined types (UDTs). The functionality offered in this restricted mode is as follows:

- The TI Component Registrar recognizes that it is executing on a computer that does not have Service Pack 4 (SP4) installed. If the registrar is instructed to deploy a component when UDT support is not available, the registrar will search the type library to ensure that there are no UDTs. If UDTs are detected, the component deployment will fail and an error describing this failure will be written to the event log.
- TI Project recognizes that it is executing on a computer that does not have Windows 2000 installed. Although TI Project does not prevent UDTs within component descriptions, it warns users when UDTs are being used on a computer that does not have Windows 2000. Specifically, in TI Project, when the user attempts to save the type library, a UDT warning appears if UDTs are used in the component's description. This warning appears only after the first attempt to save a component description.

See Also

Using TI Project to Create UDTs

Creating UDTs by Importing Host Definitions

Arrays Defined in UDTs with Visual Basic

Using TI Project to Create UDTs

In Microsoft® Visual Studio® Transaction Integrator (TI) Project, you can create a user-defined type (UDT) manually by right-clicking the **User-Defined Type** folder, and then click **Add User-defined Type**. This automatically adds one member field of the type Integer. If only one member field exists in a UDT, you cannot delete that member field; you can only delete the entire UDT. You cannot delete a UDT if it is being used as a type by some other variable in the interface. The name of a UDT cannot be the same as a method name, recordset name, or any reserved names.

To add a member field to a UDT, right-click a previously defined UDT, and then click **Add User-defined Type Member**. A default member is created and can be modified by updating its properties in the **Properties** pane.

In addition to the **Automation** and **COBOL Definition** property pages for UDT member fields, an **Arrays** property page supports defining arrays of member fields, and a **Recordsets** property page supports definition of a maximum row count and options for recordset columns. The rules for arrays of recordsets are the same as for parameters. An OCCURS DEPENDING index must be one of the member fields above the array itself.

In TI Project, you can copy and paste UDT members from and to recordset members.

See Also

Requirements for UDT Support in Windows 2000

Creating UDTs by Importing Host Definitions

Arrays Defined in UDTs with Visual Basic

Creating UDTs by Importing Host Definitions

The parser phase of the host import function identifies any group-level clause as a possible user-defined type (UDT). UDTs are created when you specify creating or updating a UDT or as the result of creating a method that contains a UDT. When you create or update a method, there is an additional wizard page following the **Select Return Value** page for specifying that groups of data items are UDTs or recordsets. This page also enables you to cancel the selection of groups of data items as UDTs or recordsets. For backward compatibility, the default data type of a group-level clause is a recordset if the group level has an OCCURS keyword. Also for backward compatibility (that is, updating a method), if there is no OCCURS keyword, the group level is flattened by default.

See Also

Requirements for UDT Support in Windows 2000

Using TI Project to Create UDTs

Arrays Defined in UDTs with Visual Basic

Arrays Defined in UDTs with Visual Basic

In Visual Basic, if an array is defined within a user-defined type (UDT), you must re-dimension the array within the UDT before you populate the array. A UDT is a group of data types assigned to a single parameter, which is defined with an alias. In the following example, the UDT is defined within a Transaction Integrator (TI) type library, and not within the Visual Basic client.

The following example presents Visual Basic code that defines an array within a UDT:

```
*** Assign the udt defined within the comti typelib to a variable within the Visual Basic app
lication.
Dim ClientUDT as UDT1
*** assign values to string data type within UDT1
ClientUDT.string = "ABCDEFG"
*** assign size before populating
ReDim ClientUDT.array1(10).
** start assigning values to array within UDT.
ClientUDT.array1(1) = 100
```

Note In an array within a UDT, do not define the array within the Visual Basic client before you perform a re-dimension against the UDT. For all other data types within the UDT, you can immediately populate the values without having to define them within the Visual Basic client data declarations.

Note If you have an output or an in/out array inside a UDT, use a lower bound of zero for all array dimensions. Use zero because type libraries contain information only about array dimensions, not upper and lower bounds. Therefore, Convert has to choose them arbitrarily when it creates the arrays.

Note Report Program Generator (RPG) has additional limitations on the use of UDTs. RPG does not support:

- Nesting more than one level of arrays of UDTs.
- UDTs that contain recordsets within UDTs.

See Also

Requirements for UDT Support in Windows 2000

Using TI Project to Create UDTs

Creating UDTs by Importing Host Definitions

Transaction Request Messages

When you use TCP/IP to communicate with CICS, the client sends the host a transaction request message (TRM) request containing the Transaction Program ID, User ID, Password, and other administrative data to be used by the host. CICS sends the client a TRM reply containing additional administrative data. The data in the TRM is independent from the actual program data to be exchanged with the Transaction Program (TP) on the host.

You can find templates for various TRMs at **\*installation directory*\Microsoft Host Integration Server\system\TIM\MicrosoftTRMDefs.tim**. Use Microsoft Visual Studio .NET 2003 to open the file, and then expand the **User-Defined Types** node. The following TRMs are defined as UDTs:

- TRMIN_MSLink
- TRMOUT_MSLink
- TRMIN_MSCCS
- TRMIN_IBMCCS
- TRMOUT_CCS

You can also find templates for various enhanced listener messages (ELMs) at **\*installation directory*\Microsoft Host Integration Server\system\TIM\MicrosoftELMDefs.tim**. Use Microsoft Visual Studio .NET 2003 to open the file, and then expand the **User-Defined Types** node. The following ELMs are defined as UDTs:

- ELMIN_MSLink
- ELMOUT_MSLink
- ELMIN_MSCCS
- ELMIN_IBMCCS
- ELMOUT_CCS

You can create a TRM or ELM template in COBOL to assist with your programming by exporting the TRM or ELM definition.

To create a TRM template in COBOL

1. Open Microsoft Visual Studio .NET 2003.
2. On the **File** menu, point to **Open**, and then click **File**.
3. In the **Open File** dialog box, navigate to <drive>:\Program Files\Microsoft Host Integration Server\System\TIM\, and then click either **MicrosoftTRMDefs.tim** or **MicrosoftELMDefs.tim**.
4. On the **File** menu, click **Export Host Definition**.
5. In the **Export Host Definition** dialog box, type or select the file name, and then click **Save**.

You can substitute a custom TRM (or ELM) for the default TRM (or ELM) created by the TI runtime. Use the COMTIContext parameter to pass custom context data.

See Also

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Using Custom TRMs and ELMs with COMTIContext

Transaction Integrator (TI) developers can pass custom formatted transaction request messages (TRMs) or enhanced listener messages (ELMs) from a client program to the CICS system and receive custom formatted TRMs or ELMs.

Custom TRMs or ELMs are passed through context data. The context data is contained in the optional *COMTIContext* parameter defined in the client application code and must be the final parameter in the method call. A TRM destined for the host must be defined as a user-defined type (UDT) for the COM model, or a structure for the .NET model. The name of the UDT must begin with the characters TRMIN. A TRM reply from the host must also be defined as a UDT. The name of the UDT must begin with the characters TRMOUT. Examples of valid TRM names are: TRMINMyVeryOwn, TRMINStandard, TRMOUTMyVeryOwn, and TRMOUTStandard.

The type library or structure can contain multiple TRM definitions, but you should include only one TRM for each direction (that is, one TRMIN and one TRMOUT) in the COMTIContext parameter in a single method call. For example, in Visual Basic each COMTIContext array is declared as a single dimension dynamic array of variants (that is, the number of occurrences is not specified).

If you define multiple TRMs for the same direction, the TI run time uses only the first TRM it encounters in the context array. (In some circumstances, the first TRM encountered might not always be the first one that you added to the context array). The TI run time ignores the remaining TRMs in the array until the TRM in use is destroyed. To ensure that the TI run time uses the correct TRM, do not add multiple TRMs intended for the same direction to a context array.

> **Note** The client application that manipulates the Context array must be able to access the appropriate file at run time. If you are using Visual Basic 6.0, the application must be able to access COMTIContext.dll. If you are using Visual Basic .NET, the application must able to access Microsoft.HostIntegration.TI.ClientContext.dll.

> **Note** When you use Visual Basic .NET, the data structure used as a custom TRM must be associated to a parameter within the assembly. Therefore, you must create a dummy method within the assembly, a parameter assigned to the method, and the data structure to be used as the TRM. Failure to do so prevents you from referencing the structure within the Visual Basic .NET application. Associating a UDT to a method was not required in Visual Basic 6.0 because Visual Basic 6.0 allowed referencing of UDTs not associated with methods.

See Also

Transaction Request Messages

Sample Client Application That Passes a Custom TRM

Sample Client Application That Passes a Custom TRM

The following code samples passes a custom TRM:

```
Private Sub Command1_Click()
Dim Context() As Variant
Dim COMTIContext As Object
Dim CedarBank As New COMTI.TestContext
Dim Balance As Currency
Dim TRMIN As COMTI.TRMINTestTRM
Dim TRMOUT As COMTI.TRMOUTTestTRM
Dim COMMA As Byte

TRMIN.TranID = "TCCB"
TRMIN.CommaDelim = ","
TRMIN.CommAreaLen = 41
TRMIN.ProgName = "        "
TRMIN.User = "        "
TRMIN.PSWD = "        "

Set COMTIContext = CreateObject("COMTI.ContextObject")

COMTIContext.WriteContext "TRMINTestTRM", TRMIN, Context


COMTIContext.WriteContext "TRMOUTTestTRM", TRMOUT, Context

‘ Call using optional context data
CedarBank.cedrbank "Name", "ID1234", Balance, Context

‘ Call without optional context data
CedarBank.cedrbank "Name", "ID1234", Balance


End Sub
```

See Also

ClearAllContext

CountContext

DeleteContext

QueryContextInfo

ReadContext

WriteContext

Using Custom TRMs and ELMs with COMTIContext

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Overriding Settings in the Type Library

If you need to temporarily change certain data sent from the type library to the host, you can override the type library settings without changing the original file. Use the following keywords in combination with the COMTIContext parameter to override the type library setting:

- **REOverride**
- **TPNameOverride**
- **ProgNameOverride**
- **USERID**
- **PASSWORD**
- **IMS_LTERM**
- **TRMIN**
- **RMOUT**

The override remains active until either a new override is set or the override is deleted. Use the **WriteContext** function to set the override and the **DeleteContext** function to delete the override. If you delete the override, the value defaults to the setting in the original type library.

See Also

REOverride

TPNameOverride

ProgNameOverride

USERID

PASSWORD

IMS_LTERM

TRMIN

TRMOUT

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

Persistent Connections with the Mainframe

Windows-initiated processing (WIP) supports persistent connections over TCP/IP and SNA for the following programming models:

- TCP Transaction Request Message (TRM) Link
- TCP Enhanced Listener Message (ELM) Link
- TCP Transaction Request Message (TRM) User Data
- TCP Enhanced Listener Message (ELM) User Data
- OS/400 DPC
- CICS Link LU 6.2
- CICS User Data LU 6.2

Persistent connections are not supported in the following programming models:

- IMS Implicit
- IMS Explicit
- IMS LU 6.2

Windows Initiated Processing (WIP) Persistent connections allow you to maintain a single TCP connection or SNA conversation over multiple method calls to the host. In Host Integration Server 2000, COMTI had to open and close a connection each time a method call was made to the host. On the mainframe side, CICS had to start and stop a transaction program (TP). In Host Integration Server 2004, persistent connections allow Transaction Integrator (TI) to open a connection for the first method in a group of methods, make all the method calls, and then close the connection. On the mainframe side, CICS starts an instance of the transaction program, keeps the instance active between method calls, and then stops the program after the last call.

One of the major benefits from using persistent connections is that it allows CICS to maintain state across multiple method calls and allows for the use of local variables. Persistent connections are implemented and managed through the COMTIContext.

COMTIContext supports methods that flow to the COM+ or .NET application and updates client status information (**COMTIContext** array) or closes persistent connections.

UpdateContextInfo updates the client’s **COMTIContext** array with information obtained from the COM+ or .NET application object, but with no server object involvement.

ClosePersistentConnection closes persistent connections by contacting the COM+ or .NET application object, but with no server object involvement.

The client can obtain connection state information by calling the **GetConnectionInfo** method that is implemented by the **COMTIContext** object. In the case of a .NET method failure, the client must call **UpdateContextInfo** before it calls **GetConnectionInfo**.

A time-out mechanism reclaims orphaned persistent connections. The new **COMTIContext** keyword **CONNTIMEOUT** takes an integer value specifying, in seconds, how much time elapses before a persistent connection is considered abandoned, and then automatically closed. The timing starts as the client call processing is completed by the COM+ or .NET generic object.

GetConnectionInfo querys the status of a persistent connection. The following shows a COM-based method:

```
       HRESULT GetConnectionInfo (
            [in, out] SAFEARRAY(VARIANT)*COMTIContextArray,
            [out] BOOL* pfConnectionIsPersistent,
            [out] BOOL* pfConnectionIsViable);
```

The following shows the .NET-based equivalent:

```
        GetConnectionInfo (ref object[] contextArray,
            out bool fConnectionIsPersistent,
            out bool fConnectionIsViable).
```

The **COMTIContextArray** parameter is updated to reflect the state of the connection, the **pfConnectionIsPersistent** parameter contains TRUE if the connection is persistent and active, and the **pfConnectionIsViable** parameter contains TRUE if the connection is active.

UpdateContextInfo updates the client's **COMTIContext** array. The following shows a COM-based method:

```
        HRESULT UpdateContextInfo (
            [in, out] SAFEARRAY(VARIANT)*COMTIContextArray);
```

The following shows the .NET-based equivalent:

```
        UpdateContextInfo (ref object[] contextArray).
```

The **COMTIContextArray** parameter is updated to reflect the state of the connection. At a later time other information kept in the COM+ or .NET application might also be returned in the update **COMTIContextArray**.

ClosePersistentConnection closes a persistent connection without the need for a call to the server system. The following shows a COM-based method:

```
        HRESULT ClosePersistentConnection (
            [in, out] SAFEARRAY(VARIANT)*COMTIContextArray);
```

The following shows the .NET-based equivalent:

```
        ClosePersistentConnection (ref object[]COMTIContextArray).
```

The **COMTIContextArray** parameter is updated to reflect the state of the connection.

This section contains:

- Using Persistent Connections

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Using Persistent Connections

To establish a persistent connection, set the **COMTIContext** keyword **CONNTYPE** to **OPEN**. If a call with **CONNTYPE** set to **OPEN** completes successfully, the returned **COMTIContext** array **CONNTYPE** keyword has a value of **USE**.

To make a call and terminate the persistent connection, set the **CONNTYPE** keyword to **CLOSE**. If a call with **CONNTYPE** set to **CLOSE** completes successfully, the returned **COMTIContext** array **CONNTYPE** keyword has a value of **NON-PERSISTENT**.

After you set the **COMTIContext** keyword **CONNTYPE** to **OPEN**, **CONNTYPE** can be set to **USE**. However, this action is not mandatory because it is set to **USE** by default.

All TI objects include the intrinsic methods **ClosePersistentConnect** and **UpdateContextInfo** for use when dealing with persistent connections.

If the method call fails, the **COMTIContext** array cannot be updated and the client should call the intrinsic method **UpdateContextInfo** and then the **GetConnectionInfo** method on the **COMTIContextLib.ContextObject** to obtain updated status of the connection.

You can call **ClosePersistentConnection** at any time to close a persistent connection. The connection will be terminated and there will be no interaction with a server program.

The following Visual Basic 6.0 code sample shows how to use the **OPEN** and **CLOSE** method calls that might return an error. The sample also demonstrates how to determine whether a connection can still be used.

```
Public CtxCount As Long
Public COMTIContext() As Variant
Public ContextObj As COMTIContextLib.ContextObject

Dim fConIsPersistent as Boolean
Dim fConnIsViable as Boolean
Dim varConnType as Variant

Private Sub cmdBalance_Click(fCloseWIthMethod As Boolean)
  On Error GoTo ErrorHandler

OpenCall:
  varConnType = "OPEN"
  ContextObj.WriteContext "CONNTYPE", varConnType, COMTIContext
  lngReturn = objBank.cedrbank(txtName.Text, txtAccount.Text, curRetBalance, COMTIContext)

UseCall:
  lngReturn = objBank.cedrbank(txtName.Text, txtAccount.Text, curRetBalance, COMTIContext)

CloseCall:
  If (fCloseWithMethod) Then
      varConnType = "CLOSE"
      ContextObj.WriteContext "CONNTYPE", varConnType, COMTIContext
      lngReturn = objBank.cedrbank(txtName.Text, txtAccount.Text, curRetBalance, COMTIContext
)
  Else
      COMTIContext = objBank.ClosePersistentConnection
  End-if

  Exit Sub

ErrorHandler:
    COMTIContext  = objBank.UpdateContextInfo  ‘ Optional for COM required for .NET
    ContextObj.GetConnectionInfo (COMTIContext, fConnIsPersistent, fConnIsViable)
    If (fConnIsPersistent = True And fConnIsViable = True) Then
        ‘Continue with the next Use or Close method call is OK
    Else
        ‘Connection is either Non-persistent or no longer viable
        ‘So a Use or Close call is not valid
    End-if
    Exit Sub

End Sub
```

Host and Automation Data

The topics in this section cover issues around working with Windows®-based Automation data and COBOL-based mainframe data.

This section contains:

- Variably-sized Data
- Date and Time Parameters
- Parameter Requirements
- Optional Metadata
- Return Value Positioning
- Data Transfer Options
- Mainframe Character Strings and Code Pages
- Maximum Buffer Sizes for Remote Environments
- Alignment Problems with Generated COBOL
- Filler
- Variable-length Tables and CICS LINK
- Sending Binary Data to the Host

Variably-sized Data

A string or array parameter that is the last parameter in its direction (last of the inputs and in/outs or last of the outputs and in/outs) can be smaller than the maximum size specified, even without an associated actual size. The variable string or array must be a parameter or return value and cannot be contained in a recordset.

If the final field is an array, it can be an array of any type, including a recordset. If there is an unbounded output recordset, it is the only variably-sized data allowed because Transaction Integrator (TI) cannot handle two pieces of the data stream that are variable in size. If COBOL FILLER exists after the last parameter, that parameter cannot be variable in size.

Identify the possibility of variably-sized data at design time in TI Project. In the Designer select the method whose parameter list contains the final field of string to be of variable size, and set the method property "Variable Sized Final Field" to true.

See Also

Host and Automation Data

Sending Binary Data to the Host

Date and Time Parameters

Transaction Integrator (TI) converts and formats the **Date** and **Time** parameters exchanged with the host differently, depending on the programming language and the host platform.

You can use TI Project to set or change the properties of the **Date** parameter. The following table shows the formatting and valid separators for each **Host Data Type** in situations where the **Data Type** property of the parameter is set to **Date**.

Data Type Formats and Separators

Host Data Type	Format (default separator)	Valid separators	Length	Notes
DATE and TIME	yyyydddhhmmsss (two packed decimal fields)	None	8	None
DATE only (COBOL only)	yyyyddd (packed decimal)	None	4	(1) (2)
DATE only (RPG only *MDY)	mm/dd/yy	/-.,’&’	8	(5)
DATE only (RPG only *DMY)	dd/mm/yy	/-.,’&’	8	(5)
DATE only (RPG only *YMD)	yy/mm/dd	/-.,’&’	8	(5)
DATE only (RPG only *JUL)	yy/ddd	/-.,’&’	6	(5)
DATE only (RPG only *LONGJUL)	yyyy/ddd	None	8	None
TIME only (COBOL only)	hhmmsss (packed decimal)	None	4	(3) (4)
TIME only (RPG only *HMS)	hh:mm:ss	:.,&	8	None
ISO DATE and TIME	yyyy-mm-dd hh.mm.ss	space	19	None
ISO DATE only	yyyy-mm-dd	-	10	None
ISO TIME only	hh.mm.ss	.	8	None
USA DATE and TIME	mm/dd/yyyy hh:mm AM (or PM)	space	19	None
USA DATE only	mm/dd/yyyy	/	10	None
USA TIME only	hh:mm AM or hh:mm PM	:	8	None
JIS DATE and TIME	yyyy-mm-dd hh:mm:ss	space	19	None
JIS DATE only	yyyy-mm-dd	-	10	None
JIS TIME only	hh:mm:ss	:	8	None
EUR DATE and TIME	dd.mm.yyyy hh.mm.ss	space	19	None
EUR DATE only	dd.mm.yyyy	.	10	None
EUR TIME only	hh.mm.ss	.	8	None
TIMESTAMP	yyyy-mm-dd-hh.mm.ss.mmmm (length 26).	0001-01-01-00.00.00.000000	0001-01-01-00.00.00.000000	None

Where:

ISO = International Standards Organization

USA = IBM USA Standard

EUR = IBM European Standard

JIS = Japanese Industrial Standard Christian Era

> (1) When a date is sent to the host, the host populates a seven-digit COMP-3 data type only with the Julian Date YYYYDDD and no other format.
>
> (2) When a date is received from the host, the **Date** parameter must be packed as a valid Julian Date within a seven-digit COMP-3 data type.
>
> (3) When a time is sent to the host, the host populates a seven-digit COMP-3 data type as HHMMSSS up to 100th of a second. For example, sending 01:12:03 AM populates the COMP-3 data type on the host with 0112030; sending 01:12:003 AM populates the COMP-3 data type on the host with 0112003.

(4) When a time is received from the host, the **Time** parameter must be packed within a seven-digit COMP-3 data type packed as HHMMSSS; data passed under any other format might not return the expected results.

(5) A two-digit year (yy) returned from the host is mapped to a four-digit year (yyyy) as follows:

00 to 39 is mapped as 20xx.

40 to 99 is mapped as 19xx.

Rounding occurs when TI receives the parameter from the host:

- The hour value of time rounds up the day of date.
- The minutes of time rounds up the hour of time.
- The first two digits of seconds influences the value of minutes.
- The third digit of second, or the one 1\100 value of seconds, does not influence the value of minutes. It would just be passed forward to the workstation and displayed.

For example:

- Assigning 1997001 to the host date field and 3701000 to the time field causes the workstation to display 01/02/1997 11:01:00 PM.
- Assigning 1197001 to the host date field and 0101610 to the time field causes the workstation to display 01/01/1997 01:02:01.
- Assigning 1197001 to the host date field and 0101619 to the time field, causes the workstation to display 01/01/1997 01:02:019.

Parameter Requirements

Requirements for the In, In/Out, and Out parameters might affect how you define a Transaction Integrator (TI) component or mainframe transaction program (TP). The In and In/Out parameters are sent to the mainframe-based TP from the TI Automation server. The Out and In/Out parameters are sent from the mainframe-based TP to the TI Automation server.

Best Parameter Order

The way parameters are ordered with regard to inputs and outputs determines the amount of data that must be transmitted, as well as the structure of the mainframe program. If you are creating a Transaction Integrator (TI) component in TI Project without importing COBOL code from a mainframe transaction program, place the parameters in the following order to minimize the amount of data transmitted:

- Input parameters
- Input/output parameters
- Output parameters

However, if you are using a CICS LINK LU 6.2, TCP TRM Link, or TCP ELM Link remote environment (RE) and importing COBOL data declarations into TI Project from an existing mainframe program, place the parameters in the order they appear in the COBOL data structure. In such a case, although the parameters are contained within the COMMAREA data structure, only the part of the COMMAREA containing the last input or input/output parameter is sent to the mainframe. The mainframe program is not affected by this ordering, but less data will be transmitted, especially in the case of small amounts of input data.

Maximum Amount of Parameter Data

The remote environment (RE) you use can affect the maximum possible message size. Programs associated with the CICS LINK LU 6.2, TCP TRM Link, or TCP ELM Link REs are limited by the maximum size of the COMMAREA (32,767 bytes). Therefore, the total byte size of all parameters cannot exceed 32 KB. Programs associated with distributed program call (DPC) are limited to a maximum of 65,500 bytes of user data. This maximum decreases as additional parameters are defined. DPC is limited to a maximum of 35 parameters.

The IMS Using LU 6.2 and CICS Using LU 6.2 REs have message size restrictions that, if exceeded, affect the programming logic in the mainframe program. Therefore, be careful not to exceed the limit if you use either of these REs.

Optional Metadata

As a developer, you can choose to have the Transaction Integrator (TI) run-time environment send and receive metadata to and from the mainframe transaction program (TP), and you can choose the content of that metadata.

> **Note** Metadata is not supported for distributed program call (DPC).

You can send or receive:

- No metadata.
- Only the method name as metadata.
- All metadata including the method name.

The TI run-time environment sends or receives metadata to or from the TP as instructed. Metadata assists the TP in:

- Identifying the format of the metadata (version information).
- Identifying the name of the method used to invoke the TP.
- Reporting detailed error information back to the client.

The metadata is not visible to the Automation client. The metadata is delivered to (or received from) the host TP as part of the request message sent to (or response message received from) the TP.

The metadata set includes the following data:

- TI run-time version.

  A string of characters, such as "Microsoft TI version 1.0.0," that uniquely identifies the TI run-time environment version that generated the request.

- Method name (32-character string) invoked by the client application code.
- Metadata block ID.

  A GUID, in character format, that uniquely identifies this block of exception data. The GUID supports the ability to have additional exception formats in the future and helps to ensure that any data received is valid.

- Variables with no assigned uses to date (reserved):
  - Boolean flag indicating whether the TP is ready to commit.
  - Boolean flag indicating whether the TP is ready to perform additional work.
  - Two Short Integers to hold pieces of the TI run-time environment version number, one Short Integer to hold the major version number and the other to hold the minor version number.
- Exception Block (used only in replies).

  A GUID, in binary format, that uniquely identifies this block of exception data. The GUID allows support of additional exception formats in the future and helps ensure the data received is valid:

  - Boolean flag that indicates whether the TP is ready to commit.
  - Boolean flag that indicates whether the TP is ready to perform additional work.
  - Boolean flag that indicates whether an exception should be returned to the client application. If set, this flag also causes the transaction to quit.
  - 16-bit integer that identifies the error (see the note later in this topic). You can assign this value, along with the 256-character message that describes the error, from the server so that the assigned value is returned when a TI run-time error occurs.
  - 32-bit integer that identifies the context ID in the TP Help file (if any).
  - 256-character message that describes the error. You can assign this value, along with the 16-bit integer that identifies the error from the server, so that the assigned value is returned when a TI run-time error occurs.

Metadata is always located at the beginning of the message.

> **Note** TI error messages have numbers in the range from 0 through 9999. Metadata error message numbers returned from the mainframe can fall within the same range. To distinguish TI error messages from metadata messages returned from the mainframe, TI adds 10000 to the number of any metadata error message returned from the mainframe.

Return Value Positioning

When an Automation method returns control to the calling application, it can return data as the method's value (as distinct from returning data as an output parameter). However, there is no analogous concept when you are dealing with a COBOL or Report Program Generator (RPG) data declaration.

Transaction Integrator (TI) allows you to select one of the data description entries in a data declaration that will be returned to the calling application. When you select an entry as the return value and that entry is not the first entry in the data declaration, the return value is said to be positioned after the parameters.

You can use this feature, for example, when your data declaration describes a table and you need to return a recordset on the Automation side. For example, if you are using Remote Data Service (RDS) to bind to a grid control for a Web application, your Automation method must return the recordset rather than define a parameter that represents an output recordset.

When you import host definitions, the Import COBOL or Import RPG Wizard provides a step that allows you to select data description entries as return values. If you are manually creating a method and you want the method's return value to be placed in a location other than at the front of the data declaration, you can specify the location on the **Advanced** tab of the method properties. Use the **Position return value after the parameter** drop-down list.

Data Transfer Options

You can use various options to transfer data to and from the mainframe transaction program (TP). These options apply to arrays, recordsets, and strings (or variable-length tables and display data in COBOL terms). The topics in this section describe each of the possible data transfer options. Choose the option that optimizes the amount of data to be transferred.

This section contains:

- Using the OCCURS DEPENDING Clause to Define Variable-length Table
- Using Variably Sized Strings
- Using Variably Sized Rows
- Using Bounded Final Fields

Using the OCCURS DEPENDING Clause to Define Variable-length Table

In COBOL, you can use the OCCURS DEPENDING ON syntax to define a variable-length table in a data declaration. The storage for a variable-length table is dynamic, depending on the value in the length specifier variable. The amount of data passed is also dependent on the value in the length specifier variable: Only the number of elements specified are sent or received. The length specifier variable for a variable-length table must be a numeric type, and its direction must match the direction of the variable-length table it controls.

When you import COBOL into Transaction Integrator (TI) Project, and you specify variable-length tables as recordsets, the variable-length tables automatically become arrays or recordset objects whose size is limited by another parameter. The length specifier is exposed on the Automation side as a parameter and must be correctly set when the parameter is being sent to the host application.

To manually indicate that a parameter in a method is the length specifier for an array, first define the length specifier parameter, and then define the array or recordset parameter:

In the parameter property class to be defined as an ODO array, use the Designer to
select the **Is Array** property. After **IsArray** is selected, the **Array Dimensions** and **Occurs depending on** property becomes available.
Define the array's dimensions using the **Array Dimensions** property.
Assign the ODO index to the parameter defined as the ODO array.
Select the index by expanding the property **Occurs depending on**.

You can also manually indicate that a parameter in a method is the length specifier for a recordset parameter.

Follow the same steps as defined earlier; however, change the data type of the parameter from a simple data type to a recordset.

Examples

The following COBOL code shows a variable-length table:

```
01 CUSTOMER-DATA.
   05 CUSTOMER-NUMBER                  PIC 9(9).
   05 LAST-NAME                        PIC X(20).
   05 FIRST-NAME                       PIC X(20).
   05 INVOICE-COUNT                    PIC 9(7) COMP-3.
   05 INVOICES OCCURS 50 TIMES DEPENDING ON INVOICE-COUNT.
      10 INVOICE-NUMBER                PIC 9(10).
      10 INVOICE-DATE                  PIC 9(7) COMP-3.
      10 INVOICE-AMOUNT                PIC S9(13)V9(2) COMP-3.
      10 INVOICE-DESCRIPTION           PIC X(40).
```

The following is the method that is created when the previous COBOL is imported:

```
SendInvoices(lCustomerNo As Long, strLastName As String, strFirstName As String _
    , lcInvoices As Long) As Object
```

The following is an example of Microsoft® Visual Basic® code that calls an imported method:

```
Dim objCustomer As Object   'Uses late binding
Dim objInvoices As ADODB.Recordset
Dim lCustomerNumber As Long
Dim iRow As Integer
Dim iCol As Integer
Dim strLastName As String
Dim strFirstName As String

'create an instance of the invoicing object
On Error GoTo ErrorHandler1
Set objCustomer = CreateObject("Customer.Invoicing.1")
```

```
lCustomerNumber = CLng(txtCustomerNumber)

'See the WebSite folder under the CedarBank tutorial folder
'for an example showing how to return recordsets to an RDS
'recordset on a Web site

'invoke the GetInvoices method
On Error GoTo ErrorHandler2
Set objInvoices = objCustomer.GetInvoices(lCustomerNumber _
    , strLastName, strFirstName)
'
' Transfer the Recordset data to a variant array in a single operation.
' This is efficient, but may not be suitable for larger Recordsets.
'
Dim Data As Variant

Data = objInvoices.GetRows
grdInvoices.Rows = UBound(Data, 2) + 1
grdInvoices.Cols = UBound(Data, 1) + 1
```

Using Variably Sized Strings

When the last input parameter or the last output parameter in a method is a string, that string can be variably sized. Its size can vary from 0 to the maximum number of bytes specified for its length. When the return value is a string and it is positioned after all other output parameters, it can be the variably sized final output field.

The string must be sent or received last if it is to be variably sized. Otherwise, there is no reliable way to determine the end of a variably sized string and the next data item in the buffer. The logic of the host application sends only the data for the part of the string that is needed.

COBOL never sets the variably sized option for strings. To set this property manually, set the **Variable Sized Final Field** property to be variable. The property **Variable Sized Final Field** is subdivided into two parts by direction. Set the direction you want to true.

Example

The following COBOL example has as its last data item a large string that could be optimized by sending only the size of the string:

```
01 CUSTOMER-DATA.
   05 CUST-HEADER.
      10 CUSTOMER-NUMBER              PIC 9(9).
      10 LAST-NAME                    PIC X(20).
      10 FIRST-NAME                   PIC X(20).
   05 COMMENTS                        PIC X(4096).
```

When imported, this COBOL code creates the following method:

```
CustomerInformation(lCustomerNo As Long,_
                    strLastName As String,_
                    strFirstName As String,-
                    strComments As String)
```

The following Visual Basic code calls the method:

```
Dim objCustomer As Object
    Dim lCustomerNo As Long
    Dim strLastName As String
    Dim strFirstName As String
    Dim strComments As String

    lCustomerNo = 100231

    'create an instance of the invoicing object
    On Error GoTo ErrorHandler1
    Set objCustomer = CreateObject("Customer.Invoicing.1")

    'invoke the SetInvoices method
    On Error GoTo ErrorHandler2
    objCustomer.CustomerInformation lCustomerNo, strLastName _
        , strFirstName, strComments
```

Using Variably Sized Rows

When the last column in a record is a string, the row can be variably sized. Its size can vary between zero and the maximum size specified in the picture clause. When you have variably sized rows, your application must explicitly specify the size of each row before the row is sent.

The actual size field is not visible on the Automation side. The Transaction Integrator (TI) run-time environment uses Automation services to determine the size of input data. When the TI run-time environment sends data to the host, it automatically sets the actual size field.

The COBOL Import Wizard never creates a recordset that has variably sized rows. Bring up properties for the recordset that contains the variably sized rows. The **Variable sized rows** property allows user to manually configure this option for a specific recordset. The **Variable sized rows** property offers advanced options. You can specify that the actual row size variable is a half-word or full-word binary. The actual size variable will include itself or will only include the size of the row.

Example

The following COBOL example shows how the host application sends variably sized rows. The length field is included in the row size:

```
01  CUSTOMER-DATA.
    05  CUSTOMER-NUMBER                  PIC 9(9).
    05  LAST-NAME                        PIC X(20).
    05  FIRST-NAME                       PIC X(20).
    05  INVOICE-COUNT                    PIC 9(7) COMP-3.
    05  INVOICES OCCURS 50 TIMES DEPENDING ON INVOICE-COUNT.
        10  INVOICE-DATA.
            15  INVOICE-ROW-SIZE         PIC S9(4) COMP.
             15  INVOICE-NUMBER           PIC 9(10).
             15  INVOICE-DATE             PIC 9(7) COMP-3.
             15  INVOICE-AMOUNT           PIC S9(13)V9(2) COMP-3.
         10  INVOICE-DESCRIPTION          PIC X(4096).
.
.
.
            MOVE LENGTH OF CUSTOMER-DATA TO SEND-LENGTH.
            SUBTRACT LENGTH OF INVOICES FROM SEND-LENGTH.
            EXEC-CICS SEND FROM(CUSTOMER-DATA)
                           LENGTH(SEND-LENGTH)
                           END-EXEC.

            PERFORM VARYING CROW FROM 1 BY 1 UNTIL CROW > INVOICE-COUNT
                INSPECT INVOICE-DESCRIPTION TALLYING INVOICE-ROW-SIZE
                    FOR CHARACTERS BEFORE INITIAL '          '
                ADD LENGTH OF INVOICE-DATA TO INVOICE-ROW-SIZE
                EXEC-CICS SEND FROM(INVOICE-ROW-SIZE)
                               LENGTH(2)
                               END-EXEC
                EXEC-CICS SEND FROM(INVOICES(CROW))
                               LENGTH(INVOICE-ROW-SIZE)
                               END-EXEC
            END-PERFORM.
```

The following COBOL example shows how the host application sends variably-sized rows. The length field is not included in the row size:

```
       01  CUSTOMER-DATA.
          05  CUSTOMER-NUMBER                  PIC 9(9).
          05  LAST-NAME                        PIC X(20).
          05  FIRST-NAME                       PIC X(20).
          05  INVOICE-COUNT                    PIC 9(7) COMP-3.
          05  INVOICE-ROW-SIZE                 PIC S9(4) COMP.
         05  INVOICES OCCURS 50 TIMES DEPENDING ON INVOICE-COUNT.
```

```
             10  INVOICE-DATA.
                  15  INVOICE-NUMBER           PIC 9(10).
                  15  INVOICE-DATE             PIC 9(7) COMP-3.
                  15  INVOICE-AMOUNT           PIC S9(13)V9(2) COMP-3.
              10  INVOICE-DESCRIPTION          PIC X(4096).
.
.
.
            MOVE SIZE OF CUSTOMER-DATA TO SEND-LENGTH.
            SUBTRACT LENGTH OF INVOICES FROM SEND-LENGTH.
            SUBTRACT LENGTH OF INVOICE-ROW-SIZE FROM SEND-LENGTH.
            EXEC-CICS SEND FROM(CUSTOMER-DATA)
                           LENGTH(SEND-LENGTH)
                           END-EXEC.

            PERFORM VARYING CROW FROM 1 BY 1 UNTIL CROW > INVOICE-COUNT
                INSPECT COMMENTS TALLYING INVOICE-ROW-SIZE
                    FOR CHARACTERS BEFORE INITIAL '   '
                ADD LENGTH OF INVOICE-DATA TO INVOICE-ROW-SIZE
                EXEC-CICS SEND FROM(INVOICE-ROW-SIZE)
                               LENGTH(LENGTH OF INVOIVE-ROW-SIZE)
                               END-EXEC

                EXEC-CICS SEND FROM(INVOICES(CROW))
                               LENGTH(INVOICE-ROW-SIZE)
                               END-EXEC
            END-PERFORM.
```

See Also

Using the OCCURS DEPENDING Clause to Define Variable-length Table

Using Variably Sized Strings

Using Bounded Final Fields

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Using Bounded Final Fields

When the last input or the last output parameter in a method is an array or recordset, that parameter can be bounded. Its size can vary from 0 to the maximum number of elements or rows specified. The array or recordset must be last to be bounded. Otherwise, there is no reliable way to determine the end of a bounded array or recordset and the beginning of the next field in the buffer. The host application must take care of sending the truncated table.

The Automation client handles this option automatically. The Transaction Integrator (TI) run-time environment sends a truncated amount of data based on the Automation bounds and detects the truncated data and creates the appropriate Automation type when data is received.

The COBOL Import wizard never sets the bounded option for arrays or recordsets. To set this manually for the final parameter in a method, use the Designer to assign a value to the property **Maximum Occurrence**. This field defines the maximum number of rows the recordset may contain. On the method containing the recordset, set the property **Variable Sized Final Field** to true by direction to make the recordset bounded.

If the method contains a recordset that is unbounded, you cannot also specify a bounded or variably-sized final field for that direction. For example, if Parameter1 is an output parameter, and it is an unbounded recordset, the final output parameter cannot be a bounded array or recordset or variably-sized string. When the return value is positioned after all other output parameters, the return value can be the bounded final output field.

Example

The following COBOL example sends only some of the rows in a recordset:

```
01  INVOICE-COUNT                        PIC S9(4) COMP.
01  CUSTOMER-DATA.
    05  CUSTOMER-NUMBER                  PIC 9(9).
    05  LAST-NAME                        PIC X(20).
    05 INVOICES OCCURS 50 TIMES.
               10  INVOICE-NUMBER               PIC 9(10).
               10  INVOICE-DATE                 PIC 9(7) COMP-3.
               10  INVOICE-AMOUNT               PIC S9(13)V9(2) COMP-3.
.
.
.
            MOVE SIZE OF CUSTOMER-DATA TO SEND-LENGTH.
            SUBTRACT LENGTH OF INVOICES FROM SEND-LENGTH.
            EXEC-CICS SEND FROM(CUSTOMER-DATA)
                           LENGTH(SEND-LENGTH)
                           END-EXEC.
            PERFORM VARYING I FROM 1 BY 1 UNTIL I = INVOICE-COUNT
                COMPUTE SEND-LENGTH = LENGTH OF INVOICE-NUMBER +
                                      LENGTH OF INVOICE-DATE +
                                      LENGTH OF INVOICE-AMOUNT
                EXEC-CICS SEND FROM(INVOICES(I))
                               LENGTH(SEND-LENGTH)
                               END-EXEC.
            END-PERFORM.
```

Mainframe Character Strings and Code Pages

When Transaction Integrator (TI) sends data to a mainframe-based transaction program (TP), the TI run-time environment transforms Unicode strings received as parameters, fields, or columns into mainframe character strings. Likewise, when it receives data from a mainframe TP, the TI run-time environment converts the mainframe character strings into Unicode strings to be returned as output values to the calling client application.

TI categorizes these strings of characters sent to and received from the mainframe as follows:

- Extended Binary Coded Decimal Interchange Code (EBCDIC) strings.
- IBM double-byte character set (DBCS) strings.
- Intermixed strings containing both EBCDIC and IBM DBCS strings with the necessary shift-out (SO) and shift-in (SI) characters.

The TI run-time environment determines the type of mainframe character string based on the following information:

- How the parameter, field, or column is defined in the TI component that was built by using TI Project.
- The code page defined for the specific remote environment (RE) that was associated with the active TI Automation server when it was deployed. When you create an RE in TI Manager, you specify a code page for that RE.

This section contains:

- Assign a Different Code Page to a Remote Environment
- IBM DBCS Code Pages
- Mainframe Character Formats
- Padding Mainframe Character Strings with Spaces
- Truncating Undefined Portions of Strings
- Adding Leading SO and Trailing SI Characters

Assign a Different Code Page to a Remote Environment

Use a remote environment (RE) to describe each CICS or IMS mainframe environment. Use Transaction Integrator (TI) Manager to create, modify, and delete REs.

Every RE description includes a property value for the code page that is to be used by the TI run-time environment to convert characters to and from mainframe data representations.

When you create a new RE, TI Manager automatically selects a code page based on the current system locale. However, you can replace this default value with a code page that you select.

As needed, you can use TI Manager to assign a different code page to any RE.

To select a different code page for an RE

1. On the **Start** menu, point to **Programs**, then **Microsoft Host Integration Server 2004**, and then click **TI Manager**.
2. Expand the **Remote Environments** node.
3. Right-click the remote environment to be modified, and then click **Properties**.
4. On the **Locale** tab, clear the check box **Use default code page for the selected locale**.
5. On the **Locale** tab, select the new code page from the **Code page** dropdown list.

Only the code page value is significant to the TI run-time environment when it converts character data. Although you can use the locale displayed on the **Locale** property page to select the code page, the TI run-time environment ignores it and uses only the code page value that is associated with that locale.

See Also

Mainframe Character Strings and Code Pages

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IBM DBCS Code Pages

Transaction Integrator (TI) recognizes the following code pages as IBM double-byte character set (DBCS) code pages:

Code page	Description
930	IBM Extend Katakana and IBM Japanese (for Japan)
931	IBM English lower case and IBM Japanese (for Japan)
933	IBM Hungle Extend single-byte and IBM Hungle (for Korea)
935	IBM English single-byte and IBM simplified Chinese (for PRC)
937	IBM English single-byte and IBM traditional Chinese
939	IBM English Extend lower case and IBM Japanese (for Japan)

All other code pages delivered with Microsoft® Host Integration Server 2004 are handled as Extended Binary Coded Decimal Interchange Code (EBCDIC) code pages, which use a single byte to represent a character.

When the TI run-time environment converts UNICODE characters to DBCS characters, it uses standard Microsoft® Windows® NLS code pages.

The following table lists the DBCS code pages and their corresponding NLS code pages.

DBCS code page	NLS code page required by TI
930	932 ANSI Japan
931	932 ANSI Japan
933	949 ANSI Korean
935	936 ANSI Chinese (China, Singapore)
937	950 ANSI Chinese
939	932 ANSI Japan

The list of code pages on the **Locale** property page for a remote environment includes a DBCS code page only if the corresponding NLS code page is loaded on the computer. The following code pages have been added for European support.

Code page	IBM or open systems name	Display name
923	ISO 8859-15 Latin 9 (Euro)	Latin-9 (Euro)
924	IBM Latin - 1/Open System	Latin-1 Open System (Euro)
858	OEM - Multilingual Latin 1 (Euro)	OEM - Multilingual Latin 1 (Euro)
1140	IBM EBCDIC - U.S./Canada (Euro)	U.S./Canada (Euro)
1141	IBM EBCDIC - Germany (Euro)	Germany (Euro)
1142	IBM EBCDIC - Denmark/Norway (Euro)	Denmark/Norway (Euro)

See Also

Mainframe Character Strings and Code Pages

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Mainframe Character Formats

Within Transaction Integrator (TI) Project, you can specify the mainframe character format that the TI run-time environment will create when sending data to the mainframe. There are two mainframe character formats supported by TI:

- PIC X(n) COBOL, or RPG A
- PIC G(n) COBOL, or RPG G

When you create string parameters, fields, or columns in TI Project, the PIC X(*n*) or RPG A data type format is selected automatically.

If necessary, you can use the **Properties** command to change the mainframe character format.

If you select the PIC X or RPG A format for a string, the TI run-time environment converts this string to either an Extended Binary Coded Decimal Interchange Code (EBCDIC) character string or an intermixed character string. Specifically, if the TI component you define in TI Project is assigned to a remote environment (RE) with an EBCDIC code page, the TI run-time environment converts a string that has a PIC X or RPG A format into an EBCDIC string. If the TI component's RE identifies a double-byte character set (DBCS) code page, the TI run-time environment converts a string that has a PIC X format as an intermixed string (not supported for RPG).

If you select the PIC G or RPG G format for a string, the TI run-time environment always converts the string into a DBCS string. Therefore, any TI component that uses a string with a PIC G or RPG G format must be assigned to an RE that has a DBCS code page.

If a TI component using a string with a PIC G or RPG G format is assigned to an RE that has an EBCDIC code page, the TI run-time environment reports a conversion error when it attempts to convert the string to or from the PIC G or RPG G format. The TI run-time environment places an error message describing this conversion problem in the Windows Event Log, and it returns an error to the invoking client application.

The following table summarizes how the selection of string format and code page controls the type of character conversion performed by the TI run-time environment.

String format	EBCDIC code page	DBCS code page
PIC X or RPG A	EBCDIC string	Intermixed string
PIC G or RPG G	TI run-time environment reports conversion errors.	DBCS string

See Also

Mainframe Character Strings and Code Pages

String Dimension Values

The meaning of a string's dimension (the *n* part of the PIC X(n) or RPG A(n) and the *n* part of the PIC G(n) or RPG G(n) formats) is based on the character format in use. You specify a string's dimension on the **COBOL Definition** property page in Transaction Integrator (TI) Project.

- The dimension value for a string with a PIC G or RPG G format gives the number of double-byte characters that are used in the mainframe representation of the string. No SO and SI character pair is added when a string with a PIC G or RPG G format is converted.
- The dimension value for a string with a PIC X or RPG A format gives the number of bytes that are used in its mainframe representation. The number of characters that can be placed into or taken from a PIC X or RPG A formatted string varies depending on the number of :
  - Double-byte character set (DBCS) characters, each of which requires two bytes of storage.
  - SO and SI character pairs needed. Each two-byte pair must encapsulate each contiguous stream of DBCS characters.

Developers using TI must take into account this variability in the size of an intermixed string when they specify dimension values in TI Project.

The number of bytes for a string converted using an EBCDIC code page with a PIC X or RPG A format is identical to the number of characters because there are no DBCS characters in the string.

However, for a string converted using a DBCS code page with a PIC X or RPG A format, the actual number of characters that can be placed in a given number of bytes varies. For example, if the conversion to or from UNICODE does not require the use of DBCS characters (that is, no SO and SI character is used in the mainframe string), each character occupies a single byte. However, if

DBCS characters do appear within the mainframe string, the SO and SI character pairs are needed.

See Also

Mainframe Character Strings and Code Pages

How the Import Wizard Defines Strings

When you use Transaction Integrator (TI) Project's Import wizard to import a host definition to create new methods and recordsets, the wizard selects the mainframe character format based on the imported host definition. The following table shows how the wizard maps different COBOL declarations to a string.

COBOL type	Type of string created
PIC X(*n*) or RPG A	String of size *n* bytes
PIC G(*n*) or RPG G	String of size *n* characters

See Also

Mainframe Character Strings and Code Pages

Padding Mainframe Character Strings with Spaces

You can define the properties for a string such that the TI run-time environment adds space characters to pad the mainframe representation of the string instead of depending on a null termination character.

To use either a space character or null termination character

1. In Microsoft® Visual Studio® .NET 2003, right-click the object.
2. On the shortcut menu, click **Properties**.
3. Under **Host Data Type Information** in the **Properties** pane, click **String Delimiting**.
4. Select either **Space** Padded or **Null Terminated**.

The following table describes what happens with each delimiting option (**Space Padded** or **Null terminated**) when converting to the type of string indicated.

Type of string operation	**What happens for each type of string delimiting operation**
Conversion to EBCDIC string	**Space Padded.** The TI run-time environment adds single-byte space characters to the end of the string until all bytes in the PIC X formatted string are filled.
	Null terminated. The TI run-time environment adds a single null character to the end of the string if there is room in the PIC X count for the byte.
Conversion from EBCDIC string	**Space Padded.** The TI run-time environment strips single-byte space characters from the end of the string.
	Null terminated. The TI run-time environment scans from the beginning of the string and stops the conversion at the first null character it encounters in the string.
Conversion to DBCS string	**Space Padded.** The TI run-time environment adds double-byte space characters to the end of the string until all characters in the PIC G formatted string are filled.
	Null terminated. The TI run-time environment adds a double-byte character set (DBCS) null character to the end of the string if there is room in the PIC G count for the bytes.
Conversion from DBCS string	**Space Padded.** The TI run-time environment strips double-byte space characters from the end of the string.
	Null terminated. The TI run-time environment scans from the beginning of the string and stops the conversion at the first DBCS null character it encounters in the string.
Conversion to Intermixed string	**Space Padded.** The TI run-time environment adds single-byte space characters to the end of the string until all bytes in the PIC X formatted string are filled. If the terminating character in the UNICODE string maps to a DBCS character, the TI run-time environment adds an SI character before it adds the space characters.
	Null terminated. The TI run-time environment adds a single byte null character to the end of the string if there is room in the PIC X count. If the terminating character in the UNICODE string maps to a DBCS character, the TI run-time environment adds an SI character before it adds the null character.
Conversion from Intermixed string	**Space Padded.** The TI run-time environment strips the terminating single-byte and double-byte space characters from the end of the string. When it strips the space characters, the TI run-time environment treats any terminating SI character as if it were a space.
	Null terminated. The TI run-time environment scans from the beginning of the string and stops the conversion at the first null character (of either width) it encounters.

Special handling occurs for a string that is last in the host buffer and that is flagged as *last is variable*. For example

- **Space Padded.** Upon conversion to an Extended Binary Coded Decimal Interchange Code (EBCDIC) string, the string is terminated by the length count of the containing buffer, so it contains no additional space characters. Upon conversion from an EBCDIC string, the buffer is considered terminated by the length count of the containing buffer; then the string is examined for blank padding. The host can send this string blank padded beyond the significant data or not blank padded but with the last significant character of the string in the last position in the containing buffer. The space character is determined by the type of string (single, double, or intermixed).
- **Null terminated.** Upon conversion to an EBCDIC string, the string is sent as is. The TI run-time environment checks the length of the string, and then checks that the exact number of characters is sent. In other words, the number of characters

sent is equal to the length of the string. No null terminator or spaces are appended to the end of the string.

The following tables show how string delimiting works when the **String delimiting** property is set to **Space Padded** versus **Null terminated** in combination with the variable size setting. All examples assume the mainframe data declaration as PIC X(5). "b" represents a space,"?" represents unassigned data, and "\0" represents a null.

String delimiting set to Space Padded and variable size not active

Workstation	Direction	Mainframe
ABC\0	To Host	'ABCbb'
ABCb	To Host	'ABCbb'
CBA	From Host	'CBAbb'
CBA\0?	From Host	'CBA\0?'
CBA\0	From Host	'CBA\0b'

String delimiting set to Space Padded and variable size active

Workstation	Direction	Mainframe
ABC\0	To Host	'ABC'
Abb	To Host	'Abb'
CBA	From Host	'CBAbb'
CBA\0?	From Host	'CBA\0?'
CBA\0	From Host	'CBA\0b'

String delimiting set to Null terminated and variable size not active

Workstation	Direction	Mainframe
ABC\0	To Host	'ABC\0?'
ABC	From Host	'ABC\0?'
ABCbb	From Host	'ABCbb'
ABC	From Host	ABC\0\0'

String delimiting set to Null terminated and variable size active

Workstation	Direction	Mainframe
ABC\0	To Host	'ABC\0'
ABC	From Host	'ABC\0?'
ABCbb	From Host	'ABCbb'
ABC	From Host	ABC\0\0'

See Also

Mainframe Character Strings and Code Pages

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Truncating Undefined Portions of Strings

You can define the properties for a string such that the Transaction Integrator (TI) run-time environment truncates undefined characters when it converts UNICODE strings to mainframe data representations instead of generating an error message. To do so, click **Truncate** under **Error handling** on the string's **Host Definition** tab (property page) in TI Project.

When truncation is turned on, the TI run-time environment limits the number of characters to the string's previously specified dimension value when it converts a character string to an Extended Binary Coded Decimal Interchange Code (EBCDIC) or double-byte character set (DBCS) character string.

When it converts to intermixed strings, the TI run-time environment ensures that all shift-out (SO) characters have matching shift-in (SI) characters. It adds a terminating SI character when truncation occurs in the middle of a contiguous stream of DBCS characters. Also, the TI run-time environment ensures that it does not leave a partial DBCS character when it adds the SI character.

If blank padding and truncation are specified for a string, the TI run-time environment might need to add an EBCDIC space character after a terminating SI character is added.

See Also

Converting Data Types from Automation to OS/390 COBOL

Converting Data Types from OS/390 COBOL to Automation

Adding Leading SO and Trailing SI Characters

For PIC G formatted strings, you can instruct the Transaction Integrator (TI) run-time environment to add a leading shift-out (SO) character and a trailing shift-in (SI) character by selecting the **Add Leading SO and Trailing SI** check box on the string's **COBOL Definition** tab (property page) in TI Project.

If the **Add Leading SO and Trailing SI** check box is selected, the TI run-time environment handles two additional bytes in the mainframe data structure used for describing the double-byte character set (DBCS) string. When it formats a message sent to the mainframe, the TI run-time environment adds the leading SO and trailing SI bytes. When it interprets a message received from the mainframe, the TI run-time environment discards the leading SO and the trailing SI bytes.

The dimension value of the PIC G string always specifies the number of double-byte DBCS characters in the strings, regardless of the presence or absence of the surrounding SO and SI characters.

The use of this automatic SO and SI handling is hidden from the client application. However, the mainframe application must ensure that the appropriate PIC X declarations surround the declaration of the PIC G string.

TI Project generates the appropriate declarations for the surrounding SO and SI bytes, as shown in the following sample code:

```
01     A-SOSI-WRAPPED-DBCS.
       05  LEADING-SO-1                         PIC X.
       05  MY-DBCS-STRING                       PIC G(80).
       05  LEADING-SI-1                         PIC X.
```

The COBOL Import Wizard in TI Project does not set the option to add leading SO and trailing SI bytes. In other words, the COBOL Import Wizard places no significance on the presence of PIC X declarations surrounding a PIC G string. If an existing mainframe transaction program (TP) uses COBOL declarations that contain explicit declarations for SO and SI characters that wrap PIC G strings, you must manually modify the interface created by the COBOL Import Wizard.

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Maximum Buffer Sizes for Remote Environments

Both Transaction Integrator (TI) and mainframe applications must be designed not to exceed the following buffer size or transfer limitations:

TCP Transaction Request Message (TRM) Link

The maximum buffer size for input/output is 32767 bytes. This limit is defined by the maximum allowable size of the COMMAREA.

TCP Enhanced Listener Message (ELM) Link

The maximum buffer size for input/output is 32767 bytes. This limit is defined by the maximum allowable size of the COMMAREA.

TCP Transaction Request Message (TRM) User Data

The buffer size for input/output is unlimited.

TCP Enhanced Listener Message (ELM) User Data

The buffer size for input/output is unlimited.

IMS Connect (TCP/IP)

The maximum segment size that TI can send to IMS is 32754 bytes. This limit is defined by the total number of bytes (32767) in an IMS message segment minus the following number of bytes:

- 2 bytes for the LL (Length field).
- 2 bytes for the ZZ (Control Information field).
- 9 bytes for the maximum TRANCODE.

The total amount of data that can be sent to, or received from, an IMS server program using the TCP/IP IMS Connect programming model is unlimited.

IMS Implicit (TCP/IP)

The buffer size for input is from 1 through 32755 bytes. In other words, the IMS Assist Module rejects a request with zero bytes of user data, and the IMS Listener rejects a request with more than 32755 bytes of user data.

The buffer size for output is from 0 through 32755 bytes. The IBM IMS default Listener enforces the limit of 32755 bytes of input/output data. The IBM IMS Assist Module enforces the required minimum of 1 byte of input.

IMS Explicit (TCP/IP)

The buffer size for input/output is unlimited.

OS/400 Distributed Program Calls (DPC)

The total buffer size is 65535 bytes and is reduced by the required headers. The send requires 23 bytes of header.

Each parameter, of either direction, requires 12 bytes of overhead on the send.
Each in\out or out parameter requires 12 bytes of overhead within memory on the return trip.

CICS LINK LU 6.2

The maximum buffer size for input/output is 32767 bytes. This limit is defined by the maximum allowable size of the COMMAREA.

CICS User Data LU 6.2

The buffer size for input/output is unlimited. However, if the size of the input buffer is greater than 32 KB, TI sends the data in multiple chunks of 32 KB. In such a case, the mainframe application must do multiple receives to gather all the input data.

IMS Using LU 6.2

The maximum segment size that TI will send to IMS is 32754 bytes. This limit is defined by the total number of bytes (32767) in an IMS message segment minus the following number of bytes:

- 2 bytes for the LL (Length field).
- 2 bytes for the ZZ (Control Information field).

- 9 bytes for the maximum TRANCODE.

The total amount of data that can be sent to, or received from, an IMS server program that uses LU 6.2 is unlimited.

See Also

Host and Automation Data

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Alignment Problems with Generated COBOL

COBOL aligns data elements at the 01 level on double-word boundaries. This practice causes a potential problem in CICS non-DPL applications that use TI-generated data declarations along with error metadata. If you code your COBOL application to receive the error metadata and the input parameters in one RECEIVE, the parameters are placed immediately adjacent to the metadata in memory. However, because the error metadata does not end on a double-word boundary, this action puts the parameters 4 bytes ahead of where the COBOL code expects them.

You can prevent this problem. When you click either the **Include method name** or the **Include all information** option under **Meta data** on the **Advanced** tab of a method's property page, verify that the mainframe program issues two RECEIVE commands to handle incoming data for the method. The first RECEIVE pulls in the metadata block, and the second RECEIVE pulls in the data for the method. When COBOL is generated for the method, an additional 01 block is generated for the metadata. When the **Include all information** option is selected, you are also expected to create an additional SEND for the metadata before sending the method data back to the Automation client application.

See Also

Host and Automation Data

Filler

This section provides recommendations for handling COBOL-based filler data.

This section contains:

- COBOL FILLER
- TI Application Cannot Reference FILLER
- Using REDEFINES in COBOL
- FILLER Optimization
- FILLER for Discontiguous Output Area and Return Value

COBOL FILLER

If COBOL data declarations imported into Transaction Integrator (TI) Project contain a COBOL FILLER clause or clauses, space is allocated in the message so that the filler is represented correctly for the mainframe program's data alignment. The filler is hidden from the Automation interface.

See Also

TI Application Cannot Reference FILLER

Using REDEFINES in COBOL

FILLER Optimization

FILLER for Discontiguous Output Area and Return Value

TI Application Cannot Reference FILLER

There are at least three possible causes for why the application cannot reference FILLER data:

- Mainframe or COBOL specifics.
- Automation specifics.
- Procedure using TI Project.

The following provides details of these three causes.

Mainframe or COBOL Specifics

When a FILLER keyword is encountered in the import process, the Transaction Integrator (TI) run-time environment adjusts the offset for the position of the data that follows the filler in a send or receive buffer by the length of the filler. This leaves untranslated gaps in the buffers that are sent to (or received from) the host and allows your data to overlay correctly onto the data declaration that describes it.

Automation Specifics

The Automation method does not reference the filler data description entries.

Procedure Using TI Project

The filler that is at the start of a data declaration is associated with a method, recordset, datatable, user-defined type (UDT), or .NET structure. You can view or change filler that is associated with a method from the **Advanced** tab of the method's properties page. To view or change a filler that is associated with a method, recordset, or UDT, right-click the method, recordset, or UDT, and then click **Properties**.

Filler that follows a data description entry is associated with the data description entry (or parameter for methods, column for recordsets, or member for UDTs). You can view or change filler that is associated with a parameter, column, or member from the **COBOL Definitions** tab of the parameter, column, or member properties. When filler follows the data description entry that you have specified as the return value, you can view or change that filler from the **COBOL Definitions** tab of the method's properties.

The following example shows a COBOL data declaration that uses FILLER:

```
01 CUSTOMER-DATA.
   05 CUSTOMER-INFO.
      10 LAST-NAME               PIC X(20).
      10 FIRST-NAME              PIC X(20).
      10 FILLER                  PIC X(12).
   05 DEMOGRAPHICS.
      10 DEMO-AGE                PIC 999.
      10 DEMO-INCOME             PIC S9(9)V99 COMP-3.
      10 DEMO-SEX                PIC X.
      10 DEMO-MSTATUS            PIC X.
      10 FILLER                  PIC X(40).
```

The resulting method is:

```
CustomerDemographics(strLastName As String, strFirstName As String, iAge As Integer _
    , curIncome As Currency, strSex As String, strMStatus As String)
```

The following is an example of the Visual Basic code that calls the method:

```
Dim objCustomer As Object
    Dim strLastName As String
    Dim strFirstName As String
    Dim iAge As Integer
    Dim curIncome As Currency
    Dim strSex As String
    Dim strMStatus As String
```

```
      strLastName = "Doe"
      strFirstName = "John"

      'create an instance of the invoicing object
      On Error GoTo ErrorHandler1
      Set objCustomer = CreateObject("Customer.Invoicing.1")

      'invoke the SetInvoices method
      On Error GoTo ErrorHandler2
      objCustomer.CustomerDemographics strLastName, strFirstName _
          , iAge, curIncome, strSex, strMStatus
```

See Also

Filler

Using REDEFINES in COBOL

The COBOL import process in Transaction Integrator (TI) Project recognizes the REDEFINES clause in a data description entry and correctly associates the redefining entries with the redefined entry. You must select one of the redefined or redefining clauses as the entry that represents the data that will be transmitted.

The redefining entries can use less space than the redefined entry. If you select a redefining entry that is smaller than the redefined entry, TI Project automatically adds filler so that the data will correctly overlay the data description when it is sent to the host. If the redefining entry represents a table with multiple fields, the last field contains the filler.

The following COBOL example shows a REDEFINES clause. The redefining clause was selected during import:

```
01 CUSTOMER-DATA.
   05 CUSTOMER-ID                          PIC X(10).
   05 CUSTOMER-ID-PARTS REDEFINES CUSTOMER-ID.
      10 LOCATION                          PIC X(3).
      10 NAME-ABREV                        PIC X(5).
```

The resulting method that is imported is:

```
CreateCustomerID(strLocation As String, strNameAbrev As String)
```

The COBOL generated for this method is:

```
01 CREATECUSTOMERID-INPUT-AREA.
   05 LOCATION              PIC X(3).              INPUT
   05 NAME-ABREV            PIC X(5).              INPUT
   05 FILLER                PIC X(2).              INPUT
```

The FILLER is added to the CUSTOMER-ID redefined area. When this FILLER occurs at the end of send or receive buffers, for performance reasons it is not sent.

The following is an example of Visual Basic code that calls this method:

```
    Dim objCustomer As Object
    Dim strLocation As String
    Dim strNameAbrev As String

    strLocation = "101"
    strNameAbrev = "SPORT"

    'create an instance of the invoicing object
    On Error GoTo ErrorHandler1
    Set objCustomer = CreateObject("Customer.Invoicing.1")

    'invoke the CreateCustomerID method
    On Error GoTo ErrorHandler2
    objCustomer.CreateCustomerID strLocation, strNameAbrev
```

See Also

Filler

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FILLER Optimization

The Transaction Integrator (TI) run-time environment optimizes buffers sent to the host by not sending the bytes corresponding to FILLER that appear at the end of the input data declaration.

In a CICS LU 6.2 environment, use both the MAXLENGTH and NOTRUNCATE options on the RECEIVE statement when the TI run-time environment receives an input area that contains FILLER as the last data item description. However, this requirement does not apply to CICS LINK and IMS transaction programs.

See Also

Filler

FILLER for Discontiguous Output Area and Return Value

If the return value is discontiguous from the output area, you must calculate and manually specify the filler between the return value and the output area.

The following example shows the calculation for the filler from the original COBOL that goes into the Import Wizard (the byte counts on the right are added as an illustration):

```
01  OUTPUT-AREA.
           05  SELECTED-OUTPUT-AREA.
               10  FIELD1                    PIC S9(4)       COMP.     [2 Bytes]
               10  FIELD2                    PIC S9(9)       COMP.     [4 Bytes]
           05  DISCONTIG-UNSELECTED-AREA.
               10  NOTSELECTED               PIC X(10).                 [10 Bytes]
               10  ALSO-NOTSELECTED          PIC S9(9)       COMP.     [4 Bytes]
           05  RETVAL                        PIC S9(9)       COMP.     [4 Bytes]
```

In this case, because the return value follows the output area, filler must be added to the last output parameter. To do this, perform the following steps.

1. Unlock the method.
2. In the details pane, click **FIELD2**.
3. On the **File** menu, click **Properties**, and then click the **COBOL Definition** tab.
4. In the **From Host** box, type 14 as the trailing filler.
5. Click **OK**.

To verify your modified code, in **TI Project**, use the **Export** command on the **File** menu. You can then see your code in Notepad.

The following is the output with the added filler:

```
       01  DISCONTIGCBL-OUTPUT-AREA.
           05  LL                            PIC S9(4) COMP.         OUTPUT     [2 Bytes]
           05  ZZ                            PIC S9(4) COMP.         OUTPUT     [2 Bytes]
           05  FIELD1                        PIC S9(4) COMP.         OUTPUT     [2 Bytes]
           05  FIELD2                        PIC S9(9) COMP.         OUTPUT     [4 Bytes]
           05  FILLER                        PIC X(14).              ADDED     [14 Bytes]
           05  RETVAL                        PIC S9(9) COMP.         OUTPUT     [4 Bytes]
```

See Also

Filler

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Variable-length Tables and CICS LINK

When an OCCURS clause describes a variable-length table in the CICS LINK environment, the storage that the table uses on the host varies depending on the value of the length specifier. COBOL handles this storage automatically on the host, but for Transaction Integrator (TI) to determine where in the buffer to place data sent to the host and where to unpack data from the host, you must give it the value of the length specifier variable on which the table size depends.

Any data that follows a variable-length table must be correctly offset in the buffer immediately following the table, regardless of the maximum length of the table. TI must have the length specifier value for a variable-length table both when it packs the buffer to be sent and when it unpacks the buffer that is received.

If an OCCURS clause describes a variable-length table, you must specify the table and the length specifier that controls the table length as input/output in TI Project. The TI run-time environment must be able to detect the length both when the buffer is sent to the host and when it is received from the host. When you import COBOL or manually create a method that describes a variable-length table in TI Project, this restriction is enforced.

> **Note** Information in this topic also applies to arrays.

See Also

Arrays

Using the OCCURS DEPENDING Clause to Define Variable-length Table

Sending Binary Data to the Host

The Transaction Integrator (TI) run-time environment does not translate binary data (Byte in Visual Basic, VT_UI1 in Automation, or unsigned char in C++) when it sends it to the mainframe. Instead, TI copies the binary data unchanged into a PIC X data representation on the mainframe. To define a string of binary data, define it as an array.

Programming Windows-Initiated Processing

This section discusses various issues you need to understand to program Windows-initiated processing components and applications.

This section contains:

- Determine Who Initiated a Transaction
- Use REOverride to Specify RE Programmatically
- Debugging Tips for Visual Basic .NET
- Impersonating Client Application Security Credentials
- Using COMTIIntrinsic in Windows XP Professional

Determine Who Initiated a Transaction

It is helpful to be able to determine who initiated a specific transaction, for example, when you need to track down the history of a transaction failure. You can also use this technique to implement resource or transaction-level, per user, security.

When you select either user-level or package-level security on the **Security** tab of the Transaction Integrator (TI) remote environment (RE) properties page, TI sends security information in the session request to the host. If you deploy the Host Account Mapping database known as the Host Account Cache (HAC) and set up a mapping between each Microsoft® Windows® user and the corresponding host user ID, TI will send that information. Or you can use the **Allow application to override security** option on the **Security** tab, and have the application return any host user ID (and password).

Whether the host does anything with the different user IDs depends mostly on the ATTACHSEC setting for the CICS connection; this corresponds to the APPC LU that TI uses. The default ATTACHSEC setting is **local**, meaning that CICS does not validate the user ID in the session, and CICS runs the transaction in a default host credential. But if you set the ATTACHSEC setting, CICS uses Resource Access Control Facility (RACF) to validate the user ID in the session, and CICS then attaches that user ID to the trusted computing base (TCB) for the transaction as it runs through the mirror transaction into the target mainframe transaction program (TP).

Use REOverride to Specify RE Programmatically

When an application uses a Transaction Integrator (TI) component, the application can be structured to explicitly specify the remote environment (RE) used by the TI run-time environment. When the application specifies the RE, the application identifies the CICS or IMS region where transaction programs (TPs) are executed when they handle method calls to the component.

To programmatically specify an RE, an application uses the **REOverride Context** entry. TI Project automatically adds an optional parameter to a TI object for passing TI context data. The application sets the **REOverride** entry for an object representing a TI component by assigning the name of the RE.

The following Microsoft® Visual Basic® code demonstrates the **REOverride Context** entry:

```
Dim Obj As Object
Dim ConObj AS Object
Dim ContextArray() As Variant

Set ConObj = CreateObject("COMTI.ContextObject")
Set Obj = CreateObject("Your.Object")

ConObj.WriteContext "REOverride", "AltREName", ContextArray

Obj.Method1 parm1, parm2, parm3, ContextArray
Obj.Method2 parm1, parm2, ContextArray
Obj.Method3 parm1, parm2, parm3, parm4, parm5
Obj.Method4 parm1, parm2, parm3, parm4, ContextArray
```

This example (with no error checking) shows how to use **REOverride** to programmatically instruct the TI run-time environment to use a non-default RE named AltREName to handle the calls to Method1, Method2, and Method4. The calls to the three methods are directed to **AltREName** because the client program has set the context name **REOverride** to have the value of **AltREName** and include the optional context parameter **ContextArray**. The call to Method3 is directed to the RE assigned as default to the object because it does not include the optional **ContextArray** context parameter.

This section contains:

- Guidelines for Using REOverride

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Guidelines for Using REOverride

Remote environment (RE) override enables applications to choose which host server environment services Transaction Integrator (TI) requests. The specific algorithm an application uses to select an RE is up to you. For example, an enterprise can use separate CICS or IMS regions to handle requests from different branches. In this case, the application should set the RE to the appropriate value that identifies the region suitable for the current branch.

Use the following guidelines for when to use **REOverride** to set an RE programmatically:

- Avoid hard-coding RE names into applications. Instead, load RE names from a file or database.
- Ensure that applications are structured to handle failures when they attempt to set the RE.
- Structure your application code to use a list of RE names. This practice reduces errors caused by missing REs.
- Ensure that procedures for adding and configuring REs include a mechanism to update REs referenced in the application code.

  Note Use **REOverride** to confirm that administrative and operational tasks do not interfere with application code that sets an RE. Specifically, review when and how REs are deactivated and deleted.

To implement RE selection by using **REOverride**, you must ensure that the TI component starts out with an associated RE instance even though the application will set the RE programmatically. The RE that is currently assigned to the component is used when an application does not explicitly set the RE.

See Also

Use REOverride to Specify RE Programmatically

Debugging Tips for Visual Basic .NET

The following are a few other tips that will save some of you from frustrating debugging sessions:

1. When a Transaction Integrator (TI) .NET application is configured to display error numbers (err.number), the number returned is always 0 and not the TI error results. Although TI returns the correct values to COM-Interop and COM-Interop passes the right values to Visual Basic .NET, Visual Basic .NET considers any positive return code to be success and changes it to 0. To work around this problem, configure the .NET application to return an error description (err.description) instead of the error number. The error description provides accurate and useful error information.
2. TI Project parameter type Integer must be defined as a short within Visual Basic .NET.
3. TI Project parameter type Long must be defined as an integer within Visual Basic .NET.
4. A Visual Basic .NET array index begins at 0, the index of TI parameters defined as arrays starts at position 1. Therefore, it is no longer possible to directly align one for one the index of TI parameters defined as arrays with those defined within Visual Basic .NET.
5. Arrays of Decimal data types must be defined as an array of objects, not an array of decimals within Visual Basic .NET. All other arrays of data types can be defined as either an object or data type.
6. A common cause of errors during development of host-initiated processing (HIP) .NET components is forgetting to copy all the required assemblies, including all the dependencies, to the HIP Implementing Assemblies folder.

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Impersonating Client Application Security Credentials

If you are using Windows-initiated processing (WIP) and are configuring a remote environment (RE) to use Enterprise Single Sign-On (SSO), you have a choice between using the security credentials of the client application or of the COM server program. You make this choice in Transaction Integrator (TI) Manager on the **Security** tab of the ***remote environment*** **Properties** dialog box. If you select **User credentials**, the COM server impersonates the client's security credentials to access SSO and retrieve the host account information. If you select **COM application or ASP.NET credentials**, the COM server uses its own credentials.

Before the COM server can impersonate the client, however, you must program the client to grant the COM server explicit permission to do the impersonating. You can grant the explicit permission in either of two ways:

- Program the client application to call **CoInitializeSecurity(...)** at the beginning of its lifetime, and then request the **Impersonate access level**:

```
HRESULT hr = CoInitializeSecurity(NULL, -1, NULL, NULL,
             RPC_C_AUTHN_LEVEL_CONNECT, RPC_C_IMP_LEVEL_IMPERSONATE
             NULL, NULL, NULL);
```

- Set the default COM security level on your computer to **Impersonate**.
    1. Click **Start**, point to **Programs**, point to **Microsoft Host Integration Server 2004**, and then click **TI Manager**.
    2. In the TI Manager navigation tree, expand **Component Services**, and then expand **Computers**.
    3. Right-click **My Computer**, and then click **Properties**.
    4. On the **Default Properties** tab, set the **Default Impersonation Level** to **Impersonate**.
    5. Restart your computer so the settings take effect.

The first course of action, adding the **CoInitializeSecurity(...)** call to your application, is the more secure of the two alternatives because it limits the explicit permission to just that client application. The second course of action, changing the default COM security level on your computer, should be chosen only if you are not able to rebuild your client application.

See Also

Security tab (remote environment properties)

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Using COMTIIntrinsic in Windows XP Professional

If you use Explicit Security in your application, you need to be sure that the property **COMTIIntrinsic** is set to **–1**. The property **COMTIIntrinsic** is set to **Off** by default for COM+ in Windows XP Professional. You can use the following Visual Basic script to display and set the **COMTIIntrinsic** value:

```
'Get arguments  ' Set objArgs = WScript.Arguments
 '  if objArgs.Count <> 3 then
 '      WScript.Echo "ComtiSec"
 '      WScript.Echo ""
 '      WScript.Echo "Usage:"
 '      WScript.Echo "ComtiSec [appname], [progid], [value]"
 '      WScript.Echo "[appname]: Name of the application"
 '      WScript.Echo "[progid]:  ProgID of the component to change. Type 'all' for all compon
ents."
 '      WScript.Echo "[value]:   0 for False, 1 for True"
 '      WScript.Quit (0)
 '  end if
   applicationName = "COMTI Utilities"
   componentProgID = "all"
   'ComtiIntrinsics must be set to -1 for comti callback secuity to work.
   ' ComtiIntrinsics = -1 ' This will make Explicit Security work in COM+ on Win XP Pro
   ' ComtiIntrinsics = 0 ' This is the deffault value for COM+ in Win XP Pro
   Set catalog = CreateObject("COMAdmin.COMAdminCatalog.1")
   Set applications = catalog.GetCollection("Applications")
   applications.Populate
   numApplications = applications.Count
   For i = numApplications - 1 To 0 Step -1
       If applications.Item(i).Value("Name") = applicationName Then
           Set application = applications.Item(i)
           Exit For
       End If
   Next
   Set components = applications.GetCollection("Components", application.Value("ID"))
   components.Populate
   numComponents = components.Count
   For i = numComponents - 1 To 0 Step -1
       If components.Item(i).Name = componentProgID Or componentProgID = "all" Then
           Set component = components.Item(i)
           'component.Value("COMTIIntrinsics") = ComtiIntrinsics
      WScript.Echo component.Value("COMTIIntrinsics")
       End If
   Next
   components.SaveChanges
   applications.SaveChanges
   WScript.Echo "Changes All Complete"
```

Note You must clear the **Protection** and **Disable Changes** properties for the COM+ COMTI Utility application before you run the preceding script.

Programming Host-Initiated Processing

This section discusses various issues you need to understand to program host-initiated processing components and applications.

This section contains:

- Connecting HIP Components to Visual Basic Applications

Connecting HIP Components to Visual Basic Applications

A key link in host-initiated processing (HIP) is the connection between the HIP component in Transaction Integrator (TI) and the client application. The connection between the HIP component and the Microsoft® Visual Basic® server DLL is created through matching elements of the HIP type library with elements of the Visual Basic project. The following table shows the relationship between the elements.

HIP Type Library	**Visual Basic Project**
Type Library name	Visual Basic Project name.
Type Library Interface name	Visual Basic Class name.
Type Library Method names	Functions or subroutines within the Visual Basic Class.
Type Library method parameters	Defined one for one within the Visual Basic functions or subroutines with the Visual Basic subroutines and functions.

> **Note** Be sure the Visual Basic server DLL is registered.

If you are using the **Implements** key word within a Visual Basic server, the following additional rules apply:

- The **Visual Basic Implement Compatible Interface** property must be enabled. Set the property on the component *interface* **Properties** page within the TI type library or assembly
- All parameters defined to type library methods must be **Input\Output**. The **Implements** keyword does not support parameters defined as either input or output. All parameters must be defined as input or output.
- The function or subroutine calls must be defined as public, not private, within the Visual Basic class.

Transaction Integrator Security Guide

This section provides information about steps you can take to safeguard Transaction Integrator, your data, and your network when you are programming client or server applications.

This section contains:

- Mainframe Authentication for CICS LINK
- AS/400 Security
- Limitations of User Access Level Sign On
- Using SSO with Host-Initiated Processing
- Using SSO with Encrypted Passwords
- Threat Mitigation within Visual Studio

Mainframe Authentication for CICS LINK

Resource-level authentication is recommended in the CICS region. Due to a restriction imposed by the IBM distributed program link (DPL) protocol, a user ID and password transmitted from the workstation by Transaction Integrator (TI) are ignored and not used for transaction-level authentication. The target CICS region expects, under such circumstances, that authentication has been completed by the application that executes the IBM DPL; for example, a TI application on the PC. (Traditionally, the application that executes an IBM DPL has been another CICS region.)

Instead, for transaction-level authentication, the target CICS region associates the default user ID for the region with the transaction ID of the CICS (Mirror transaction) task and the user ID from the sender is ignored. Unless this practice is taken into consideration, attempts to secure the Mirror transaction can cause an application malfunction because of the failure to authenticate.

See Also

AS/400 Security

Limitations of User Access Level Sign On

Using SSO with Host-Initiated Processing

Using SSO with Encrypted Passwords

Threat Mitigation within Visual Studio

Transaction Integrator Security Guide

AS/400 Security

The support for AS/400 security is the same as for other Microsoft® Windows®-initiated operations against the mainframe, with the following adjustments:

- No support for RACF, AFC/2, Kerberos, or Top Secret
- Integration with AS/400 native security system only
- Support for Single Sign-On through SSO
- Support for SSL security

See Also

Mainframe Authentication for CICS LINK

Limitations of User Access Level Sign On

Using SSO with Host-Initiated Processing

Using SSO with Encrypted Passwords

Threat Mitigation within Visual Studio

Transaction Integrator Security Guide

Limitations of User Access Level Sign On

When you sign on with only user access permissions, you have restricted capabilities for using Transaction Integrator (TI). In Microsoft® Visual Studio® .NET, user access enables you to:

- Open TI Projects
- Create and save new type libraries
- Open and save existing type libraries

See Also

Mainframe Authentication for CICS LINK

AS/400 Security

Using SSO with Host-Initiated Processing

Using SSO with Encrypted Passwords

Threat Mitigation within Visual Studio

Transaction Integrator Security Guide

Using SSO with Host-Initiated Processing

When you use Single Sign-On (SSO) security with host-initiated processing (HIP), the impersonation of user credentials is handled differently depending upon whether you are calling a .NET object or a COM object. If HIP is calling a .NET object, there are no special considerations; the Transaction Integrator (TI) run-time environment impersonates the user account. If HIP is calling a COM object, however, there are special considerations.

Depending on the threading model and registration type of the components, the following actions occur when HIP calls the method of a .COM object when it is impersonating a user account (the one that the host credentials would have been mapped to via SSO):

Threading Model	**Registration**	**Actions**
Single, apartment	Server/Library/No COM+ application	• Server object methods are called under HIP Service/COM+ application configured identity. • Server object methods call **CoImpersonateClient** to start impersonating the user identity. • Optionally, methods can call **CoRevertToSelf**, although that is not necessary because COM will call it anyway after the method returns.
Free, both, neutral	Server COM+ application	• Server object methods are called under HIP Service/COM+ application configured identity. • Server object methods call **CoImpersonateClient** to start impersonating the user identity. • Optionally, methods can call **CoRevertToSelf**, although that is not necessary because COM will call it anyway after the method returns.
Free, both, neutral	Library/No COM+ application	• Server object methods are called under the user identity being impersonated. • Server object method should not call **CoImpersonateClient** or **CoRevertToSelf** because they would fail with RPC_E_CALL_COMPLETE.

If you are programming in Microsoft Visual Basic® 6.0, be sure to include the **CoImpersonateClient** and **CoRevertToSelf** declarations in your programs:

```
Private Declare Function CoImpersonateClient Lib "ole32.dll" () As Long
Private Declare Function CoRevertToSelf Lib "ole32.dll" () As Long
```

See Also

Mainframe Authentication for CICS LINK

AS/400 Security

Limitations of User Access Level Sign On

Using SSO with Encrypted Passwords

Threat Mitigation within Visual Studio

Transaction Integrator Security Guide

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Using SSO with Encrypted Passwords

If you are using Single Sign-On (SSO) security, you must determine whether the client application passes plain text passwords or encrypted passwords to the Transaction Integrator (TI) run-time environment. If the passwords are in plain text, SSO accepts the passwords when they are submitted by the TI run-time environment. If the passwords are encrypted, SSO does not accept the passwords, and the call to SSO fails. To avoid failed SSO calls, disable password validation for the SSO affiliate application.

See Also

About Programming Single Sign-On

Threat Mitigation within Visual Studio

Product security is a top priority throughout Microsoft development. Beginning with the Microsoft® Windows® Security Push in 2002, Microsoft has invested additional time and resources to developing secure code and detailed instructions for deploying and securing your computing environment. This increased attention to security issues has made Host Integration Server 2004 (HIS 2004) the most secure version in the history of the product.

The HIS 2004 product team conducted a complete threat modeling analysis to identify and mitigate potential areas of concern. A threat model is a security-based analysis that helps you determine the highest-level security risks posed to a product or application and how attacks can manifest themselves.

Although Microsoft has mitigated all known internal security threats to HIS 2004, you should take steps to mitigate threats from elsewhere in your network environment. Threat modeling helps you evaluate the threats to the applications you are writing or running, and thereby reduce the overall risk to your computer system. For more information about threat model analysis, see Chapter 4 “Threat Modeling” in Michael Howard and David LeBlanc, *Writing Secure Code 2nd Edition*, Redmond, WA: Microsoft Press. 2003.

Howard and LeBlanc summarize six categories of possible security threats to your computing environment:

- **Spoofing identity**. Spoofing threats enable an attacker to pose as another user or enable a rogue server to pose as a valid server. An example of user identity spoofing is illegally gaining access and then using another user’s authentication information, such as username and password.
- **Tampering with data**. Data tampering involves malicious modification of data. Examples include unauthorized changes made to persistent data, such as that held in a database, and the alteration of data as it flows between two computers over an open network, such as the Internet.
- **Repudiation**. Repudiation threats are associated with a user who denies that he performed an action without other parties having any way to prove otherwise—for example, a user performs an illegal operation in a system that lacks the ability to trace the prohibited operations.
- **Information disclosure**. Information disclosure threats involve the exposure of information to individuals who are not supposed to have access to it—for example, a user’s ability to read a file that she was not granted access to and an intruder’s ability to read data in transit between two computers.
- **Denial of service**. Denial of service (DoS) attacks deny service to valid users—for example, by making a Web server temporarily unavailable or unusable. You protect against certain types of DoS threats simply to improve system availability and reliability.
- **Elevation of privileges**. In this type of threat, an unprivileged user gains privileged access and thereby has sufficient access to compromise or destroy the entire system. Elevation of privilege threats include situations in which an attacker has effectively penetrated all system defenses and become part of the trusted system itself, a dangerous situation indeed.

Howard and LeBlanc also point out that some threat types can interrelate. For example, it is possible for information disclosure threats to lead to spoofing threats if the user’s credentials are not secured. Similarly, elevation of privilege threats is by far the worst because if someone can become an administrator or root on the target computer, every other threat category becomes a reality. Conversely, spoofing threats might lead to a situation where escalation is no longer needed for an attacker to achieve his goal.

To mitigate threats that originate outside Transaction Integrator (TI) but which can negatively affect TI components and your application, Microsoft recommends that you:

- Protect the TI COM Type Library or .NET Assembly from Unauthorized Access
- Protect the Output from Tracing and Network Monitoring Activities
- Protect the TI Record or Playback Files from Unauthorized Access

Protect the TI COM Type Library or .NET Assembly from Unauthorized Access

To prevent an attacker from viewing or modifying the contents of a Transaction Integrator (TI) COM type library or .NET assembly and then using that information to either create a client application which spoofs the identity of an authorized user or modify the custom properties of the component, you should:

- Place the computer running Visual Studio and TI Designer in a secure location.
- Confirm that the access permissions to Visual Studio, TI Designer, or any other tool used to modify TI type libraries and .NET assemblies are set correctly.
- Store all TI component type libraries and .NET assemblies in a secure directory.
- Confirm that the access permissions are set correctly on all type libraries and .NET assemblies.
- Confirm that the access permissions are set correctly on the directory that contains the type libraries and .NET assemblies.

See Also

Protect the Output from Tracing and Network Monitoring Activities

Protect the TI Record or Playback Files from Unauthorized Access

Threat Mitigation within Visual Studio

Protect the Output from Tracing and Network Monitoring Activities

To prevent an attacker from viewing the user credential information that might be stored in trace files or network monitoring files, you should:

- Confirm that only authorized users are allowed to run the SNA TRACE or Microsoft Network Monitoring programs on the computer that is running Transaction Integrator.
- Store all tracing (Tracebits) output files and network monitoring (Netmon) output files in a secure directory.
- Confirm that the access permissions are set correctly on all tracing output files and network monitoring output files.
- Confirm that the access permissions are set correctly on the directory that contains the output files.
- Delete all tracing output files and network monitoring output files as soon as you are done with them.

See Also

Protect the TI COM Type Library or .NET Assembly from Unauthorized Access

Protect the TI Record or Playback Files from Unauthorized Access

Threat Mitigation within Visual Studio

Protect the TI Record or Playback Files from Unauthorized Access

To prevent an attacker from either viewing the contents of the Transaction Integrator (TI) record or playback files or replacing those files with ones that could record user data sent to or from the host, you should:

- Store all TI record and playback files in a secure directory.
- Confirm that the access permissions on all record or playback files are set correctly. A user must have administrator rights to be able to record and save a file.
- Confirm that the access permissions are set correctly on the directory that contains the record or playback files are stored.
- Store the record file in a form other than plain text.

See Also

Protect the TI COM Type Library or .NET Assembly from Unauthorized Access

Protect the Output from Tracing and Network Monitoring Activities

Threat Mitigation within Visual Studio

Data Integration Programmer's Guide

This section provides information required to develop applications to access data in an environment using Microsoft® Host Integration Server 2004. This section provides documentation for developers about data access, data replication, and data tools.

For API reference and other technical information about data integration, see the Data Integration Programmer's Reference section of the SDK.

For sample code that illustrates data integration, see the Data Integration Samples section of the SDK.

This section contains:

- Introduction to Data Integration
- Data Access Library Programmer's Guide
- Managed Provider Programmer's Guide
- OLE DB Providers Programmer's Guides
- ODBC Driver for DB2 Programmer's Guide
- ActiveX Controls Programmer's Guides
- Using Data Design Tools
- Data Integration Security Guide

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Introduction to Data Integration

This section provides information required to develop applications to access data in an environment using Microsoft® Host Integration Server 2004.

You can develop applications for data integration used in a Host Integration Server 2004 environment using several different development tools and application programming interfaces including the following:

- C or C++ applications that use OLE DB to access AS/400 and VSAM files.
- C or C++ applications that use OLE DB to access IBM Data Base 2 (DB2).
- C, C++, or Microsoft® Visual Basic® applications that use Open Database Connectivity (ODBC) drivers to access IBM DB2.
- Visual Basic applications that use ActiveX® Data Objects (ADO) to access AS/400 and VSAM files.
- Visual Basic applications that use ADO to access IBM DB2 using OLE DB.
- Visual Basic applications that use ADO to access IBM DB2 using ODBC.
- C, C++, or Visual Basic applications that use the Host File Transfer ActiveX control to transfer files to and from MVS, OS/390, AS/400, and AS/36.
- C, C++, or Visual Basic applications that use the Data Queue ActiveX control to access AS/400 data queues.
- Microsoft C++ .NET, Microsoft C#, Microsoft Visual Basic .NET applications that use the Managed Provider for DB2 to access IBM Data Base 2 (DB2).

To use this section effectively, you should be familiar with:

- Microsoft Host Integration Server 2004
- One of the following operating environments:
    - Microsoft Windows Server™ 2003
    - Microsoft Windows XP
    - Microsoft Windows® 2000 Server
- SNA concepts

Depending on the application programming interface and development tools used, you should be familiar with:

- Microsoft COM objects
- Microsoft OLE DB
- Microsoft ADO
- Microsoft ODBC
- Microsoft .NET

This section contains:

- Additional Resources for Data Integration

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Additional Resources for Data Integration

This section does not describe the products, architectures, or standards developed by other companies or organizations.

For information about SNA architecture, see your system network documentation.

The following documents provide additional information about the OLE DB application programming interfaces (APIs):

- Microsoft® Data Access Components (MDAC) Software Development Kit 2.8

The following documents provide additional information about Microsoft ActiveX® Data Objects:

- Microsoft Data Access Components (MDAC) Software Development Kit 2.5

The following documents and publications provide additional information about the Open Database Connectivity (ODBC) standard and ODBC programming:

- Microsoft Data Access Components (MDAC) Software Development Kit 2.5
- Microsoft ODBC 3.0 Software Development Kit and Programmer's Reference
- *Inside ODBC*, written by Kyle Geiger and published by Microsoft Press

For more information about SNA and the Distributed Data Manager (DDM), see the following manuals:

- *IBM Distributed Data Management Architecture: General Information* (Document Number GC219527-3)
- *IBM OS400 Distributed Data Manager User's Guide*
- *IBM OS400 Distributed Data Manager Programmer's Guide*
- *IBM Systems Network Architecture: Technical Overview*
- *IBM Systems Network Architecture: Concepts and Products*
- *IBM SNA Format and Protocol Reference Manual: Architectural Logic*
- *IBM DFSMS/MVS Version 1 Release 2 DFM/MVS Guide and Reference* (Document Number SC26-4915-00)
- *IBM DFSMS/MVS Version 1 Release 3 DFM/MVS Guide and Reference* (Document Number SC26-4915-01)
- *IBM DFSMS/MVS Version 1 Release 4 DFM/MVS Guide and Reference* (Document Number SC26-4915-02)

For more information about IBM Data Base 2 (DB2), see the following manuals:

- *IBM DB2 for OS/390 Version 5 Reference for Remote DRDA: Requesters and Servers* (Document Number SC26-8964-00*)*
- *IBM DB2 for OS/390 Version 5 Application Programming and SQL Guide* (Document Number SC26-8958-00)
- *IBM DATABASE 2 Administration Guide for Common Servers Reference* (Document Number S20H-4580)
- *IBM DATABASE 2 Application Programming Guide for Common Servers Reference* (Document Number S20H-4643*)*
- *IBM DB2 Universal Database API Reference* (Document Number S10J-8167)
- *IBM DB2 Universal Database Building Applications for Windows and OS/2 Environments Reference* (Document Number S10J-8160)

For background information about logical unit (LU) 6.2, Advanced Program-to-Program Communications (APPC), or the Common Programming Interface for Communications (CPI-C), see the following manuals:

- *IBM SNA: Technical Overview*
- *IBM SNA: Format and Protocol Reference Manual: Architecture Logic for LU Type 6.2*
- *IBM SNA: Formats*
- *IBM Systems Network Architecture: Introduction to APPC*
- *IBM Systems Network Architecture: Transaction Programmer's Reference Manual for LU Type 6.2*

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Data Access Library Programmer's Guide

This section contains information describing how to access the capabilities of the Data Access Tool using the interface exposed by the Data Access Library.

For API references and other technical information about the Data Access Library, see the Data Access Library Programmer's Reference section of the SDK.

This section contains:

- About the Data Access Library
- Programming with the Data Access Library

About the Data Access Library

This section describes the background for the Data Access Library (DAL), how the different interfaces relate to each other, and what technologies you ought to be familiar with in order to program the DAL.

This section contains:

- Goals for the Data Access Library
- About the Data Access Library Interface
- What You Need to Know Before Programming the Data Access Library
- Supported Platforms for the Data Access Library

Goals for the Data Access Library

The original goal of the Data Access Library (DAL) was to expose an interface that would enable developers to automate lengthy tasks normally performed through the Data Access Tool (DAT) user interface. As development progressed, the Data Access Library grew to include the most common functionality of the DAT.

When Microsoft developers originally created the Data Access Tool (DAT), they realized that some tasks were relatively time-consuming. For example, creating a DB2 data package takes several steps through the DAT user interface. The developers determined that the best way to reduce the time to perform such tasks was to expose a programming interface to the DAT. They determined that in exposing the interface necessary to automate a lengthy procedure, they could expose essentially the entire functionality of the Data Access Tool.

Therefore, the purpose of the Data Access Library interface is to provide a programmatic interface for the Data Access Tool and Data Source Wizard. This is done through a straightforward interface that correlates almost entirely to actions that you can take using the appropriate user interface. Although the Data Access Library provides a subset of the capabilities the user interface exposes, you can automate most of the common tasks for which you would normally use the UI.

About the Data Access Library Interface

The Data Access Library is based around four objects that represent the core functionality of the Data Access Tool (DAT) and Data Source Wizard. The following table describes the core objects for the Data Access Library.

Object	Description
DataAccessControl	Provides access to the options listed on the DAT **Action** menu: testing connections and queries, creating packages, and converting data.
DataAccessSettings	Provides access to the functionality of the Data Source Wizard: describing where information is stored, and controlling the Wizard dialog boxes and warnings.
IConnectionString	Base class for describing the different types of connection strings that the DAT uses.
IHCDItem	Base class for describing the objects that make up a host column description (HCD) file.

In addition to the above objects, the Data Access Library interface has an exception object, possible data types, a callback function triggered when creating packages, and a collection of IHCD items. For more information, see the Data Access Library Programmer's Reference.

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What You Need to Know Before Programming the Data Access Library

The Data Access Library (DAL) is a .NET interface for creating universal data link (.udl) files for Microsoft® Host Integration Server. Therefore, you ought to be familiar with the following concepts and technologies:

- Host Integration Server (HIS) 2004

  The purpose of the DAL is to simplify the creation of .udl files, which HIS then uses to access remote servers through a variety of technologies. As such, you ought to be familiar with the general framework that you will be working with when you use the DAL.

- Data Access Tool (DAT) and Data Access Wizard

  The DAT and the Data Access Wizard are the technologies that allow you to create .udl files and ODBC DSNs through a user interface. Therefore, you ought to be familiar with the standard way in which the technology performs a task before you attempt to perform that task programmatically.

- .NET Framework 1.1

  The Data Access Library was written using Microsoft Visual Studio® .NET 2003 and the .NET Frameworks 1.1. Therefore, in order to successfully use the DAL, you ought to be familiar with the technologies that went into constructing it.

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Supported Platforms for the Data Access Library

As a programmatic interface to the Data Access Tool (DAT), the Data Access Library (DAL) is supported by all systems that also support the DAT. In particular, the DAT is supported on the following platforms:

- Microsoft Windows Server™ 2003
- Microsoft Windows XP Professional
- Microsoft® Windows 2000 Server
- Microsoft Windows® 2000 Advanced Server
- Microsoft Windows 2000 Datacenter Server
- Microsoft Windows 2000 Professional

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Programming with the Data Access Library

The main programming tasks for the Data Access Library (DAT) can be considered one of three tasks: creating a connection string, retrieving or modifying data in a connection string, or performing an administrative task.

This section contains:

- Creating a Connection String
- Retrieving Data
- Performing Administrative Tasks

Creating a Connection String

The Data Access Tool can create one of two basic types of connection strings: an OLE DB connection string stored in a universal data link (.udl) file, and an ODBC connection string stored in a data source name (DSN).

This section contains:

- Creating a Connection String for a .udl File
- Creating a Connection String for an ODBC System, User or File DSN

Creating a Connection String for a .udl File

A universal data link (.udl) file is essentially a text file containing the connection string for an OLE DB data source. You can create a .udl file with the appropriate DB2OleDbConnectionString or FileSysOleDbConnectionString constructor, and then save the string to secondary storage with a call to Save. The Data Access Library automatically creates the appropriate .udl file to store the string in, and save the file to disk.

To create a .udl file and associated connection string

1. Create an empty connection string with a call to a connection string constructor.

   Calling the constructor creates a connection string with default settings. These default settings can be set only through the Data Access Tool user interface.

   If you use a file path for a file that currently exists, the system loads the connection string information in that file instead.

   You can determine the default path your system uses for storing .udl files with a call to DataAccessSettings.MakeUDLPath. **DataAccessSettings** also stores the default paths for DSN and HCD files.

2. Add in the relevant connection information to the connection string with a call to the various connection string properties, such as DataSourceName, UserName, or Password. You can also retrieve the full connection string as a text string with a call to GetString, and then save the modified string with SetString.
3. Save the string with a call to the relevant **Save** method, such as **DB2OleDbConnectionString.Save**.

   The system saves the connection string in an .udl file. The system creates the .udl file using the file path passed in the **name** parameter of the constructor. If the file does not contain the full path, the system uses the default path as described in **DataAccessSettings.UDLpath**.

The following code sample describes how to create a .udl file using a new file name, user name, and password.

```
static DB2OleDbConnectionString CreateUDLFile(string FileName, string NameOfUser, string Pass
Word, ref System.Exception myException)
{
   try
   {
      DB2OleDbConnectionString myConnection = new DB2OleDbConnectionString(FileName, false);
      myConnection.UserName = NameOfUser;
      myConnection.Password = PassWord;
      myConnection.Save();
      System.Exception MyEx= new System.Exception(@"Successful Creation", null);
      myException = MyEx;
      return myConnection;

   }
   catch (Exception ex)
   {
      myException = ex;
      return null;
   }
}
```

See Also

Retrieving Data

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Creating a Connection String for an ODBC System, User or File DSN

The other type of data you can create using the Data Access Library is a data source name (DSN). Like a universal data link (UDL) file, a DSN contains the connection information necessary to access a remote database. However, where an .udl file is generally used for an OLEDB database connection, most systems use DSN files for ODBC connections. Further, a DSN does not necessarily have to be a file: a DSN can be a file, a registry-based system DSN, or a registry-based user DSN.

To create a DSN file and associated connection string

1. Call the constructor for DB2OdbcFileConnectionString, DB2OdbcSysConnectionString, or DB2OdbcUserConnectionString.

   Calling the constructor creates a connection string with default settings. These default settings can be set only through the Data Access Tool user interface.

   If you use a file path for a file that currently exists, the system loads the connection string information in that file instead.

2. Fill in the relevant connection string properties with a call to the properties of the object created.

   You can also fill in the connection string with GetString, which returns the connection string as a text string. Once you finish modifying the relevant values, you can return the connection string to the object with a call to SetString.

3. Save the connection string information back into storage with a call to Save.

The following code sample describes how to create a DSN file and associated connection string.

```
static DB2OdbcFileConnectionString CreateUDLFile2(string FileName, string NameOfUser, string
PassWord, ref System.Exception myException)
{
   try
   {
      DB2OdbcFileConnectionString myConnection = new DB2OdbcFileConnectionString(FileName, fa
lse);
      myConnection.UserName = NameOfUser;
      myConnection.Password = PassWord;
      myConnection.Save();
      System.Exception MyEx= new System.Exception(@"Successful Creation", null);
      myException = MyEx;
      return myConnection;

   }
   catch (Exception ex)
   {
      myException = ex;
      return null;

   }
}
```

See Also

Configuring a Data Source for the ODBC Driver for DB2

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Retrieving Data

Creating connection string information requires that you create an object that is derived from the **IConnectionString** class, such as DB2OdbcConnectionString or DB2OleDbConnectionString. Once you create the string, you can save, modify, or retrieve information from it using the associated properties.

To retrieve and modify connection string information

1. Create new connection string with a call to the specific type of connection string constructor, using the file path of the .udl file containing the specified connection string.

   Alternately, you can call ReadUDL for the specified **ConnectionString** type. Many of the **ConnectionString** classes also have a **Clone** method that you may wish to use. Note that **Clone** does not load the current instance into active memory, but instead makes a copy that you can later modify and save to disk.

   If you are attempting to retrieve data from a connection string that you currently have an instance of, you can call **Load**. For example, if you recently created a new connection string and called **Save**, you can retrieve the object from storage and into active memory by calling **Load** on the object again.

   If you use a path that describes a file that does not exist, the system creates an .udl new file using the path described.

2. Retrieve the connection data from your current instance using GetString or by accessing the relevant property.

   Using **GetString** enables you to manipulate the connection string as though it were a standard text string. In contrast, accessing the value as a property is usually simpler and safer.

3. When you are finished viewing or manipulating the relevant value, return the value to the object with a call to **SetString** or by setting the appropriate property.
4. Once you are done, save your changes to secondary storage by calling Save.

The following code sample describes how to retrieve, change, and save connection string data.

```
static System.Exception ChangeCommentInUDL(string connString, string newComment)
{
   try
   {
      IConnectionString udl = DB2OleDbConnectionString.ReadUDL(connString);
      udl.Comment = newComment;
      udl.Save();
      System.Exception noException = null;
      return noException;

   }
   catch (System.Exception ex)
   {
      return ex;
   }
}
```

See Also

Creating a Connection String

Creating a Connection String for an ODBC System, User or File DSN

Performing Administrative Tasks

The administrative tasks for the Data Access Library refers to the tasks you can perform using the **DataAccessControl** interface. In general, these tasks are those that require you go beyond creating universal data link (UDL) or host column description (HCD) files, and start interacting with the actual data sources.

This section contains:

- Converting Data Source Information
- Creating a DB2 Package
- Testing a Connection
- Running a Sample Query

Converting Data Source Information

Converting a data source enables you to convert DB2 data source information from one provider type to another. Note that this does not change the data source itself, but rather reformats the data source information stored on your system.

To convert data source information

1. Retrieve the connection string for the relevant database using the appropriate call to **ReadUDL**.
2. Create a connection string to the converted database using a call to **DataAccessControl.ConvertTo**, describing the data types of the original data and translated data.
3. Save the data in the new connection string with a call to **IConnectionString.Save**.

The following sample describes how to convert data source information between OLE DB UDLs and ODBC DSNs.

```
IConnectionString ConvertUDLtoODBC(string originalUDL)
{
   try
   {
      IConnectionString udl = DB2OleDbConnectionString.ReadUDL(originalUDL);
      IConnectionString odbcDsn = DataAccessControl.ConvertTo(udl, typeof(DB2OdbcSysConnectio
nString));
      odbcDsn.Save();
      return odbcDsn;
   }
   catch
   {
      return null;
   }
}
```

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Creating a DB2 Package

A DB2 package is a collection of data used by a provider implemented as an IBM Distributed Relational Database Architecture (DRDA) application requester. The provider uses packages to issue SQL statements and call DB2 stored procedures. You can use DataAccessControl.CreatePackages to create these packages.

The create package command creates a Host Integration Server package on a DB2 system.

To create a DB2 package

1. Create a connection string to the targeted database with a call to DB2OleDbConnectionString.ReadUDL.
2. Create the package with **DataAccessControl.CreatePackage**.

The following example describes how to create a package.

```
static void CreatePackage(string myUDL, System.Exception myException)
{
try
   {
      IConnectionString connString = DB2OleDbConnectionString.ReadUDL(myUDL);
      DataAccessControl.CreatePackages(connString, null);
      myException = null;
   }
catch (System.Exception Caught)
   {
      myException = Caught;
   }
}
```

See Also

Creating Packages for Use with the OLE DB Provider for DB2

Creating Packages for Use with the ODBC Driver for DB2

Testing a Connection

Once you have created the appropriate connection string and stored it in a file, you can programmatically test the validity of your connection with a call to DataAccessControl.TestConnection.

To test a connection

1. Create or retrieve the connection string on which you run the sample query.

   For more information about creating and retrieving connection strings, see Creating a Connection String and Retrieving Data.

2. Test the connection with a call to **TestConnection**.

   If successful, **TestConnection** returns the class and version number of the server. Otherwise, the method returns null. Note that you may be required to enter the user name and password. In this case, the **Password** dialog box appears.

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Running a Sample Query

One of the final checks you can perform on a created connection string is a simple query that fetches a list of available files and data sources in the target database. Once you create the connection string, you can run this query using DataAccessControl.SampleQuery.

To run a sample query

1. Create or retrieve the connection string on which you run the sample query.

   For more information on creating and retrieving connection strings, see Creating a Connection String and Retrieving Data.

2. Run the sample query with a call to **SampleQuery**.

   If successful, **SampleQuery** returns a data table with the relevant values. Otherwise, the method returns null.

Managed Provider Programmer's Guide

A Managed Provider is a .NET data provider used for connecting Microsoft® Host Integration Server 2004 applications to a database, executing commands, and retrieving results. Those results are processed directly, placed in an ADO.NET **DataSet** to be exposed to the user, combined with data from multiple sources, or accessed remotely between tiers. A Host Integration Server Managed Provider is designed to be lightweight, creating a minimal layer between the data source and your code, and increasing performance without sacrificing functionality.

This section contains:

- Managed Provider for DB2 Programmer's Guide

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Managed Provider for DB2 Programmer's Guide

This section describes the general architecture and implementation details of the Managed Provider for DB2. The Managed Provider for DB2 enables a client to connect to a DB2 data source in order to retrieve and modify data, and also serves as a bridge between a DB2 data source and an ADO.NET **DataSet**. The Managed Provider for DB2 implements a subset of the **System.Data** interfaces to enable connection management and query execution.

This section contains:

- About the Managed Provider for DB2
- Using the Managed Provider for DB2

About the Managed Provider for DB2

Microsoft® Host Integration Server (HIS) 2004 includes a Managed Provider to access data from a loosely coupled data source; in this case, a DB2 database. The Managed Provider for DB2 uses two central .NET components to implement this capability: the ADO.NET **DataSet** and the Managed Provider for DB2 itself.

A **DataSet** is an object designed for data access independent of any data source. As a result, it can be used with multiple and differing data sources, used with XML data, or used to manage data local to the application. A **DataSet** contains a collection of one or more **DataTable** objects made up of rows and columns of data, as well as primary key, foreign key, constraint, and relation information about the data in the **DataTable** objects.

In contrast, the Managed Provider for DB2 provides data manipulation and fast, forward-only, read-only access to data. As such, the Managed Provider for DB2 exposes a specific set of objects. The **MSDb2Command** object enables access to DB2 commands to return data, modify data, run stored procedures, and send or retrieve parameter information. The **MsDb2DataReader** provides a high-performance stream of data from the DB2 database. Finally, the **MsDb2DataAdapter** provides the bridge between the **DataSet** object and the DB2 database. **MsDb2DataAdapter** uses **MsDb2Command** objects to execute SQL commands at the data source to both load the **DataSet** with data, and reconcile changes made to the data in the **DataSet** back to the data source.

This section contains:

- Goals for the Managed Provider for DB2
- The .NET Data Provider
- About the ADO.NET DataSet

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Goals for the Managed Provider for DB2

The main goal for the Managed Provider for DB2 is to allow access to loosely coupled data sources using the technologies offered by ADO.NET and the .NET Framework. To implement this goal, the Managed Provider for DB2 was designed as an incremental improvement over the traditional COM-based OLE DB providers. In addition, the Managed Provider for DB2 is optimized for DB2 over the currently-available OLE DB .NET data provider.

Microsoft has offered programming models and tools for developing enterprise data integration solutions for several years. These include the industry-standard ODBC and the COM-based OLE DB. However, developing and deploying ADO-based Web solutions presents a number of issues, including insufficient design tools, diminished performance, limited scalability, and little XML interoperability.

Additionally, the ADO- and OLE DB-based data architecture is based on solutions that require tightly coupled, live connections between application and data tiers. However, the vast majority of Web solutions today require a loosely coupled association between application components and tiers. Also, most modern Web application requirements include the use of XML as the universal Web message and data medium. Remote Data Services (RDS) offered a disconnected recordset between application and presentation tiers. ADO also offered the ability to persist recordsets as XML. However, there was no uniform means of providing asynchronous execution between tiers. In addition, XML recordset persistence was extremely limited.

To make implementation easier and to improve performance, scalability, and XML support, Microsoft offered the .NET Framework and ADO.NET. The .NET Framework offered developers a number of advantages over COM, such as cross-language inheritance, object lifetime management, and language-neutral class libraries as supported by the common language runtime (CLR). The CLR offers application developers with a predictable, managed environment in which to execute their programs. The ADO.NET programming model was designed to provide better performance and scalability the older ADO. ADO.NET is a set of common classes for exposing data services that are implemented by .NET data providers.

Microsoft Visual Studio .NET has shipped two .NET data provider implementations: the first provider accesses Microsoft SQL Server through an application-level protocol called Tabular Data Stream (TDS), and is called the SQL Server .NET Data Provider. The second provider accesses the underlying OLE DB providers, and is called the OLE DB .NET Data Provider.

However, just as the OLE DB Provider for ODBC offers less optimal performance and scalability than a direct OLE DB provider solution, so too does the OLE DB .NET Data Provider offer a less optimal solution than a specific .NET data provider implementation would. In addition, the OLE DB .NET Data provider adds complexity and compatibility issues with an extra layer of indirection. Therefore, Host Integration Server has implemented a .NET data provider for a key enterprise data source: DB2.

See Also

Managed Provider for DB2 Programmer's Guide

The .NET Data Provider

In concept, a .NET data provider is similar to an OLE DB provider: the provider runs as an interface between your application and the data source. However, the .NET data provider exposes only a single set of **ADO.NET** interfaces.

This section contains:

- Examining the Core Interface for a Managed Provider for DB2
- About the Relationships between the .NET Provider for DB2 Interfaces

Examining the Core Interface for a Managed Provider for DB2

A data provider in the .NET Framework serves as a bridge between an application and a data source. The data provider is used to retrieve data from a data source and to reconcile changes to that data back to the data source.

ADO.NET exposes a common model for .NET data provider objects so that a single set of code can be written to work regardless of the .NET data provider. The **Connection**, **Command**, **DataReader**, and **DataAdapter** objects represent the core elements of the .NET data provider model. The following table describes the purpose of these objects, and how they are implemented in the Managed Provider for DB2.

Common model	Managed Provider for DB2	Description
Connection	MsDb2Connection	Responsible for opening, closing, and maintaining a connection to a DB2 host.
Command	MsDb2Command	Manages all parameters that a query may include, which includes both SQL parameters and stored procedure parameters.
DataReader	MsDb2DataReader	A server-side forward-only cursor implementation that inherits form the **IDataReader** and **IDataRecord** interfaces.
DataAdapter	MsDb2DataAdapter	Acts as the gateway between a DB2 host table and a .NET-based data set.

In addition, the Managed Provider for DB2 has several interfaces specific to this implementation. These interfaces deal with exception and event handling, setting up connections to a DB2 host over different types of networks, and passing parameters. For more information, see the Microsoft.HostIntegration.MsDb2Client Namespace.

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About the Relationships between the .NET Provider for DB2 Interfaces

The Managed Provider for DB2 interfaces interact in different ways—with the exception of **MsDb2DataAdapter**, the remaining classes adhere to a rigid parent/child relationship:

- An **MsDb2Connection** can have one **MsDb2Transaction** running, although it can have multiple **MsDb2Commands**.
- An **MsDb2Transaction** can have one or more **MsDb2Commands** running.
- An **MsDb2Command** owns one **MsDb2ParameterCollection**, which stores multiple **MsDb2Parameters**.

  An **MsDb2Command** can also create a single **MsDb2DataReader** for parsing one or more resultsets.

The **MsDb2DataAdapter** takes advantage of all the other **Managed Provider** interfaces. The **MsDb2DataAdapter** serves as the gateway between a host DB2 system and a client-side ADO.NET **DataSet**. The **DataSet** is an important piece of the .NET data framework because it provides a mechanism for caching data in a managed environment and inferring XML schema information, in essence providing a gateway between DB2 data and Microsoft Web Services.

See Also

Examining the Core Interface for a Managed Provider for DB2

About the ADO.NET DataSet

The ADO.NET **DataSet** is the object that contains the DB2 data that the Managed Provider for DB2 retrieved from the remote data source. Specifically, the ADO.NET **DataSet** is a local cache of tables, similar to a collection of ADO disconnected recordsets, described in the **System.Data** namespace. In addition, the **DataSet** records the relationships between the tables using keys and constraints. The **DataSet** is central to supporting disconnected, distributed data scenarios with ADO.NET.

Note that the **DataSet** described here is identical to other **DataSets** used in ADO.NET.

This section contains:

- The DataTableCollection
- The DataRelationCollection
- The ExtendedProperties
- XML Support

The DataTableCollection

An ADO.NET **DataSet** contains a collection of zero or more tables represented by **DataTable** objects. The **DataTableCollection** contains all the **DataTable** objects in a **DataSet**.

A **DataTable** is defined in the **System.Data** namespace and represents a single table of memory-resident data. It contains a collection of columns represented by a **DataColumnCollection**, and constraints represented by a **ConstraintCollection**, which together define the schema of the table. A **DataTable** also contains a collection of rows represented by the **DataRowCollection**, which contains the data in the table. Along with its current state, a **DataRow** retains both its current and original versions to identify changes to the values stored in the row.

See Also

About the ADO.NET DataSet

The DataRelationCollection

A **DataSet** contains relationships in its **DataRelationCollection** object. A relationship, represented by the **DataRelation** object, associates rows in one **DataTable** with rows in another **DataTable**. It is analogous to a join path that might exist between primary and foreign key columns in a relational database. A **DataRelation** identifies matching columns in two tables of a **DataSet**.

Relationships enable navigation from one table to another within a **DataSet**. The essential elements of a **DataRelation** are the name of the relationship, the name of the tables being related, and the related columns in each table. Relationships can be built with more than one column per table by specifying an array of **DataColumn** objects as the key columns. When a relationship is added to the **DataRelationCollection**, it may optionally add a **UniqueKeyConstraint** and a **ForeignKeyConstraint** to enforce integrity constraints when changes are made to related column values.

See Also

About the ADO.NET DataSet

The ExtendedProperties

The **DataSet** (as well as the **DataTable** and **DataColumn**) has an **ExtendedProperties** property. **ExtendedProperties** is a **PropertyCollection** where you can place customized information, such as the **SELECT** statement that was used to generate the resultset or a date/time stamp of when the data was generated. The **ExtendedProperties** collection is persisted with the schema information for the **DataSet** (as well as the **DataTable** and **DataColumn**).

See Also

About the ADO.NET DataSet

XML Support

The **DataSet** can also persist and reload its contents as XML and its schema as XSD. The **DataSet** has direct support for reading (shredding) and writing data using XML using the .NET Framework **XmlReader** and **XmlWriter**. When writing XML, the output conforms to the W3C XSD schema. XML is a good method of moving data between application tiers. The **XMLDataDocument** can make use of the XML services, such as XSL/T and XPath.

See Also

About the ADO.NET DataSet

Using the Managed Provider for DB2

The Managed Provider for DB2 operates in most ways as a normal data provider: you can connect to a DB2 database, execute commands, retrieve data, and use stored procedures.

This section contains:

- Creating a Project in Visual Studio Using the Managed Provider for DB2
- Connecting and Disconnecting to and from a DB2 Database
- Executing Commands in a DB2 Database
- Reading Data from a DB2 Database
- Using Stored Procedures in a DB2 Database
- Obtaining a Single Value from a DB2 Database
- Working with the DataAdapter and the DataSet for a DB2 Database
- Performing Transactions with a DB2 Database
- Performing a Two-Phase Commit Transaction over TCP/IP

Creating a Project in Visual Studio Using the Managed Provider for DB2

You can create a project in Microsoft® Visual Studio® .NET using the Managed Provider for DB2 in the same way you would create any other project. However, while the Managed Provider for DB2 is compatible with versions 1.0 and 1.1 of the .NET Framework, interoperability between the two versions of .NET Framework is limited. The following table describes the different versions of Visual Studio and the .NET Framework you may have installed on your system, and the effects it may have on any new projects you create with the Managed Provider for DB2.

Visual Studio version installed	.NET Framework version installed	New projects using the Managed Provider for DB2
2003	1.1	Reference .NET Framework version 1.1 and work as described.
2002 and 2003	1.0 and 1.1	Projects build in Visual Studio 2002 reference the incorrect .NET Frameworks version. Projects built in Visual Studio 2003 reference .NET Framework 1.1 and function as expected.

When only Visual Studio 2003 and .NET Framework 1.1 are installed, newly created projects function as expected, and reference .NET Framework version 1.1. However, conflicts occur when both Visual Studio 2002 and Visual Studio 2003 or both .NET Framework 1.0 and 1.1 are installed.

Specifically, projects created in Visual Studio 2003 function as expected and reference .NET Framework version 1.1. In contrast, projects created in Visual Studio 2002 only function as expected after redirecting your project to .NET Framework 1.1.

To redirect your Visual Studio 2002 project to .NET Framework version 1.1

1. Remove the version 1.0 references to System, System.Data, and System.Xml.
2. Replace these references with version 1.1 references to System, System.Data, and System.Xml.

   You can browse for the location of these references at <drive>:\Windows\Microsoft.NET\Framework\v1.1.4322\.

See Also

Using the Managed Provider for DB2

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Connecting and Disconnecting to and from a DB2 Database

There are two ways to connect and disconnect to a DB2 database. The first and most common way is using an **MsDb2Connection** to open and close the connection. The second method is to access a connection pool.

This section contains:

- Connecting with an MsDb2Connection
- Connecting to a DB2 Connection Pool

Connecting with an MsDb2Connection

The first step to accessing a remote DB2 database is to connect to the database. You must use MsDb2Connection to access an IBM DB2 data source. Once you have connected, you may retrieve, modify, and update information as you wish. Note that connections are not implicitly released when the **MsDb2Connection** falls out of scope or is reclaimed by garbage collection. As such, you must close the connection when you are finished using it. You can close a connection by using either the MsDb2Connection.Close or MsDb2Connection.Dispose.

The following sample describes how to connect to a DB2 database.

```
Public void SampleConnect()
{
   MsDb2Connection myConnection = null;
   Try
   {
      myConnection = new MsDb2Connection(@"file name=HOST.udl ");
      myConnection.Open();
      //perform any necessary tasks here
      myConnection.Close();
   }
finally
   {
      if(myConnection!= null)
         myConnection.Dispose();
   }
}
```

See Also

Using the Managed Provider for DB2

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Connecting to a DB2 Connection Pool

Another way to connect to a DB2 database is through a connection pool. Although implemented differently on the server, a connection pool is identical to a tradition ional connection from the perspective of a client application.

A connection pool is a set of one or more connections the server keeps open to service requests from one or more clients. When the client is finished with a connection, the server does not terminate the connection. Instead, the connection is released back into the pool, and can then service another client. Connection pooling is often used in situations where clients will connect, query, and terminate a connection to the server multiple times over the course of a session, such as a database server accessed through the internet.

To connect and disconnect to a DB2 connection pool with HIS

1. Connect to the DB2 server with MsDb2Connection, with the MsDb2Connection.ConnectionPooling set to **true**.
2. Perform your queries as you would with a traditional DB2 connection.
3. Use MsDb2Connection.Close or MsDb2Connection.Dispose to end your session.

   Note that calling **Close** or **Dispose** on a connection from a connection pool does not actually close or dispose the connection. Instead, the server returns the connection to the pool.

The following code sample describes how to connect to a DB2 database using a connection pool.

```
int GetNumberOfOrders()
{
    MsDb2Connection conn = new MsDb2Connection(@"File Name=C:\MyConn.UDL");
    sDb2Command cmd;
    int numOrders = 0;
    conn.ConnectionPooling = true;
    conn.Open();
    cmd = new MsDb2Command("select count(*) from orders", conn);
    numOrders = (int)cmd.ExecuteScalar();
    conn.Close();
    return numOrders;
}
```

See Also

Using the Managed Provider for DB2

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Executing Commands in a DB2 Database

After establishing a connection to a data source, you can execute commands and return results from the data source using MsDb2Command. **MsDb2Command** can be created by calling MsDb2Connection.CreateCommand.

MsDb2Command exposes several **Execute** methods you can use. When returning results as a stream of data, use ExecuteReader to return a **DataReader** object. Use ExecuteScalar to return a singleton value. Use ExecuteNonQuery to execute commands that do not return rows.

When using **MsDb2Command** with a stored procedure, you may set MsDb2Command.CommandType to *StoredProcedure*. With a **CommandType** of *StoredProcedure*, you can use the MsDb2Command.Parameters to access input and output parameters and return values. **MsDb2Command.Parameters** can be accessed regardless of the **Execute** method called.

The following example describes how to execute a command in a DB2 database by inserting a row into a database.

```
Public void InsertRow()
{
   MsDb2Connection myConnection = null;
   MsDb2Command myCommand = null;
   try
      {
         string myInsertQuery = "INSERT INTO Customers (CustomerID, CompanyName)
                  Values('NWIND', 'Northwind Traders')";
         myConnection = new MsDb2Connection(@"file name=HOST.udl ");
         myConnection.Open();
         myCommand = new MsDb2Command(myInsertQuery);
         myCommand.Connection = myConnection;
         myCommand.ExecuteNonQuery();
         myConnection.Close();
      }
finally
      {
         if(myCommand!= null)
                  myCommand.Dispose();
         if(myConnection!= null)
                  myConnection.Dispose();
       }
}
```

See Also

Using the Managed Provider for DB2

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Reading Data from a DB2 Database

In addition to executing commands on a remote database, you can also retrieve information from the database to view locally.

This section contains:

- Reading Data from the Database
- Retrieving Multiple ResultSets
- Retrieving Schema Information

Reading Data from the Database

You can use MsDb2DataReader to retrieve a read-only, forward-only stream of data from a database. Using **MsDb2DataReader** can increase application performance and reduce system overhead because only one row at a time is ever in memory.

After creating an instance of the MsDb2Command object, you can create an **MsDb2DataReader** by calling MsDb2Command.ExecuteReader to retrieve rows from a data source.

You can use MsDb2DataReader.Read to obtain a row from the results of the query. You access each column of the returned row by passing the name or ordinal reference of the column to **MsDb2DataReader**. However, for best performance, **MsDb2DataReader** provides a series of methods that enable you to access column values in their native data types.

Using the typed accessor methods when the underlying data type is known reduce the amount of type conversion required when retrieving the column value.

MsDb2DataReader also provides a nonbuffered stream of data that enables procedural logic to efficiently process results from a data source sequentially. **MsDb2DataReader** is a good choice when retrieving large amounts of data because the data is not cached in memory.

After you are finished with **MsDb2DataReader**, make sure to call the **Close** method. In addition, output parameters and return values from an MsDb2Command are not available until **MsDb2DataReader** is closed.

Note that the Distributed Relational Data Architecture (DRDA) uses a "." as a decimal point and a "," to separate numerical values. If you are working in a language, such as German, that uses a "," as a decimal point, your may encounter an error when retrieving data from your database. To avoid this error, use **System.Globalization.CultureInfo.InvariantCulture** when calling the **ToString** and **Parse** methods.

The following example describes how to read data from a DB2 database by reading a row from a **SELECT** statement:

```
Public void ReadMyData(string myConnString)
{
   string mySelectQuery = "SELECT OrderID, CustomerID FROM Orders";
   MsDb2Connection myConnection = new MsDb2Connection(myConnString);
   MsDb2Command myCommand = new MsDb2Command(mySelectQuery,myConnection);
   myConnection.Open();
   MsDb2DataReader myReader;
   myReader = myCommand.ExecuteReader();
   //Always call Read before accessing data.
   While (myReader.Read())
   {
       Console.WriteLine(myReader.GetInt32(0) + ", "
       + myReader.GetString(1));
   }
   //always close when done reading.
   myReader.Close();
   //close the connection when done.
   myConnection.Close();
}
```

See Also

Using the Managed Provider for DB2

Retrieving Multiple ResultSets

MsDb2DataReader provides the **NextResult** method to iterate through multiple returned results. The following example describes how to retrieve multiple resultsets.

```
Public void ReadMyData(string myConnString)
{
   string myCallQuery = "CALL MyReports()";
   MsDb2Connection myConnection = new MsDb2Connection(myConnString);
   MsDb2Command myCommand = new MsDb2Command(myCallQuery,myConnection);
   myConnection.Open();
   MsDb2DataReader myReader;
   myReader = myCommand.ExecuteReader();
   do
      {
      //Always call Read before accessing data.
      While (myReader.Read())
         {
         Console.WriteLine(myReader.GetString(0) + " , ", "
                 + myReader.GetString(1));
         }
       }
   while(myReader.NextResult());
   //always call Close when done reading.
   myReader.Close();
   //Close the connection when done with it
   myConenction.Close();
}
```

See Also

Using the Managed Provider for DB2

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Retrieving Schema Information

While an MsDb2DataReader is open, you can retrieve schema information about the current resultset using MsDb2DataReader.GetSchemaTable. **GetSchemaTable** returns a **DataTable** populated with rows and columns that contain the schema information for the current resultset. The **DataTable** contains one row for each column of the resultset. Each column of the schema table row maps to a property of the column returned in the resultset, where the **ColumnName** is the name of the property and the value of the column is the value of the property. However, hierarchical rowsets, or "chapters" (OLE DB type DBTYPE_HCHAPTER, ADO type **adChapter**) cannot be retrieved using **MsDb2DataReader**.

See Also

Using the Managed Provider for DB2

Using Stored Procedures in a DB2 Database

A stored procedure is an executable object stored in a database. Calling a stored procedure is similar to invoking an SQL command. Using stored procedures on the data source, instead of executing or preparing a statement in the client application, can provide several advantages, including: higher performance, reduced network overhead, and improved consistency and accuracy.

Stored procedures offer many advantages in data-driven applications. Database operations can be encapsulated in a single command, optimized for best performance, and enhanced with additional security. While a stored procedure can be called by simply passing the stored procedure name followed by parameter arguments as an SQL statement, using MsDb2Command.Parameters enables you to more explicitly define stored procedure parameters as well as to access output parameters and return values.

To call a stored procedure, set MsDb2Command.CommandType to **StoredProcedure**. You can then use **Parameters** to define parameters.

You can create a parameter using the appropriate constructor or by calling **Command.Parameters.Add**. **Parameters.Add** takes as input either constructor arguments or an existing **Parameter** object. When setting the value of a parameter to a **null** value, use **DBNull.Value**.

For parameters other than input parameters, you must set the MsDb2Parameter.Direction property to specify whether the parameter type is **Input**, **Output**, or **InputOutput**.

When using parameters with **MsDb2Command**, the names of the parameters added to the MsDb2ParameterCollection must match the names of the parameter markers in your stored procedure. The Managed Provider for DB2 treats parameters in the stored procedure as named parameters and searches for the matching parameter markers.

The Managed Provider for DB2 does not support named parameters for passing parameters to an SQL statement or a stored procedure called by **CommandType.Text** command. As such, you must use the question mark (?) placeholder, as shown in the following example:

```
SELECT * FROM Customers WHERE CustomerID = ?
```

As a result, the order in which **MsDb2Parameters** are added to the **MsDb2ParametersCollection** must directly correspond to the position of the question mark placeholder for the parameter.

You may need to return information from a database that is not in the form of a table or data stream. For example, you may want to return a single value such as the result of **Count(*)**, **Sum(Price)**, or **Avg(Quantity)**. **Command** provides the capability to return single values using MsDb2Command.ExecuteScalar. **ExecuteScalar** returns the value of the first column of the first row of the resultset as a scalar value.

See Also

Using the Managed Provider for DB2

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Obtaining a Single Value from a DB2 Database

You may need to return database information that is simply a single value rather than in the form of a table or data stream. For example, you may want to return the result of an aggregate function such as **Count(*)**, **Sum(Price)**, or **Avg(Quantity)**. The Command object provides the capability to return single values using the **ExecuteScalar** method. The **ExecuteScalar** method returns as a scalar value the value of the first column of the first row of the resultset.

The following code sample describes how to retrieve a single value from a DB2 database.

```
static void SingleValueConnection()
{
    MsDb2Connection myConnection = null;
    try
    {
//  Obtaining a single value as a database.
        myConnection = new MsDb2Connection(@"file name=HOST.udl ");
        myConnection.Open();
        MsDb2Command myCommand = new MsDb2Command("SELECT Count(*) FROM Orders", myConnection
);
       Int32 count = (Int32)myCommand.ExecuteScalar();
        myConnection.Close();
    }
        catch (Exception exc)
    {
        Console.WriteLine(exc);
        Console.ReadLine();
    }

    finally
    {
        if(myConnection!= null)
            myConnection.Dispose();
    }
} // End SingleValueConnection
```

See Also

Using the Managed Provider for DB2

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Working with the DataAdapter and the DataSet for a DB2 Database

The **MsDb2DataAdapter** is the main interface for retrieving and updating the **DataSet**.

This section contains:

- Populating a Managed Provider Dataset from a Data Adapter
- Working with DataAdapter Events
- Updating the DB2 Database with a DataAdapter and the DataSet
- Using Parameters with the DB2 DataAdapter
- Adding Additional Constraints to a DB2 DataSet
- Setting up DataTable and DataColumn Mappings for a DB2 Database

Populating a Managed Provider Dataset from a Data Adapter

A **DataSet** is a memory-resident representation of data that provides a consistent relational programming model independent of the data source. The **DataSet** represents a complete set of data including tables, constraints, and relationships among the tables. Because the **DataSet** is independent of the data source, a **DataSet** can include data local to the application, as well as data from multiple data sources. Interaction with existing data sources is controlled through the MsDb2DataAdapter.

The **MsDb2DataAdapter** is used to retrieve data from a data source and populate tables within a **DataSet**. The **MsDb2DataAdapter** also resolves changes made to the **DataSet** back to the data source. The **MsDb2DataAdapter** uses MsDb2Connection to connect to a data source, and MsDb2Command to retrieve data from and resolve changes to the data source.

MsDb2DataAdapter.SelectCommand is an MsDb2Command object that retrieves data from the data source. Similarly, InsertCommand, UpdateCommand, and DeleteCommand are **MsDb2Command** objects that manage updates to the data in the data source according to modifications made to the data in the **DataSet**. For more information, see Updating the DB2 Database with a DataAdapter and the DataSet.

Working with DataAdapter Events

MsDb2DataAdapter exposes two events you can use to respond to changes made to data at the data source. The following table shows the **MsDb2DataAdapter** events.

Event	**Description**
RowUpdating	An **UPDATE**, **INSERT**, or **DELETE** operation on a row (by a call to one of the **Update** methods) is about to begin.
RowUpdated	An **UPDATE**, **INSERT**, or **DELETE** operation on a row (by a call to one of the **Update** methods) is complete.

RowUpdating is raised before any update to a row from the **DataSet** has been processed at the data source. **RowUpdated** is raised after any update to a row from the **DataSet** has been processed at the data source. As a result, you can use **RowUpdating** to modify update behavior before it happens, to provide additional handling when an update occurs, to retain a reference to an updated row, to cancel the current update and schedule it for a batch process to be processed later, and so on. **RowUpdated** is useful for responding to errors and exceptions that occur during the update. You can add error information to the **DataSet**, as well as retry logic, and so on.

The MsDb2RowUpdatingEventArgs and MsDb2RowUpdatedEventArgs arguments passed to the **RowUpdating** and **RowUpdated** events include: a **Command** property that references the **Command** object being used to perform the update; a **Row** property that references the **DataRow** object containing the updated information; a **StatementType** property for what type of update is being performed; the **TableMapping**, if applicable; and the **Status** of the operation.

You can use the **Status** property to determine if an error has occurred during the operation and, if desired, to control the actions against the current and resulting rows. When the event occurs, the **Status** property equals either **Continue** or **ErrorsOccurred**. The following table shows the values to which you can set the **Status** property in order to control subsequent actions during the update.

Status	**Description**
Continue	Continue the update operation.
ErrorsOccurred	Abort the update operation and throw an exception.
SkipCurrentRow	Ignore the current row and continue the update operation.
SkipAllRemainingRows	Abort the update operation, but do not throw an exception.

Setting the **Status** property to **ErrorsOccurred** causes an exception to be thrown. You can control which exception is thrown by setting the **Errors** property to the desired exception. Using one of the other values for **Status** prevents an exception from being thrown.

Updating the DB2 Database with a DataAdapter and the DataSet

MsDb2DataAdapter.Update is called to resolve changes from a **DataSet** back to the data source. **Update**, like **Fill**, takes as arguments an instance of a **DataSet**, and an optional **DataTable** object or **DataTable** name. The **DataSet** instance is the **DataSet** that contains the changes that have been made, and the **DataTable** identifies the table from which to retrieve the changes.

When you call the **Update** method, the MsDb2DataAdapter analyzes the changes that have been made and executes the appropriate command (**INSERT**, **UPDATE**, or **DELETE**). When the **MsDb2DataAdapter** encounters a change to a **DataRow**, it uses InsertCommand, UpdateCommand, or DeleteCommand to process the change. This enables you to maximize the performance of your ADO.NET application by specifying command syntax at design time and, where possible, through the use of stored procedures. You must explicitly set the commands before calling **Update**. If **Update** is called and the appropriate command does not exist for a particular update (for example, no **DeleteCommand** for deleted rows), an exception will be thrown.

Command parameters can be used to specify input and output values for an SQL statement or stored procedure for each modified row in a **DataSet**. For more information, see Using Parameters with the DB2 DataAdapter.

If your **DataTable** maps to or is generated from a single database table, you can take advantage of the **CommandBuilder** object to automatically generate the **DeleteCommand**, **InsertCommand**, and **UpdateCommand** of the **DataAdapter**.

The **Update** method resolves your changes back to the data source, however other clients may have modified data at the data source since the last time you filled the **DataSet**. To refresh your **DataSet** with current data, use the **DataAdapter** and **Fill** the **DataSet** again. New rows is added to the table, and updated information is incorporated into existing rows.

To handle exceptions that may occur during an **Update**, you can use the **RowUpdated** event to respond to row update errors when they occur (see Working with DataAdapter Events), or you can set **DataAdapter.ContinueUpdateOnError** to **true** before calling **Update**, and respond to the error information stored in the **RowError** property of a particular row when the **Update** is completed.

Note that calling **AcceptChanges** on the **DataSet**, **DataTable**, or **DataRow** causes all **Original** values for a **DataRow** to be overwritten with the **Current** values for the **DataRow**. If the field values that identify the row as unique have been modified, after calling **AcceptChanges,** the **Original** values no longer match the values in the data source.

Using Parameters with the DB2 DataAdapter

The MsDb2DataAdapter has four properties that are used to retrieve data from and update data to the data source. SelectCommand returns data from the data source. The InsertCommand, UpdateCommand, and DeleteCommand are used to manage changes at the data source. **SelectCommand** must be set before calling **Msdb2DataAdapter.Fill**. **InsertCommand**, **UpdateCommand**, or **DeleteCommand** must be set before the **MsDb2DataAdapter.Update** is called, depending on what changes were made to the data in the **DataSet**. For example, if rows have been added, the **InsertCommand** must be set before calling **Update**. When **Update** is processing an inserted, updated, or deleted row, the **MsDb2DataAdapter** uses the respective Command property to process the action. Current information about the modified row is passed to **MsDb2Command** through the **MsDb2ParametersCollection**.

Adding Additional Constraints to a DB2 DataSet

MsDb2DataAdapter.Fill fills a **DataSet** only with table columns and rows from a data source; though constraints are commonly set by the data source, **Fill** does not add this schema information to the **DataSet** by default. To populate a **DataSet** with existing primary key constraint information from a data source, you can either call **MsDb2DataAdapter.FillSchema**, or set **MsDb2DataAdapter.MissingSchemaAction** to *AddWithKey* before calling **Fill**. This ensures that primary key constraints in the **DataSet** reflect those at the data source. Foreign key constraint information is not included and needs to be created explicitly.

Adding schema information to a **DataSet** before filling it with data ensures that primary key constraints are included with the **DataTable** objects in the **DataSet**. As a result, when additional calls to **Fill** the **DataSet** are made, the primary key column information is used to match new rows from the data source with current rows in each **DataTable**, and current data in the tables is overwritten with data from the data source. Without the schema information, the new rows from the data source are appended to the **DataSet**, resulting in duplicate rows.

Note that if a column in a data source is identified as autoincrementing, **FillSchema**, or the **Fill** method with a **MissingSchemaAction** of *AddWithKey*, creates a **DataColumn** with an **AutoIncrement** property set to **true**. However, you need to set the **AutoIncrementStep** and **AutoIncrementSeed** values yourself.

Using **FillSchema** or setting the **MissingSchemaAction** to *AddWithKey* requires extra processing at the data source to determine primary key column information. This additional processing can hinder performance. If you know the primary key information at design time, it is recommended that you specify the primary key column or columns explicitly in order to achieve optimal performance.

If the MsDb2DataAdapter encounters multiple resultsets returned from the SelectCommand, it creates multiple tables in the **DataSet**. The tables is given an incremental default name of TableN, starting with "Table" for Table0. If a table name is passed as an argument to the **FillSchema** method, the tables will be given an incremental default name of TableNameN, starting with "TableName" for TableName0.

Setting up DataTable and DataColumn Mappings for a DB2 Database

An MsDb2DataAdapter contains a collection of zero or more **DataTableMapping** objects in its **TableMappings** property. A **DataTableMapping** provides a master mapping between the data returned from a query against a data source, and a **DataTable**. The **DataTableMapping** name can be passed in place of the **DataTable** name to **MsDb2DataAdapter.Fill**.

A **DataTableMapping** enables you to use column names in a **DataTable** that are different from those in the database. The **MsDb2DataAdapter** uses the mapping to match the columns when the table is updated.

If you do not specify a **TableName** or a **DataTableMapping** name when calling **Fill** or **Update**, the **MsDb2DataAdapter** looks for a **DataTableMapping** named "Table". If that **DataTableMapping** does not exist, the **TableName** of the **DataTable** will be "Table". You can specify a default **DataTableMapping** by creating a **DataTableMapping** with the name of "Table".

In more advanced situations, you may decide that you want the same **MsDb2DataAdapter** to support loading different tables with different mappings. To do this, simply add additional **DataTableMapping** objects.

When **Fill** is passed an instance of a **DataSet** and a **DataTableMapping** name, if a mapping with that name exists, it is used, otherwise a **DataTable** with that name is used.

Note that if a source column name is not supplied for a column mapping or a source table name is not supplied for a table mapping, default names will be automatically generated. If no source column is supplied for a column mapping, the column mapping is given an incremental default name of SourceColumnN, starting with "SourceColumn1". If no source table name is supplied for a table mapping, the table mapping is given an incremental default name of SourceTableN, starting with "SourceTable1".

It is recommended that you avoid the naming convention of "SourceColumnN" when you supply a source column name for a column mapping, or "SourceTableN" when you supply a source table name for a table mapping, because the name you supply may conflict with an existing default column mapping name in the **ColumnMappingCollection** or table mapping name in the **DataTableMappingCollection**. If the supplied name already exists, an exception will be thrown.

If your MsDb2DataAdapter.SelectCommand returns multiple tables, **Fill** automatically generate table names with incremental values for the tables in the **DataSet**, starting with the specified table name and continuing on in the form TableNameN, starting with "TableName1". You can use table mappings to map the automatically generated table name to a name you want specified for the table in the **DataSet**.

See Also

Using the Managed Provider for DB2

Performing Transactions with a DB2 Database

Transactions are a group of database operations combined into a logical unit of work, and are used to control and maintain the consistency and integrity of each database despite errors that might occur in the system. A transaction consists of a series of SQL **SELECT**, **INSERT**, **UPDATE**, or **DELETE** statements. If no errors are encountered during a transaction, all modifications in the transaction become a permanent part of the database. If errors are encountered, none of the modifications are made to the database.

For example, in a banking application where funds are transferred from one account to another, one account is credited an amount, and another account is debited the same amount at the same time. Because computers can fail due to power outages, network outages, and so on, it is possible to update a row in one table, but not in the related table. Because the managed provider for DB2 supports the **MsDb2Transaction** object, you can group database operations into a transaction to prevent database inconsistency resulting from these events.

There are three basic commands for transactions: **BEGIN**, **COMMIT**, and **ROLLBACK**. The **BEGIN** statement marks the beginning of a transaction. All procedures attempted after the **BEGIN** statement are considered part of the transaction, which is completed by the **COMMIT** statement, or canceled by the **ROLLBACK** statement.

To perform a transaction

1. Call MsDb2Connection.BeginTransaction to mark the start of the transaction.

   BeginTransaction returns a reference to the transaction. Retain this reference so that you can assign it to commands that are enlisted in the transaction.

2. Assign the transaction to the MsDb2Command.Transaction to be executed.

   If a command is executed on a connection with an active transaction and the **Transaction** object has not been assigned to the **Transaction** property of the Command, an MsDb2Exception will be thrown.

3. Execute the required commands.
4. Call MsDb2Transaction.Commit to complete the transaction, or call MsDb2Transaction.Rollback to cancel the transaction.

The following code sample describes how to perform a transaction.

```
static void TransactionConnection()
{
    MsDb2Connection myConnection new MsDb2Connection(@"file name=HOST.udl ");
    myConnection.Open();
    // Start a local transaction.
    MsDb2Transaction myTrans = myConnection.BeginTransaction();
    // Enlist the command in the current transaction.
    MsDb2Command myCommand = myConnection.CreateCommand();
    myCommand.Transaction = myTrans;
    try
    {
        myCommand.CommandText = "Insert into Region (RegionID, RegionDescription) VALUES (100
, 'Description')";
        myCommand.ExecuteNonQuery();
        myCommand.CommandText = "Insert into Region (RegionID, RegionDescription) VALUES (101
, 'Description')";
        myCommand.ExecuteNonQuery();
        myTrans.Commit();
        Console.WriteLine("Both records are written to database.");
    }
    catch(Exception e)
    {
        try
        {
           myTrans.Rollback();
        }
        catch (MsDb2Exception ex)
        {
            if (myTrans.Connection != null)
            {
                Console.WriteLine("An exception of type " + ex.GetType() +
                        " was encountered while attempting to roll back the transaction.");
                }
            }

            Console.WriteLine("An exception of type " + e.GetType() +
                "was encountered while inserting the data.");
            Console.WriteLine("Neither record was written to database.");
        }
        finally
        {
            Console.ReadLine();
            myConnection.Close();
        }
    } //End TransactionConnection
```

See Also

Using the Managed Provider for DB2

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Performing a Two-Phase Commit Transaction over TCP/IP

Two-phase commit (2PC) is a host server-installed protocol that ensures that updates to multiple instances of a database on a network either succeed or fail in their entirety. Host Integration Server 2004 supports 2PC over TCP/IP, enabling you to gain the security of a 2PC connection over the Internet.

Host Integration Server supports 2PC works using three components: the Microsoft Distributed Transaction Coordinator (DTC), the Resync service, and the transaction log. The DTC governs the normal DTC transaction flow: enlist, prepare, commit, and abort. The Resync service coordinates transaction recovery in case of any failure or disconnection, while the transaction log maintains a log of information that is needed in case of recovery.

You can perform a 2PC transaction with ADO.NET and the Managed Provider for DB2 using the **System.EnterpriseServices** namespace. Using a 2PC transaction is automatic. However, you may need to configure your 2PC connection using tools such as the Data Access Tool.

The following code sample describes how to use 2PC in a DB2 transaction.

```
Public class CentralBank : ServicedComponent
{
   public CentralBank()
   {
   }

   public void Transfer(string connString, int fromId, int toId, double amount)
   {
      MsDb2Connection conn = null;
      MsDb2Command cmd = null;
      int rowsAffected = 0;
      try
      {
         conn = new MsDb2Connection(connString);
         conn.Open();

         cmd = new MsDb2Command();
         cmd.Connection = conn;
         cmd.CommandText = "UPDATE ACCOUNTS SET BALANCE = BALANCE + ?
WHERE ID = ?";
         cmd.Parameters.Add("balance", amount);
         cmd.Parameters.Add("toId", toId);
         rowsAffected = cmd.ExecuteNonQuery();
         cmd.Parameters.Clear();
         cmd.CommandText = "UPDATE ACCOUNTS SET BALANCE = BALANCE - ?
WHERE ID = ?";
         cmd.Parameters.Add("balance", amount);
         cmd.Parameters.Add("fromId", fromId);
         rowsAffected = cmd.ExecuteNonQuery();
         ContextUtil.SetComplete();
      }
      catch(MsDb2Exceptionsqlca)
      {
         Console.WriteLine(sqlca.Message);
         ContextUtil.SetAbort();
      }
      finally
      {
         if(cmd != null)
            cmd.Dispose();
         if(conn != null)
         {
            if(conn.State == ConnectionState.Open)
               conn.Close();
            conn.Dispose();
         }
      }
   }
}
```

See Also

Using the Managed Provider for DB2

OLE DB Providers Programmer's Guides

This section of the Microsoft® Host Integration Server 2004 software development kit (SDK) provides information about using the OLE DB providers for AS/400, VSAM, and DB2.

This section contains:

- OLE DB Provider for AS/400 and VSAM Programmer's Guide
- OLE DB Provider for DB2 Programmer's Guide
- ADO Object, Method, Property, and Collection Support for AS/400, VSAM and DB2

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OLE DB Provider for AS/400 and VSAM Programmer's Guide

The Microsoft® OLE DB Provider for AS/400 and VSAM enables you to directly access record-level data in mainframe VSAM, partitioned data sets (PDSs), and midrange OS/400 files from within an OLE-aware application. The object linking and embedding database (OLE DB) is a standard set of interfaces that provide heterogeneous access to disparate sources of information located anywhere—file systems, e-mail folders, and databases. The OLE DB Provider for AS/400 and VSAM combines the universal data access of OLE DB with the Record-Level Input/Output (RLIO) protocol of the IBM distributed data management (DDM) architecture.

DDM is a set of rules for distributing or extending the data management from one computer to another, such as from a mainframe to an AS/400 computer, or from one of these host computers to a server computer. By combining the OLE DB and DDM architectures, Microsoft enables organizations to preserve their investments in an existing data management infrastructure, while extending universal data access to all enterprise-wide data sources.

For API references and other technical information about the OLE DB provider, see the OLE DB Providers Programmer's Reference section of the SDK.

For sample code using the OLE DB provider, see the OLE DB Provider and ODBC Driver Samples section of the SDK.

This section contains:

- Goals of the OLE DB Provider for AS/400 and VSAM
- OLE DB Environment
- DDM Record-Level Access
- Platforms Supported by the OLE DB Provider for AS/400 and VSAM
- Indexed File Access
- File and Record Attributes
- Configuring the OLE DB Provider for AS/400 and VSAM
- Programming Considerations Using the OLE DB Provider for AS/400 and VSAM
- Host Column Description
- Conversion from Host to OLE DB Data Types
- Character Code Conversions

Goals of the OLE DB Provider for AS/400 and VSAM

For the majority of enterprises today, much mission-critical information resides on IBM mainframe and AS/400 computers. This information is stored in records on the OS/400 and VSAM file systems. This information is created, owned, and often accessible by only host-based applications. In the mainframe environment, these applications include CICS and DB2; other commercial applications; and a large number of custom applications written in COBOL, PL/I, and other languages. In the AS/400 environment, these applications include primarily DB2 and commercial applications, plus a large number of custom report program generator (RPG) applications. Not all of these data sources are SQL-accessible. Many of the host data stores contain non-SQL-accessible data that is owned by something other than a traditional relational database management system (RDBMS).

These same enterprises rely on vast networks of personal computers to enable their users to achieve business goals. End users invariably rely on network e-mail, Microsoft® Windows® productivity applications such as Microsoft Office, and personal database programs such as Microsoft Access, to accomplish their daily tasks. It is essential for these same users to incorporate data stored on host systems into their regular correspondence, analysis, and reports.

Available methods of accessing host data do not provide the granular, record-level access required for cost-effective, secure, and meaningful integration of host and personal computer systems. In many cases, end users employ antiquated means of data integration. These methods include copying and pasting data from a terminal emulation screen, retyping information from host application reports, and importing text files containing comma-delimited values that use host EBCDIC-to-computer ASCII file transfer. These methods are not efficient although widely used and are not supported by products from independent software vendors (ISVs).

The challenge is how to provide direct record-level access to this valuable data without going through the host application. Much of the renewed interest in improved access to host data sources is a result of the growth of local intranets, the use of the Internet, and Web technology as a mechanism for delivering information. Fast and inexpensive methods of record-level access are needed to deliver modern, three-tiered information systems during this era of cost-cutting and budget tightening. Additional uses of this direct data access are specific queries and Web-based reporting.

It is common for corporate management to rethink host data storage and the appropriate software used to provide data access. For many organizations, the answer to these issues is in rewriting the arguably outdated host-based business rules with server-based, or even client-based, business logic.

The goal of the Microsoft® OLE DB Provider for AS/400 and VSAM is to provide customers and solution providers with the means to integrate desktop applications with this wealth of data residing on host computers.

OLE DB Environment

Three main roles are performed by software applications in an OLE DB environment:

- **OLE DB Consumer.** The end-user or server-based program that uses (consumes) the OLE DB interfaces. An example is a Web-based component that makes OLE DB calls to integrate host records with a Web-based report.
- **OLE DB Data Provider.** A driver or other program that exposes OLE DB interfaces for use by consumer applications. Data providers translate OLE DB interfaces to a language or commands that the target data source understands. An example is the Microsoft® OLE DB Provider for AS/400 and VSAM, which translates OLE DB interfaces to distributed data management (DDM) commands.
- **OLE DB Service Provider.** An application that both uses (consumes) and exposes OLE DB interfaces. Service providers typically act as proxies for the consumer, retrieving the data through the data provider and offering services to the consumer by manipulating the target data. An example is a query-processing engine.

DDM Record-Level Access

The Microsoft® OLE DB Provider for AS/400 and VSAM provides record-oriented access to host files. There is no need to perform bandwidth-intensive file transfers of entire host files to access data on the host.

The OLE DB interface provided by the OLE DB Provider for AS/400 and VSAM supports the following features:

- Set attributes and a record description of a host file (column information).
- Lock files and records.
- Position to the first record or the last record in a file.
- Navigate to the previous or next record in a file.
- Seek to a record, based on an index.
- Change records in a file.
- Insert new records and delete records in a file.
- Preserve file and record attributes.

The OLE DB Provider for AS/400 and VSAM is a source distributed data management (DDM) requester implementation that can initiate DDM commands to be serviced by a remote host-based target DDM server. On the Microsoft® Windows Server™ 2003 or Windows® 2000 operating system, the Microsoft DDM requester can run as a Windows service. This enables the DDM service to integrate with other host applications using the IBM DDM protocol and DDM servers that are resident on the host. Microsoft-based host software is not required. For more information, see Platforms Supported by the OLE DB Provider for AS/400 and VSAM. IBM offers DDM servers for the most popular host environments.

Providing users with direct record-level access reduces the development time to build and deploy new data integration solutions. Accessing only the target records, as opposed to entire host files, helps ensure data integrity.

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Platforms Supported by the OLE DB Provider for AS/400 and VSAM

On the mainframe platform, IBM offers a target distributed data management (DDM) server implementation in IBM Distributed File Manager (DFM), a component of IBM Data Facility Storage Management Subsystem (DFSMS). The Microsoft® OLE DB Provider for AS/400 and VSAM requires DFSMS version 1 release 2 or later for MVS/ESA and OS/390 to support an SNA LU 6.2 connection.

On midrange AS/400 computers, IBM has implemented target DDM servers directly in OS/400. The Microsoft OLE DB Provider for AS/400 and VSAM requires OS/400 Version 3 Release 2 or later to support an SNA LU 6.2 connection. The Microsoft OLE DB Provider for AS/400 and VSAM requires OS/400 Version 4 Release 2 or later to support a TCP/IP connection.

On the AS/400 platform, the OLE DB Provider for AS/400 and VSAM supports physical and logical files with an associated external record description file. For specific limitations, see the *AS/400 DDM User's Guide*.

On the mainframe platform, the OLE DB Provider for AS/400 and VSAM supports the following data set types:

Sequential Access Method (SAM) data sets

- Basic Sequential Access Method data sets (BSAM)
- Queued Sequential Access Method data sets (QSAM)

Virtual Storage Access Method (VSAM) data sets

- Entry-Sequenced Data Sets (ESDS)
- Key-Sequenced Data Sets (KSDS)
- Fixed-Length Relative Record Data Sets (RRDS)
- Variable-Length Relative Record Data Sets (VRRDS)
- Relative Record Data Set (RRDS)
- VSAM Alternate Indexes for ESDS and KSDS data sets

Basic Partitioned Access Method (PDS) data sets

- Partitioned Data Set Extended members (PDSE)
- Partitioned data set (PDS) members
- Read-only support for PDSE directories
- Read-only support for PDS directories

The preceding data set types are supported by IBM DFM/MVS.

The following data set types are not supported by DFM/MVS and cannot be accessed using the OLE DB Provider for AS/400 and VSAM:

- VSAM Linear Data Sets (LDS)
- Generation Data Groups (GDG)
- Generation Data Sets (GDS)
- Basic Direct Access Method data sets (BDAM)
- Indexed Sequential Access Method data sets (ISAM)
- Sequential Data Striping data sets
- OpenEdition MVS Hierarchical File System (HFS) files
- Tape Media

All mainframe data sets accessible through IBM Distributed File Manager must be cataloged in an Intersystem communications function (ICF) catalog and reside on direct access storage devices (DASD).

More information can be found in the Host Integration Server 2004 Installation Guide topic
Hardware and Software Requirements.

The OLE DB Provider for AS/400 and VSAM supplied with Microsoft Host Integration Server 2004 supports the following OLE DB and ADO versions:

- **OLE DB version 2.5.** The Host Integration Server 2004 data access features require the run-time libraries for OLE DB version 2.5. On Windows Server 2003 or Windows 2000, these OLE DB libraries are installed as part of the operating system.

- **ADO version 2.5.** The Microsoft Host Integration Server 2004 data access features require the run-time libraries for ADO version 2.5. On Windows Server 2003 or Windows 2000, these ADO libraries are installed as part of the operating system.

OLE DB version 2.0 or later and ADO version 2.0 or later are required to support indexed record access from an ADO consumer application using the OLE DB Provider for AS/400 and VSAM. Indexed support through OLE DB is supported with OLE DB versions 2.0 and later.

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Indexed File Access

The Microsoft® OLE DB Provider for AS/400 and VSAM provides both sequential and indexed file access. Sequential file access is provided for all supported file types on the Platforms Supported by the OLE DB Provider for AS/400 and VSAM.

Indexed file access is provided for the following host file types only:

- Mainframe Virtual Storage Access Method (VSAM) data sets.
  - Key-Sequenced Data Sets (KSDS) only when the keys are unique.
  - Fixed-length Relative Record Data Sets (RRDS) only when the keys are unique.
  - Variable-length Relative Record Data Sets (VRRDS) only when the keys are unique.
- AS/400 files.
  - Logical files.
  - Keyed physical files (externally described to the system).

OLE DB and ADO offer several interfaces that enable indexed file access.

The OLE DB Provider for AS/400 and VSAM supports integrated indexes based on the underlying rowset. OLE DB support for indexed file access using the OLE DB Provider for AS/400 and VSAM is available using the **IRowsetIndex**, **IViewFilter**, and **IViewRowset** interfaces.

For more information about indexes, see Chapter 8, "Indexes" and Chapter 16, "Integrated Indexes" in the *OLE DB Programmer's Reference*. To obtain a list of available indexes in a target AS/400 library, a program can call the OLE DB **IDBSchemaRowset::GetRowset** function of the **Session** object requesting a query type of DBSCHEMA_INDEXES.

ADO support for indexed file access using the OLE DB Provider for AS/400 and VSAM is available using the Find method, Filter property, and Sort property on the ADO **Recordset** object. To obtain a list of available indexes in a target AS/400 library using ADO, a program can call the OpenSchema method on the **Connection** object specifying a *QueryType* of **adSchemaIndexes**.

By default, the OLE DB Provider for AS/400 and VSAM uses a server-based cursor. This means that all indexed file access is based on the cursor located over the host file and not a local computer copy of the host file. If you want to use the many client-based cursor service providers available with the Microsoft® Data Access Components (MDAC), you must configure the provider to use a client-based cursor. For example, a client-based cursor is required when using Remote Data Service (RDS) and the Microsoft® Visual Studio® ADO data-bound controls. However, using these controls, an application can access the host files for read-only purposes. If your application needs to access host files with an intent of both reading and writing, and you require indexed file access, your application should use the OLE DB Provider for AS/400 and VSAM server-based cursor.

File and Record Attributes

By definition, the record description is not part of the record I/O architecture in distributed data management (DDM). Traditionally, applications must embed the record format as part of the application program. This creates a burden on the application and is inconsistent with the existing computer-based data access standards, such as OLE DB and ODBC.

To solve this problem, the Microsoft® OLE DB Provider for AS/400 and VSAM uses an external host column description (HCD) file stored on the computer that enables administrators to describe the host record format. At run time, the OLE DB Provider for AS/400 and VSAM transparently converts the host data to computer data using the local HCD information. Before a user program can view or open a VSAM file using the OLE DB Provider for AS/400 and VSAM, the user program must create a valid record description file or entry for the target VSAM file.

The OLE DB Provider for AS/400 and VSAM includes a Microsoft Management Console (MMC) application designed to enable administrators and developers to easily create these local record description files and the necessary registry settings for data sources. The OLE DB DDM Management application makes it relatively easy to create HCD files without knowing the HCD file format. The Host Column Description file format is documented in the Data Integration Programmer's Reference.

The conversion process occurs in two steps. The host data is converted from host EBCDIC to ASCII data by the DDM dynamic-link library (DLL). The HCD file is used during this step to convert host data types to C data types, which are defined in ODBC and based on the SQL data types defined in the ANSI/ISO SQL-92 standard. The second phase of this conversion occurs in the SNAOLEDB DLL where these SQL C data types are converted to the defined OLE DB data types.

The use of an HCD file is not necessary to describe the record format for data stored in the AS/400 computer because the OLE DB Provider for AS/400 and VSAM automatically detects that the target host system is an AS/400 and uses the appropriate DDM commands to retrieve the record description. If the system administrator or the OLE DB application developer wants to use an HCD file instead of retrieving the AS/400 record description, this behavior can be forced by setting the configuration of the **Host Column Description File** property using Data Links.

Configuring the OLE DB Provider for AS/400 and VSAM

Microsoft® Data Access Components (MDAC) includes Data Links, a generic method for managing and loading connections to OLE DB data sources. Microsoft Data Links provide a uniform method of creating persistent OLE DB data source object definitions stored in the form of universal data link (.udl) files. The Microsoft® OLE DB Provider for AS/400 and VSAM normally uses Data Links and .udl files for loading and configuring data sources.

Data Links provide a flexible method for finding and saving connection information to OLE DB data sources.

The Data Source Wizard in the new Microsoft Data Access Tool can help to define .udl files. OLE DB consumer applications, such as Data Transformation Services in Microsoft® SQL Server™ can then use the .udl file to connect to IBM data sources, such as DB2 and the mainframe file system.

To use Microsoft OLE DB Provider for AS/400 and VSAM with an OLE DB consumer application, the user must either create a Microsoft data link (.udl) file and call this from the application, or call the OLE DB provider from within the application using a connection string that includes the provider name and other necessary parameters. If an application accesses VSAM data sets, after configuring a data link, a host data description must also be configured using the Data Descriptions tool.

This section contains:

- Creating Data Links for the OLE DB Provider for AS/400 and VSAM
- Configuring Data Links for the OLE DB Provider for AS/400 and VSAM
- Configuring Data Descriptions
- Converting Existing Data Sources

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Creating Data Links for the OLE DB Provider for AS/400 and VSAM

Data source information must be configured for each AS/400 or mainframe system data source object that is to be accessed using the OLE DB provider. The default parameters for the OLE DB provider are used as the default values for data sources when these parameters are not configured for each data source.

Microsoft Data Links, a core element of Microsoft Data Access Components (MDAC), provide a uniform method for creating file-persistent OLE DB data source object definitions in the form of universal data link (.udl) files.

The Data Source Wizard in the new Microsoft Data Access Tool can help to define .udl files. OLE DB consumer applications, such as Data Transformation Services in Microsoft SQL Server can then use the .udl file to connect to IBM data sources, such as DB2 and the mainframe file system.

Applications, such as the RowsetViewer sample included with the Microsoft Data Access SDK and the MSDN Platform SDK, can open created .udl files and pass the stored initialization string to the OLE DB Provider for AS/400 and VSAM at run time.

Creating New Data Links for the OLE DB Provider for AS/400 and VSAM

You create new Data Links using the Data Source Wizard from the Data Access Tool.

Browsing Data Links for the OLE DB Provider for AS/400 and VSAM

You can browse data sources using the Data Source Browser window in the Data Access Tool.

To find the physical location of the .udl file associated with a data source, right-click the data source and select **Locate** from the context menu. Windows Explorer appears which will display the location of the file.

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Configuring Data Links for the OLE DB Provider for AS/400 and VSAM

To edit the properties of a Data Link file, browse to that file in Windows Explorer, and right-click the file and then click **Data Link Properties**. The **Data Link Properties** dialog box appears with several property tabs:

- **General**
- **Security**
- **Summary**
- **Provider**
- **Connection**
- **Advanced**
- **All**

The **General**, **Security**, and **Summary** tabs provide access to general file information for the .udl file that is available for other files and is not related to the Data Link properties. This information includes file location, file type, file size, file dates, file security permissions for access, and descriptive summary information (description and origin properties and values such as title, subject, and author) for the .udl file. The **General** tab has a text box with the name of the Data Link. This file name must end with the .udl extension if the file is to be recognized as a Data Link file. Note that the **Security** and **Summary** tabs are available on NTFS files systems, and not on the older FAT file systems.

This section contains:

- Provider
- Connection
- Advanced
- All

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Provider

The **Provider** tab enables you to select the OLE DB provider (the provider name string) to be used in this .udl file from a list of possible OLE DB providers. Select the Microsoft OLE DB Provider for AS/400 and VSAM. The parameters and fields displayed by the remaining tabs (**Connection**, **Advanced**, and **All**) are determined by the OLE DB provider that is selected.

Connection

The **Connection** tab enables you to configure the basic properties required to connect to a data source. For the Microsoft OLE DB Provider for AS/400 and VSAM, the connection properties include the following values.

Property	Description
Data Source	This is an optional parameter that can be used to describe the data source.
Network	This drop-down list box enables you to select the type of network connection to be used. The allowable options are **TCP/IP Connection** or **SNA Connection**. If **TCP/IP Connection** is selected, click **More Options**, to open a dialog box for configuring TCP/IP network settings. The parameters you can configure include the IP address of the remote host (or a hostname alias for this computer) and the Network Port (TCP/IP port) used for communication with the host. The default value for the Network Port is 446. The IP address of the host has no default value. If **SNA Connection** is selected (using LU 6.2), click **More Options** to open a dialog box for configuring SNA network settings. The parameters you can configure include: the APPC local LU alias, the APPC remote LU alias, and the APPC mode used for communication with the host. The default value for the APPC mode normally defaults to **QPCSUPP**. The local and remote LU alias fields do not have default values.
	This button enables using the Host Integration Security features providing a to access this OLE DB data source. When this button is selected, the **User name** and **Password** fields are dimmed and become inaccessible. The user name and password fields are set based on the Windows Server 2003 or Windows 2000 logon values. When this button is not selected, the **User name** and **Password** fields must normally contain appropriate values to access data sources on hosts.
User name	A valid user name and password are normally required to access data sources on hosts. These values are case-sensitive. The user must click the button that requires a specific user name and password to be entered.
Password	A valid user name and password are normally required to access data sources on hosts. These values are case-sensitive. The **Blank password** check box is only applicable for a Test Connection. To enter a password, the user needs to clear the **Blank password** check box if it is selected. If **Blank password** is selected, a Test Connection with a blank password does not cause the OLE DB provider to prompt for a password. Optionally, the user can choose to save the password in the .udl file by selecting the **Allow saving password** check box. Users and administrators should be warned that this option saves the authentication information (password) in plain text within the .udl file.
Location	The remote database name used for connecting to OS/400 systems. In DB2/400, this property is referred to as RDBNAM. This parameter is not used when connecting to mainframe systems.

It is possible to connect using a specific user name and password defined on the host system or use the feature (often referred to as Windows integrated security). If a specific user name and password is to be used, this information may need to be saved into the .udl file. The user name and password are saved in plain text in the .udl file. For security reasons in these cases, it is imperative that the .udl file be protected with an access control list (ACL) that restricts access to only authorized users. Saving the user name and password in the data link also forces this .udl file to be updated whenever the password associated with the username is changed. So for a variety of reasons, specifying a user name and password is not the preferred authentication option. Using the Windows integrated security option is the preferred method for authentication.

The **Connection** tab also includes a **Test Connection** button that can be used to test the connection parameters. The connection can only be tested after all of the required parameters are entered. When you click this button, an APPC session or a TCP/IP session attempts to be established to the host using the OLE DB Provider for AS/400 and VSAM.

Advanced

The **Advanced** tab enables you to set the network protection level and access permissions. You can set the protection level from the list box of allowable values. Access permissions are set by selecting the appropriate check boxes. For the Microsoft OLE DB Provider for AS/400 and VSAM, these properties include the values listed in the following table.

Property	**Description**
Host CCSID	The character code set identifier (CCSID) matching the column data as represented on the remote host computer. The CCSID property is required when processing binary data as character data. Unless the Process Binary as Character value is set to true, character data is converted based on the column CCSID and default ANSI code page. This parameter defaults to **U.S./Canada (37)**. This parameter is equivalent to the DBPROP_SNAOLEDB_HOSTCCSID OLE DB property ID.
PC Code Page	The PC Code Page parameter indicates the code page to be used on the personal computer for character code conversion. This parameter is required when processing binary data as character data. Unless the Process Binary as Character check box is selected (value is set to true), character data is converted based on the default ANSI code page configured in Windows. This parameter defaults to **Latin 1 (1252)**. This parameter is equivalent to the DBPROP_SNAOLEDB_PCCODEPAGE OLE DB property ID.
Read only	When the Read-only parameter is selected in the **Advanced** tab, the OLE DB Provider for AS/400 and VSAM creates a read-only data source by setting the **Mode** parameter to **Read** (DB_MODE_READ). A user has read access to files and cannot do update operations.
Repair Host Keys	This parameter provides for repair of invalid key offsets received from OS/400 when keys have been defined using the DDS "RENAME" clause. This parameter indicates whether the OLE DB provider should repair any host key values set in the registry. This parameter defaults to false. This parameter is equivalent to the DBPROP_SNAOLEDB_REPAIRKEY OLE DB property ID.

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All

The **All** tab allows users to configure essentially all of the properties for the data source except for the OLE DB provider. The properties available in the **All** tab include properties that can be configured using the **Connection** and **Advanced** tabs as well as optional detailed properties used to connect to a data source. Some of the properties in the **All** tab are required.

These properties on the **All** tab may be edited by selecting a property from the list displayed and selecting **Edit Value**. This button invokes a dialog box for the specific property containing a Property Description describing the property and a Property Value box for making changes.

For the Microsoft OLE DB Provider for AS/400 and VSAM, these properties include the following values.

Property	Description
Affiliate Application	This property is only used when is enabled. It provides the application name to use when retrieving host credentials from the database.
APPC Local LU Alias	The name of the local LU alias configured on the Host Integration Server 2004 computer. This parameter is equivalent to the DBPROP_SNAOLEDB_LOCALLU OLE DB property ID.
APPC Mode Name	When LU 6.2 (SNA) is selected for the Network Transport Library, this field is the APPC mode and must be set to a value that matches the host configuration and Host Integration Server 2004 computer configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bidirectional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This parameter normally defaults to **QPCSUPP**. This parameter is equivalent to the DBPROP_SNAOLEDB_APPCMODE OLE DB property ID.
APPC Remote LU Alias	When LU 6.2 (SNA) is selected for the Network Transport Library, this field is the name of the remote LU alias configured in the Host Integration Server 2004 computer. This parameter is equivalent to the DBPROP_SNAOLEDB_REMOTELU OLE DB property ID.
Cache Authentication	This parameter determines whether the OLE DB provider caches authentication information such as a password in an internal cache. The value of this property (**true** or **false**) is selected from the drop-down list box. This parameter is not currently supported by the OLE DB provider and defaults to **false**. This parameter is equivalent to the DBPROP_AUTH_CACHE_AUTHINFO OLE DB property ID.
Connect Timeout	The amount of time (in seconds) to wait for initialization to complete. This parameter is not currently supported by the OLE DB provider and defaults to **0**. This parameter is equivalent to the DBPROP_INIT_TIMEOUT OLE DB property ID.
Data Source	The data source is an optional parameter that can be used to describe the data source. This parameter is equivalent to the DBPROP_INIT_DATASOURCE OLE DB property ID.
Default Library	The default AS/400 library to be accessed. This parameter is not required for mainframe access and is optional when connecting to AS/400 files. This parameter is equivalent to the DBPROP_SNAOLEDB_LIBRARY OLE DB property ID.

Encrypt Password	This parameter determines whether special security mechanisms are used to ensure password privacy. The value of this property (true or false) is selected from the drop-down list box. This parameter is not currently supported by the OLE DB provider and defaults to **false**. This parameter is equivalent to the DBPROP_AUTH_ENCRYPT_PASSWORD OLE DB property ID.
Extended Properties	This parameter is a string containing provider-specific, extended connection information. Properties passed through this parameter should be delimited by semicolons and will be interpreted by the provider's underlying network client. The use of this property implies that the OLE DB consumer knows how this string is interpreted and used by the OLE DB provider. This parameter should be used only for provider-specific connection information that cannot be explicitly described through the other property parameters. This parameter is equivalent to the DBPROP_INIT_PROVIDERSTRING OLE DB property ID.
Host CCSID	The character code set identifier (CCSID) matching the data as represented on the host. The CCSID property is required when processing binary data as character data. Unless the **Process Binary as Character** value is set, character data is converted based on the host column CCSID and default ANSI code page. This parameter defaults to **U.S./Canada (37)**. This parameter is equivalent to the DBPROP_SNAOLEDB_HOSTCCSID OLE DB property ID.
Host Column Description File	The fully qualified file name of the distributed data management (DDM) Host Column Description (HCD) file. This parameter can be a UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the system directory below where the Host Integration Server or Client software was installed. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400. This parameter is equivalent to the DBPROP_SNAOLEDB_HCDPATH OLE DB property ID.
Impersonation Level	The level of impersonation that the server is allowed to use when impersonating the client. This property applies only to network connections other than Remote Procedure Call (RPC) connections. These impersonation levels are similar to those provided by RPC. The values of this property correspond directly to the levels of impersonation that can be specified for authenticated RPC connections, but can be applied to connections other than authenticated RPC. This parameter can be set to one of the following values: **Anonymous**—The client is anonymous to the server. The server process cannot obtain identification information about the client and cannot impersonate the client. **Delegate**—The process can impersonate the client's security context while acting on behalf of the client. The server process can also make outgoing calls to other servers while acting on behalf of the client. **Identity**—The server can obtain the client's identity. The server can impersonate the client for access control list (ACL) checking, but cannot access system objects as the client. **Impersonate**—The server process can impersonate the client's security context while acting on behalf of the client. This information is obtained when the connection is established, and not on every call. The value of this property is selected from the drop-down list box. This parameter defaults to **Impersonate**. This parameter is equivalent to the DBPROP_INIT_IMPERSONATION_LEVEL OLE DB property ID.
Integrated Security	This parameter is a string containing the name of the authentication service used by the server to identify the user using the identity provided by an authentication domain. For example, for Microsoft Windows Server 2003 or Windows 2000 Integrated Security, this is "SSPI" (for Security Support Provider Interface). If this parameter is a null pointer, the default authentication service should be used. When this property is used, no other DBPROP_AUTH* properties are needed and, if provided, their values are ignored. This parameter is equivalent to the DBPROP_AUTH_INTEGRATED OLE DB property ID.
Locale Identifier	This parameter specifies the locale to be used. OLE DB Provider for AS/400 and VSAM does not support this parameter and defaults to **437**. This parameter is equivalent to the DBPROP_INIT_LCID OLE DB property ID.

Location	The remote database name used for connecting to OS/400 systems. In DB2/400, this property is referred to as RDBNAM. This parameter is not used when connecting to mainframe systems. This parameter is equivalent to the DBPROP_INIT_LOCATION OLE DB property ID.
Mask Password	This parameter indicates whether the password should be sent to the data source or enumerator in a masked form. The value of this property (**true** or **false**) is selected from the drop-down list box. The OLE DB provider does not support this parameter and defaults to **false**. This parameter is equivalent to the DBPROP_AUTH_MASK_PASSWORD OLE DB property ID.
Mode	After a connection is established, this parameter represents a bitmask of the access permissions that will be applied to the data file. As implemented by the OLE DB Provider for AS/400 and VSAM, access permissions apply to host file locks and do not apply to record locks. The allowable values include the following: Read, ReadWrite, Share Deny None, Share Deny Read, Share Deny Write, Share Exclusive, and Write. This parameter can be a combination of zero or more of the following: DB_MODE_READ—Read-only. DB_MODE_WRITE—Write-only. DB_MODE_READWRITE—Read/write (DB_MODE_READ | DB_MODE_WRITE). DB_MODE_SHARE_DENY_READ—Prevents others from opening in read mode. DB_MODE_SHARE_DENY_WRITE—Prevents others from opening in write mode. DB_MODE_SHARE_EXCLUSIVE—Prevents others from opening in read/write mode (DB_MODE_SHARE_DENY_READ | DB_MODE_SHARE_DENY_WRITE). DB_MODE_SHARE_DENY_NONE—Neither read nor write access can be denied to others. This parameter is equivalent to the DBPROP_INIT_MODE OLE DB property ID.
Network Address	When TCP/IP has been selected for the Network Transport Library, this parameter is used to locate the target host computer. This parameter indicates the IP address or TCP/IP host name alias associated with the DDM server on the host. The network address is required when connecting through TCP/IP. This parameter is equivalent to the DBPROP_SNAOLEDB_NETADDRESS OLE DB property ID.
Network Port	When TCP/IP has been selected for the Network Transport Library, this parameter is used to locate the target DDM service access port when connecting through TCP/IP. This parameter represents the TCP/IP port used for communication with the DDM service on the host. The default value is TCP/IP port 446. This parameter is equivalent to the DBPROP_SNAOLEDB_NETPORT OLE DB property ID.
Network Transport Library	This parameter, which represents the dynamic-link library used for transport, designates whether the provider connects through SNA LU 6.2 or TCP/IP for network communication. The possible values for this parameter are **TCPIP** or **SNA**. If TCPIP is selected, values for Network Address and Network Port are required. The OLE DB Provider for AS/400 and VSAM does not support TCP/IP connectivity to the mainframe. If SNA is selected, values for APPC Local LU Alias, APPC Mode Name, and APPC Remote LU Alias are required. The value of this property (SNA or TCPIP) is selected from the drop-down list box. This value defaults to **SNA**. This parameter is equivalent to the DBPROP_SNAOLEDB_NETTYPE OLE DB property ID.
Password	A valid user name and password are normally required to access data sources on hosts. The password is case-sensitive and is shown as asterisks in this dialog box for security purposes. Optionally, you can choose to save the password in the .udl file by selecting the **Allow saving password** check box. Users and administrators should be warned that this option persists the authentication information in plain text within the .udl file. This parameter is equivalent to the DBPROP_AUTH_PASSWORD OLE DB property ID.

PC Code Page	Indicates the code page used for character code conversion. This property is required when processing binary data as character data. Unless the **Process Binary as Character** value is set, character data is converted based on the default ANSI code page configured in the Windows operating system. If this parameter is set to **Binary** or **65535**, no character code conversions takes place. This parameter defaults to **Latin 1 (1252)**. This parameter is equivalent to the DBPROP_SNAOLEDB_PCCODEPAGE OLE DB property ID.
Persist Security Info	This parameter indicates whether the data source object is allowed to persist sensitive authentication information such as a password along with other authentication information. Optionally, a user can choose to save the password in the .udl file by selecting the **Allow saving password** check box. Users and administrators should be warned that this option persists the authentication information in plain text within the .udl file. The value of this property (**true** or **false**) is selected from the drop-down list box. This parameter defaults to **false**. This parameter is equivalent to the DBPROP_AUTH_PERSIST_SENSITIVE_AUTHINFO OLE DB property ID.
Process Binary as Character	This parameter indicates whether to process binary fields (CCSID of 65535) as character data type fields on a per data source basis. The **Host CCSID** and **PC Code Page** values are required input parameters when this parameter is true. The value of this property (true or false) is selected from the drop-down list box. The default for this parameter is **false**; do not process binary fields as character fields. This parameter is equivalent to the DBPROP_SNAOLEDB_BINASCHAR OLE DB property ID.
Protection Level	The level of protection of data sent between client and server. The values of this property correspond directly to the levels of protection that can be specified for authenticated RPC connections. This parameter can be set to one of the following values: DB_PROT_LEVEL_NONE—Performs no authentication of data sent to the server. DB_PROT_LEVEL_CONNECT—Authenticates only when the client establishes the connection with the server. DB_PROT_LEVEL_CALL—Authenticates the source of the data at the beginning of each request from the client to the server. DB_PROT_LEVEL_PKT—Authenticates that all data received is from the client. DB_PROT_LEVEL_PKT_INTEGRITY—Authenticates all data received is from the client and that it has not been changed in transit. DB_PROT_LEVEL_PKT_PRIVACY—Authenticates all data received is from the client, that it has not been changed in transit, and protects the privacy of the data by encrypting it. The value of this property is selected from the drop-down list box. This parameter is not supported by the OLE DB Provider for AS/400 and VSAM and defaults to the connect level of protection. This parameter is equivalent to the DBPROP_INIT_PROTECTION_LEVEL OLE DB property ID.
Read only	When the Read only parameter is selected in the **Advanced** tab, the OLE DB Provider for AS/400 and VSAM creates a read-only data source by setting the **Mode** parameter to **Read** (DB_MODE_READ). A user has read access to files and cannot do update operations.
Repair Host Keys	This parameter provides for repair of invalid key offsets received from OS/400 when keys have been defined using the DDS "RENAME" clause. This parameter indicates whether the OLE DB provider should repair any host key values set in the registry. This parameter defaults to **false**. The value of this property (**true** or **false**) is selected from the drop-down list box. This parameter is equivalent to the DBPROP_SNAOLEDB_REPAIRKEY OLE DB property ID.

Strict Validation	This parameter indicates whether strict validation should be used and defaults to **false**. The value of this property (**true** or **false**) is selected from the drop-down list box. This parameter is equivalent to the DBPROP_SNAOLEDB_STRICTVAL OLE DB property ID.
User ID	A valid user name is normally required to access data sources on hosts. This value is case-sensitive. This parameter is equivalent to the DBPROP_AUTH_USERID OLE DB property ID.

Configuring Data Descriptions

You use the Data Access Tool to describe the host data file format for mainframe access. Use of the host column description (HCD) files is not required for AS/400 files because by default, the data file format is retrieved automatically from the host.

The data descriptions are stored in a local Host Column Description (HCD) file for each data source.

The following table provides the general parameters or attributes that can be configured describing each column in a data description on the **General** property page.

General parameters	Description
Name	The character string that represents the name of the column. This parameter may be null.
Alias	An optional character string that represents an alias label for the column string name. This parameter may be null.
Comment	An optional character string that represents a comment about the column. This attribute may be null.

The following table provides the data type parameters or attributes that can be configured describing each column in a data description in the **Host** property page.

Host parameters	Description
Type	The data type on the host. The allowed data values for host data type are selected from a drop-down list box. (For allowed values, see Host Data Types.)
Length	Length of the field in bytes. Depending on the selected host type, this parameter may not be editable.
Precision	Total number of decimal digits in the column containing numeric data on the host. Depending on the selected host type, this parameter may not be editable. The only numeric data types that require this information are the PACKED and ZONED data types. For these types, this field cannot be null. It must contain a valid numeric value. For all other host types, this parameter is not editable.
Scale	Number of decimal digits to the right of any decimal point for numeric data on the host. Depending on the selected host type, this parameter may not be editable. The only numeric data types that require this information are the PACKED and ZONED host data types. For these types, this field cannot be null. It must contain a valid numeric value. For all other host types, this parameter is not editable.
CCSID	The character code set identifier (CCSID) used on the host. The allowed data values for host CCSID are selected from a drop-down list box. This parameter defaults to the host CCSID configured for the OLE DB provider and is typically U.S./Canada (37).

The following table describes the parameters contained in the **Local** property page.

Local parameters	Description
Type	Indicates the OLE DB data type on the local computer. The allowed data values for the local data type are selected from a drop-down list box. (For allowed values, see Local OLE DB Data Types.)

The OLE DB provider limits the maximum length character field that can be accessed on an AS/400 computer to 32,745. On mainframes, a limitation of the IBM DFM is that SAM data sets and PDSE members are inaccessible if the fixed record length is greater than 32,760 or variable record lengths are greater than 32,756. DFM also limits all VSAM data sets on a mainframe to have a maximum record length no greater than 32,760. If you attempt to access a character field greater than these lengths on an AS/400 or a mainframe, the attempt will fail and can have unpredictable results.

The CCSID setting used by the OLE DB provider must be set to match the CCSID actually used on the host—otherwise, data loss will occur. Some AS/400 systems default to a CCSID of 937 for enabling double-byte character sets (DBCS).

This section contains:

- Host Data Types
- Local OLE DB Data Types

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Host Data Types

The **Host Type** parameter represents the data type used for this column on the host. The allowed values for **Host Type** that can be selected from the drop-down list box are listed in the following table.

Host Type	Description
Binary	Fixed-length binary data (no character conversion). The length must be specified for this data type.
Character	Fixed-length character data. The length must be specified for this data type.
Date	The date represented as character data in the format yyyy-mm-dd that fits into 10 bytes.
DBCS	Fixed-length character data that can contain only DBCS data. The length must be specified for this data type.
DCBS – Mixed Either	Fixed-length character data that can contain either DBCS or alphanumeric data. The length must be specified for this data type.
DCBS – Mixed Open	Fixed-length character data that can contain both DBCS and alphanumeric data. DBCS data is distinguished from alphanumeric data with SHIFT+CTRL characters. The length must be specified for this data type.
DBCS – Variable	Variable-length character data with a prefix of 2 bytes for length that contains only DBCS data. The maximum possible length for the column containing this data type must be specified.
DCBS – Variable Mixed Either	Variable-length character data with a prefix of 2 bytes for length that can contain either DBCS or alphanumeric data. The maximum possible length for the column containing this data type must be specified.
DCBS – Variable Mixed Open	Variable-length character data with a prefix of 2 bytes for length that can contain both DBCS and alphanumeric data. DBCS data is distinguished from alphanumeric data with SHIFT+CTRL characters. The maximum possible length for the column containing this data type must be specified.
Double	Floating-point data that fits in 8 bytes (64 bits).
Long	Integer data that fits in 4 bytes (32 bits).
Packed	Packed decimal numeric data where the precision and scale are exactly as specified.
Short	Integer data that fits in 2 bytes (16 bits).
Single	Floating-point data that fits in 4 bytes (32 bits).
Time	The time represented as character data in the format hh:mm:ss that fits into 8 bytes.
Time Stamp	Time stamp represented as characters in the format yyyy-mm-dd hh:mm:ss.ffffff that fits into 19 bytes.
Variable Binary	Variable-length binary data represented as an unsigned character array with a prefix of 2 bytes for length. The maximum possible length for the column containing this data type must be specified.
Variable Character	Variable-length character data with a prefix of 2 bytes for length. The maximum possible length for the column containing this data type must be specified.
Zoned	Zoned decimal numeric data where the precision and scale are exactly as specified.

> **Note** The floating-point data format assumed by the OLE DB Provider for AS/400 and VSAM depends on the host. For AS/400, the host floating-point data format is assumed to be IEEE. On mainframe hosts, floating-point data types are assumed to be in IBM floating-point formats. Because OLE DB supports the IEEE floating-point format, data conversion errors can occur when converting the extreme values of VSAM floating-point data in IBM format to IEEE floating-point data by the OLE DB provider. These conversion errors occur because the default IBM floating-point formats and the IEEE floating-point format use a different number of bits for the mantissa and exponent when representing a floating-point number.

Local OLE DB Data Types

The **Local Type** represents the OLE DB data type used for this column on the computer. The OLE DB data types are defined in the OLE DB specifications and **#defines** can be found in the Oledb.h file. The allowed values for **Local Type** that can be selected from the drop-down list box are listed in the following table.

Host Type	**Description**
DBTYPE_BYTES	Fixed-length binary data represented as an unsigned char array.
DBTYPE_DBDATE	The OLE DB DBDATE typedef struct as defined in the Oledb.h file.
DBTYPE_DBTIME	The OLE DB DBTIME typedef as defined in the Oledb.h file.
DBTYPE_DBTIMESTAMP	The OLE DB DBTIMESTAMP typedef struct as defined in the Oledb.h file.
DBTYPE_DECIMAL	The OLE DB DECIMAL typedef struct as defined in the Oledb.h file.
DBTYPE_I2	Integer data stored in 2 bytes (16 bits).
DBTYPE_I4	Integer data stored in 4 bytes (32 bits).
DBTYPE_NUMERIC	The OLE DB NUMERIC typedef struct as defined in the Oledb.h file.
DBTYPE_R4	Single precision IEEE floating-point data stored in 4 bytes (32 bits).
DBTYPE_R8	Double precision floating-point data stored in 8 bytes (64 bits).
DBTYPE_STR	Fixed and variable length character data.

Converting Existing Data Sources

The OLE DB management console that was previously used in SNA Server 4.0 and SNA Server 4.0 with Service Pack 1 (SP1) for configuring OLE DB Provider for AS/400 and VSAM data sources has been removed and replaced by Microsoft Data Links and the Data Access Tool. Microsoft Data Links is a component of Microsoft Data Access Components (MDAC) 2.5. On Windows Server 2003 or Windows 2000, MDAC 2.5 is installed as part of the operating system.

Existing registry-based OLE DB Provider for AS/400 and VSAM data sources that were created in SNA Server 4.0 and SNA Server 4.0 SP1 can be converted to .udl files using the Reg2udl tool supplied with Host Integration Server. The Reg2Udl tool is not installed as part of Host Integration Server, but is located on the Host Integration Server 2004 CD in the \Options\Maintenance folder.

When a duplicate .udl file is present in the destination folder, the Reg2udl tool will increment the file name by 1 (Data.udl will become Datat1.udl, for example). This may cause existing applications to fail because the OLE DB Provider for AS/400 and VSAM is looking for the existing name (Data.udl).

Manual conversion of registry-based data sources to .udl files may be necessary in some cases when Setup for Host Integration Server 2004 is used. A version of the Reg2udl tool (for Intel) can be found in the \Support\Utilities folder on the Host Integration Server 2004 CD.

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Programming Considerations Using the OLE DB Provider for AS/400 and VSAM

All the Microsoft® OLE DB objects exposed by the Microsoft® OLE DB Provider for AS/400 and VSAM support aggregation. Each OLE DB object has two classes, one that delegates its **IUnknown** calls and one that controls the object as a whole.

The apartment-threading model is supported, allowing multiple threads to access the objects safely. This is the only threading model supported.

When working with the Data Environment (DE) commands within Microsoft® Visual Studio® 6.0, you must use a period (.) as a delimiter when specifying the AS/400 Library or File path. For example, the following is valid syntax when opening the AUTHORS physical file in the PUBS library on an AS/400:

```
EXEC OPEN PUBS.AUTHORS
```

To use the ADO Recordset Find method or the ADO Filter property, an AS/400 logical file, an AS/400 keyed physical file, a mainframe KSDS file with a unique key, or a mainframe RRDS file with a unique key must be used. If this method is used on an AS/400 nonkeyed physical file or any other mainframe file type, this method fails.

When using RRDS files, the **Find** method fails when a search is executed using a column name. For example, the following Microsoft® Visual Basic® code will fail on an RRDS file with a column called Area:

```
RecordSet.Find "Area > '1111'", 0, adSearchForward, adBookmarkFirst
```

The error description indicates that a bookmark is invalid.

RRDS files do not have an index based on a column name and the value of the column data, so the syntax to the preceding ADO **Find** method call does not work for RRDS files. In a COBOL program designed to dynamically find a record in an RRDS file, the record position would be passed. For example, for the 75th record in the file, a COBOL program would pass a value of 75. The COBOL program would then use the returned record number and the record length to calculate the position of the first byte of the record in the file.

The SQL command parser of the Data Environment does not accept the forward slash (/) character. The OLE DB Provider for AS/400 and VSAM automatically substitutes a forward slash in place of the period and passes the correctly formatted path to your AS/400 computer.

When using the Data Environment with Microsoft Visual Basic 6.0, it is possible to get the following error when accessing the OLE DB Provider for AS/400 and VSAM:

```
"File is in use by another process. Unspecified error"
```

This error can occur after a data source has been configured for the OLE DB Provider for AS/400 and VSAM using the Data Links property page and a command is added using the Data Environment where the command added is the following:

```
"EXEC OPEN filename"
```

Using the Data Environment and selecting **Run** for this command can result in the preceding error. The Data Environment is opening the file and then trying to open it a second time based on the command to execute without closing the first copy. Depending upon the share options of the data set and the DBPROP_INIT_MODE property set for this data source, this error can occur and the user can be locked out of the AS/400 or VSAM file.

The OLE DB Provider for AS/400 and VSAM does not support the following Microsoft® SQL Server™ features:

- Data Transformation Services (DTS)
- Replication
- Distributed queries as a linked server

When operating on large VSAM files and only querying data on a subset of the records, using the **Filter** property is not desirable because of the performance impact. The entire VSAM file is transferred to the client for filtering. A better solution is to use the server cursor engine and the **Find** method.

The syntax supported by the OLE DB Provider for AS/400 and VSAM for command text is as follows:

```
EXEC COMMAND DDMCmd
```

where *DDMCmd* represents a valid OS/400 control language (CL) command. Note that only OS/400 CL commands are supported. These commands allow you to request functions from the OS/400 operating system. Some examples are the DLTF (Delete File) or DSPFFD (Display File Description) commands. These are the same commands that could be issued on the command line if you were connected to an AS/400 using a 5250 terminal session. For a detailed list of possible commands, see the *OS/400 CL Reference* for your platform.

The syntax supported by the OLE DB Provider for AS/400 and VSAM to open a rowset (table) using command text is as follows:

```
EXEC OPEN FileName
```

where *FileName* represents one of the following host file naming conventions listed in the following table.

Host file type	File naming convention
VSAM Data Sets	DATASETNAME.FILENAME
Partitioned data sets (PDSs)	DATASETNAME.FILENAME(MEMBER)
OS/400 Files	LIBRARY/FILE
OS/400 Files	LIBRARY/FILENAME
OS/400 File Members	LIBRARY/FILE(MEMBER)
OS/400 File Members	LIBRARY.FILENAME(MEMBER)

Note that if a member of a library contains a dot in the member name, the member name must be surrounded by double quotes. For example, if the member name is NAMES.DAT, the proper syntax used to open a rowset using command text is as follows:

```
EXEC OPEN LIBRARY/FILE("NAMES.DAT")
```

The distributed queries feature of SQL Server is sometimes referred to as the Distributed Query Processor (DQP).

This section contains:

- Record Access and Data Conversion
- Record Locking
- Client Cursor Engines Using the OLE DB Provider for AS/400 and VSAM
- Error Codes Returned by the OLE DB Provider for AS/400 and VSAM

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Record Access and Data Conversion

The design of the OLE DB APIs is similar to the APIs provided by ODBC and other ISAM APIs. The APIs are handle-based. After opening a file, the application can determine the buffer size required to store a row, use the cursor APIs to move, and optionally retrieve one or more rows of data using the row-level binding.

Data is converted to default C data types as defined in ODBC, as illustrated in the following table.

Host data type	**Default C data type**
Binary	unsigned char binary[]
Character	char string[]
Date (in character format)	date struct
Double	Double
Long	Int
Packed	unsigned char number[]
Short	Short
Single	Float
Time (in character format)	time struct
Time Stamp (in character format)	timestamp struct
Variable Binary	unsigned char binary[]
Variable Character	char string[]
Zoned	unsigned char number[]

Data conversions from a large numeric type to a small numeric type are supported (from DOUBLE to SINGLE and from INT to SMALLINT, for example). However, truncation and conversion errors can occur that will not be reported by the OLE DB Provider for AS/400 and VSAM.

The OLE DB Provider for AS/400 and VSAM has a number of other limitations:

- Positive signed floating-point values cannot be read from ZONED DECIMAL fields.
- No floating point values can be inserted into ZONED DECIMAL fields.
- No values can be inserted into single-precision FLOATING POINT fields.
- Positive signed floating-point values cannot be inserted into PACKED DECIMAL fields.
- The ADO **Find** method fails to locate the first record when the key is multiple columns and the first column is a VARCHAR or TIME data type.

You can use the OLE DB Provider for AS/400 and VSAM to access a System/36 computer. However, the automatic mapping from host to client does not occur correctly when you attempt to access the System/36 host. Instead, you must manually map the data types using a host column description (HCD) file. The following table indicates the data types you must map to when accessing a System/36 computer.

Host data type	**OLE DB data type**	**Comments**
Character	DBTYPE_STR	Null-terminated ASCII character string.
Zoned	DBTYPE_STR	The NUMERIC typedef structure defined in OLEDB.H. This is an exact numeric value with a fixed precision and fixed scale.

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Record Locking

Distributed data management (DDM) supports record locks so that a requester can perform intended operations on a record without interference from concurrent users. Record locks are used only when the requester opens a file with intent to update the file and specifies that the file is to be shared with another user. Two types of record locks are supported. Record locks are handled automatically by the Microsoft OLE DB Provider for AS/400 and VSAM whenever users call **IRowsetChange::SetData** (in immediate mode) or **IRowsetUpdate** (in the delayed mode). The OLE DB Provider for AS/400 and VSAM locks the record, updates the record, and then releases the lock.

Client Cursor Engines Using the OLE DB Provider for AS/400 and VSAM

The Microsoft Data Access Components (MDAC) supports the option of a client cursor engine. This feature is implemented as part of OLE DB, ADO, and Remote Data Services (RDS). When using ADO, a client cursor is enabled by setting the **CursorLocation** property on the recordset to **adUseClient**.

The OLE DB Provider for AS/400 and VSAM does not support any updating capabilities when used with a client cursor engine. If a client cursor engine is enabled using RDS or ADO, the OLE DB provider cannot be used to update data on the host. The ADO recordset is treated as if it were read-only.

Error Codes Returned by the OLE DB Provider for AS/400 and VSAM

The Microsoft OLE DB Provider for AS/400 and VSAM supports ranges of error codes, as listed in the following table.

Error code range	Source	Definition
1–100	Ddmapi.dll	OLE DB error codes (see OLE DB Provider for AS/400 and VSAM).
256–511	Ddm.dll	IBM DDM documentation.
512–higher	Ddmwappc.dll	Errors specific to the OLE DB Provider for AS/400 and VSAM.

An invalid local LU alias at connect time yields "Network Error" instead of "Invalid Local LU Alias" error. No error is reported when connecting using a nonexistent default library value.

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Host Column Description

The Microsoft® OLE DB Provider for AS/400 and VSAM uses a host column description (HCD) file to specify how data on the host is converted by the OLE DB provider. These HCD files are not necessary when used with IBM AS/400 computers because the host data format is automatically determined by the OLE DB provider. When used with AS/400 computers, the OLE DB provider uses default conversions from host data type to OLE DB data types. However, HCD files can be used with AS/400 computers to override the host data format and specify a particular local OLE DB data type to which the data is to be converted.

The following topics describe the host column description file format in detail and provide an example of an HCD file for illustration.

This section contains:

- Host Column Description File Format
- Host Column Description Attributes
- Host Column Description Example File

Host Column Description File Format

The Microsoft® OLE DB Provider for AS/400 and VSAM uses a host column description (HCD) file to describe the format of data files on IBM mainframes and dictate how the data in columns or fields in these files is to be converted by the OLE DB provider. Host column description files can also be used for data on AS/400 computers to override the data format description maintained by the AS/400 host.

The default naming convention for the HCD file is <*data source*>.hcd, where <*data source*> is the remote LU alias, and .hcd is the file extension of the record description file. For example, if the remote LU alias configured on Host Integration Server is named ABC01234, the host column description file would be named ABC01234.hcd as the default. Any name may be used for an HCD file as long as the file extension is .hcd.

All the Virtual Storage Access Method (VSAM) files that have local record descriptions are listed in the [Files] section of the record description file. Each file that is listed in the [Files] section has a record description section, and that section name is the same as the file name. For example, a VSAM file named PUBS/AUTHORS has its record description saved in the [PUBS/AUTHORS] section.

The first key of a record description section is the number of the columns for the file. The syntax is as follows:

```
numcol=<number of columns>
```

Where <*number of columns*> is the actual number of columns described in the section. Each column of a file is described by one key. The naming convention for the key name is as follows:

```
col<column number>
```

For example the ninth column's key is **col9**. Each key has an attribute list that contains eleven concatenated attributes that describe the column. Attributes are separated by semicolons.

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Host Column Description Attributes

Attributes are shown in the following table.

Attribute	Field number	Description
Reserved	1	Always zero
Column Name	2	Character string
Alias	3	Character string
Precision	4	Numeric value
Scale	5	Numeric value
Length	6	Numeric value
Host Type	7	Keyword representing the host data type
OLE DB Type	8	Keyword representing the local OLE DB data type
Nullable	9	Y or N
CCSID	10	Numeric value
Title	11	Character string

Column Name

The Column Name attribute is the character string that represents the name of the column. This attribute may be null.

Alias

The Alias attribute is an optional character string that represents an alias label for the column string name. This attribute may be null.

Precision

The Precision attribute is the total number of decimal digits in the column containing numeric data on the host. The only two fixed-point numeric data types that require this information are the NUMERIC and DECIMAL keyword data types, and for these types this field cannot be null and must contain a valid numeric value.

The precision must be set the same as the length attribute for CHAR and BINARY keyword data types, and set to zero for the other types. (Note that under ODBC, the precision was also used to indicate the length of nonnumeric data types including character, date, time, and binary data types.) Precision has no default value and must not be left null.

Scale

The Scale attribute is the number of decimal digits to the right of any decimal point for numeric data on the host. The only two numeric data types that require this information are the NUMERIC and DECIMAL keyword data types, and for these types this field cannot be null and must contain a valid numeric value. For other numeric (the SINGLE and DOUBLE keywords, for example) and nonnumeric data types (binary, character, date, time, and timestamp), the scale should be set to zero. This field must not be left null and must contain a numeric value.

Length

The Length attribute is the total length of the data on the host. This field must not be left empty and must contain a numeric value.

Host Type

The Host Type attribute is a keyword value that represents the data type of the host data. This keyword value is based on standard data types used on AS/400 and VSAM files. If no keyword is entered, this attribute defaults to the BINARY keyword. The following table describes the allowable types for AS/400 and VSAM.

Host type name	Keyword	Comment
Binary	BINARY	Fixed-length binary data (no character code conversions). The length must be specified.
Character	CHAR	Fixed-length character data. The length must be specified.
Date	DATE	The date represented as character data in the format yyyy-mm-dd that fits in 10 bytes.
DBCS	DBCS	Fixed-length character data that can contain only DBCS data.
DCBS – Mixed Either	MIXED_EITHER	Fixed-length character data that can contain either DBCS or alphanumeric data.
DCBS – Mixed Open	MIXED_OPEN	Fixed-length character data that can contain both DBCS and alphanumeric data. DBCS data is distinguished from alphanumeric data with SHIFT+CTRL characters.
DBCS – Variable	VARDBCS	Variable-length character data with a prefix of 2 bytes for length that contains only DBCS data. The maximum possible length for the column containing this data type must be specified.

DCBS – Variable Mixed Either	VARMIXED_EITHER	Variable-length character data with a prefix of 2 bytes for length that can contain either DBCS or alphanumeric data. The maximum possible length for the column containing this data type must be specified.
DCBS – Variable Mixed Open	VARMIXED_OPEN	Variable-length character data with a prefix of 2 bytes for length that can contain both DBCS and alphanumeric data. DBCS data is distinguished from alphanumeric data with SHIFT+CTRL characters. The maximum possible length for the column containing this data type must be specified.
Double	DOUBLE	Floating-point data that fits in 8 bytes (64 bits).
Long	LONG	Integer data that fits in 4 bytes (32 bits).
Long Variable Binary	LONG VARBINARY	Variable-length binary data represented as an unsigned character array with prefix 2 bytes for length. The maximum possible length for the column containing this data type must be specified.
Long Variable Character	LONG VARCHAR	Variable-length character data with a prefix of 2 bytes for the length. The maximum possible length for the column containing this data type must be specified.
Packed	PACKED	Packed decimal numeric data where the precision and scale are exactly as specified.
Short	SHORT	Integer data that fits in 2 bytes (16 bits).
Single	SINGLE	Floating-point data that fits in 4 bytes (32 bits).
Time	TIME	The time represented as character data in the format hh:mm:ss that fits in 8 bytes.
Time Stamp	TIMESTAMP	Timestamp represented as characters in the format yyyy-mm-dd hh:mm:ss.ffffff that fits in 19 bytes.
Variable Binary	VARBINARY	Variable-length binary data represented as an unsigned character array with prefix 2 bytes for length. The maximum possible length for the column containing this data type must be specified.
Variable Character	VARCHAR	Variable-length character data with a prefix of 2 bytes for length. The maximum possible length for the column containing this data type must be specified.
Zoned	ZONED	Zoned decimal numeric data where the precision and scale are exactly as specified.

Note that the OLE DB provider limits the maximum length character field that can be accessed on an AS/400 computer to 32,745. Attempting to access a character field greater than this length on an AS/400 computer can have unpredictable results and can cause the OLE DB provider to stop responding.

Note that the floating-point data format assumed by the OLE DB Provider for AS/400 and VSAM depends on the host. For AS/400, the host floating-point data format is assumed to be IEEE. On mainframe hosts, floating-point data types are assumed to be in IBM floating-point formats. Because OLE DB supports the IEEE floating-point format, data conversion errors can occur when converting the extreme values of VSAM floating-point data in IBM format to IEEE floating-point data by the OLE DB provider.

Note that the DECIMAL, FLOAT, INTEGER, NUMERIC, REAL, and SMALLINT keywords should not be used in HCD files and should be replaced with the newer keywords as follows:

- The DOUBLE keyword replaces the FLOAT keyword.
- The LONG keyword replaces the INTEGER keyword.
- The PACKED keyword replaces the NUMERIC keyword.
- The SHORT keyword replaces the SMALLINT keyword.
- The SINGLE replaces the REAL keyword.
- The ZONED keyword replaces the DECIMAL keyword.

The Data Descriptions management console snap-in provided with Host Integration Server does not work properly with HCD files containing these older keywords and will give unpredictable results.

OLE DB Type

The OLE DB Type attribute is a keyword that represents the data type of the local personal computer data. This keyword value is based on the standard OLE DB data types as defined in the OLEDB.H header file included with the OLE DB SDK version 1.5 and later. The data structures for the date, time, and timestamp C data types are defined as typedefs in the OLEDB.H header file included with the OLE DB SDK. Similar data types are also used by ODBC. If no keyword is entered, this attribute defaults to the BINARY keyword.

For the decimal and numeric host data types, the OLE DB Type attribute must be set to DBTYPE_STR. These two fixed-point numeric types are currently converted to character data strings by the DDM layer of the Microsoft OLE DB Provider for AS/400 and VSAM. If these host types are converted to any of the defined OLE DB numeric C types, numeric accuracy can be lost.

The allowable types are listed in the following table.

OLE DB type name	Keyword	Comment
DBTYPE_BYTES	BINARY	Fixed-length binary data represented as an unsigned char array.
DBTYPE_DBDATE	DATE	The OLE DB DBDATE typedef struct as defined in the OLEDB.H header file.
DBTYPE_DBTIME	TIME	The OLE DB DBTIME typedef as defined in the OLEDB.H header file.
DBTYPE_DBTIMESTAMP	TIMESTAMP	The OLE DB DBTIMESTAMP typedef struct as defined in the OLEDB.H header file.
DBTYPE_DECIMAL	DECIMAL	The OLE DB DECIMAL typedef struct as defined in the OLEDB.H header file.
DBTYPE_I2	SHORT	Integer data stored in 2 bytes (16 bits).
DBTYPE_I4	LONG	Integer data stored in 4 bytes (32 bits).
DBTYPE_NUMERIC	NUMERIC	The OLE DB NUMERIC typedef struct as defined in the OLEDB.H header file.
DBTYPE_R4	FLOAT	Floating-point data stored in 4 bytes (32 bits).
DBTYPE_R8	DOUBLE	Floating-point data stored in 8 bytes (64 bits).
DBTYPE_STR	CHAR	Character data.
DBTYPE_I1	Not applicable	Not supported (signed tiny integer stored in one byte, 8 bits).
DBTYPE_I8	Not applicable	Not supported (signed long integer stored in eight bytes, 64 bits).
DBTYPE_UI1	Not applicable	Not supported (unsigned tiny integer stored in one byte, 8 bits).
DBTYPE_UI2	Not applicable	Not supported (unsigned short integer stored in two bytes, 16 bits).
DBTYPE_UI4	Not applicable	Not supported (unsigned long integer stored in four bytes, 32 bits).
DBTYPE_UI8	Not applicable	Not supported (unsigned long integer stored in eight bytes, 64 bits).

Nullable

The Nullable attribute indicates whether this field can be a null value. Legal values for this field are Y or N. If this field is empty, the default value for nullable is N. The current version of the OLE DB Provider for AS/400 and VSAM does support nullable fields, so this value must be set to N.

CCSID

The character code set identifier (CCSID) attribute indicates the character set used on the host. If this field is empty, the default value for CCSID is set to EBCDIC US English (37). The CCSID setting used by the OLE DB provider must be set to match the CCSID actually used on the host, otherwise data loss will occur. Note that some AS/400 systems default to a CCSID of 937, rather than 37, for enabling double-byte character sets (DBCS).

If the CCSID is set to 0 or 65535, no character translation will take place when converting character data from the host to the personal computer by the OLE DB provider. The allowable values for CCSID when used with OLE DB Provider for AS/400 and VSAM are listed in the following table.

EBCDIC character set	CCSID value
U.S./Canada	37
Germany	273
Denmark/Norway	277
Finland/Sweden	278
Italy	280
Latin America/Spain	284
United Kingdom	285
France	297
International	500

Note that this value needs to correspond to the CCSID used on the host.

Title

The Title attribute is an optional character string that represents a comment describing the column. This attribute may be null.

Host Column Description Example File

The following is an example for a host column description (HCD) file containing two sample database file descriptions—SAMPLE/ACCOUNTS and PUBS/AUTHORS. The first sample file (SAMPLE/ACCOUNTS) has four columns of data while the second example (PUBS/AUTHORS) has nine columns that must be described.

```
[files]
SAMPLE/ACCOUNTS=1
PUBS/AUTHORS=1

[SAMPLE/ACCOUNTS]
numcol=4
col1=0;CUST_NO;CUST_NO;8;0;0;ZONED;LONG;N;37;;
col2=0;CUST_NAME;CUST_NAME;0;0;40;CHAR;CHAR;N;37;;
col3=0;BALANCE;BALANCE;10;2;0;ZONED;FLOAT;N;37;;
col4=0;LAST_ACC;LAST_ACC;0;0;26;TIMESTAMP;TIMESTAMP;N;37;;

[PUBS/AUTHORS]
NumCol=9
Col1=0;AU_ID;AU_ID;11;0;11;CHAR;CHAR;N;37;;
Col2=0;AU_LNAME;AU_LNAME;0;0;40;VARCHAR;CHAR;N;37;;
Col3=0;AU_FNAME;AU_FNAME;0;0;20;VARCHAR;CHAR;N;37;;
Col4=0;PHONE;PHONE;0;0;12;CHAR;CHAR;N;37;;
Col5=0;ADDRESS;ADDRESS;0;0;40;VARCHAR;CHAR;N;37;;
Col6=0;CITY;CITY;0;0;20;VARCHAR;CHAR;N;37;;
Col7=0;STATE;STATE;2;0;2;CHAR;CHAR;N;37;;
Col8=0;ZIP;ZIP;0;0;5;CHAR;SHORT;N;37;;
Col9=0;CONTRACT;CONTRACT;0;0;9;BINARY;BINARY;N;37;;
```

Conversion from Host to OLE DB Data Types

The external record description for data files residing on mainframes is configured in a host column description (HCD) file using the SNA OLE DB management snap-in. This HCD file is used to convert from host EBCDIC data types to ASCII C data types for the computer in the Distributed Data Management (DDM) dynamic-link library (DLL). These C data types are then mapped to OLE DB data types by the SNAOLEDB DLL.

This section contains:

- Default OLE DB Data Types
- DBDATE
- DBTIME
- DBTIMESTAMP
- DECIMAL
- NUMERIC

Default OLE DB Data Types

The following table indicates the default OLE DB data types that result from the mapping of the host data types by the Microsoft OLE DB Provider for AS/400 and VSAM.

Host data type	**OLE DB data type**	**Comments**
Binary	DBTYPE_BYTES	A fixed-length array of bytes (unsigned char).
Character	DBTYPE_STR	Null-terminated ASCII character string.
Date	DBTYPE_DBDATE	The DBDATE typedef struct defined in OLEDB.H header file.
DBCS	DBTYPE_STR	Null-terminated ASCII character string.
DCBS – Mixed Either	DBTYPE_STR	Null-terminated ASCII character string.
DCBS – Mixed Open	DBTYPE_STR	Null-terminated ASCII character string.
DBCS – Variable	DBTYPE_STR	Null-terminated ASCII character string.
DCBS – Variable Mixed Either	DBTYPE_STR	Null-terminated ASCII character string.
DCBS – Variable Mixed Open	DBTYPE_STR	Null-terminated ASCII character string.
Double	DBTYPE_R8	8-byte floating-point data.
Float	DBTYPE_R8	8-byte floating-point data.
Long Integer	DBTYPE_I4	4-byte signed integer.
Long Variable Binary	DBTYPE_BYTES	A fixed-length array of bytes (unsigned char).
Long Variable Character	DBTYPE_STR	Null-terminated ASCII character string.
Packed	DBTYPE_DECIMAL	The DECIMAL structure typedef defined in OLEDB.H. This is an exact numeric value with a fixed precision and fixed scale.
Real	DBTYPE_R4	4-byte floating-point data.
Short	DBTYPE_I2	2-byte signed integer.
Single	DBTYPE_R4	4-byte floating-point data.
Time	DBTYPE_DBTIME	The DBTIME typedef defined in OLEDB.H header file.
Time Stamp	DBTYPE_DBTIMESTAMP	The DBTIMESTAMP typedef defined in OLEDB.H header file.
Variable Binary	DBTYPE_BYTES	A fixed-length array of bytes (unsigned char).
Variable Character	DBTYPE_STR	Null-terminated ASCII character string.
Zoned	DBTYPE_NUMERIC	The NUMERIC typedef structure defined in OLEDB.H. This is an exact numeric value with a fixed precision and fixed scale.

The host Binary, VarBinary, and Long VarBinary data types are converted to SQL_C_CHAR type by the DDM DLL and mapped to the DBTYPE_BYTES data type by the SNAOLEDB DLL. The host Zoned data type is converted to SQL_C_CHAR type by the DDM DLL and mapped to the DBTYPE_NUMERIC data type by the SNAOLEDB DLL. The host Packed data type is converted to SQL_C_CHAR type by the DDM DLL and mapped to the DBTYPE_DECIMAL data type by the SNAOLEDB DLL.

DBDATE

The **DBDATE** structure typedef is defined as follows:

```
typedef struct tagDBDATE {
    SHORT  year;
    USHORT month;
    USHORT day
} DBDATE;
```

Members

year
The year (0 to 9999) is measured from 0 A.D.

month
The month ranges from 1 to 12 representing January through December.

day
The day ranges from 1 to a maximum of 31, depending on the number of days in the month.

DBTIME

The **DBTIME** structure typedef is defined as follows:

```
typedef struct tagDBTIME {
    USHORT hour;
    USHORT minute;
    USHORT second
} DBTIME;
```

Members

hour
The hour ranges from 0 to 23.

minute
The minute ranges from 0 to 59.

second
The second ranges from 0 to 59.

DBTIMESTAMP

The **DBTIMESTAMP** structure typedef is defined as follows:

```
typedef struct tagDBTIMESTAMP {
    SHORT  year;
    USHORT month;
    USHORT day;
    USHORT hour;
    USHORT minute;
    USHORT second;
    ULONG  fraction
} DBTIMESTAMP;
```

Members

year
The year (0 to 9999) is measured from 0 A.D.

month
The month ranges from 1 to 12 representing January through December.

day
The day ranges from 1 to a maximum of 31, depending on the number of days in the month.

hour
The hour ranges from 0 to 23.

minute
The minute ranges from 0 to 59.

second
The second ranges from 0 to 59.

fraction
The fraction represents billionths of a second ranging from 0 to 999,999,999.

DECIMAL

The **DECIMAL** typedef structure is an exact numeric value with a fixed precision and fixed scale, stored in the same way as in OLE Automation. The **DECIMAL** typedef structure is defined as follows:

```
typedef struct tagDECIMAL {
    USHORT wReserved;
    union {
        struct {
            BYTE scale;
            BYTE sign;
         };
        USHORT signscale;
    };
    ULONG Hi32;
    union {
        struct {
             ULONG Lo32;
             ULONG Mid32;
          };
         ULONGLONG Lo64;
    };
} DECIMAL;
```

Members

wReserved
This member is reserved and should be 0.

scale
Specifies the number of digits to the right of the decimal point and ranges from 0 to 28.

sign
The sign is 0 if positive, 0x80 if negative.

Hi32
The high part of the integer (32-bit aligned).

Mid32
The middle part of the integer (32-bit aligned).

Lo32
The low part of the integer (32-bit aligned).

For example, to specify the number 12.345, the scale is 3, the sign is 0, and the number stored in the 12-byte integer is 12345.

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NUMERIC

The **NUMERIC** typedef structure is an exact numeric value with a fixed precision and fixed scale. The **NUMERIC** typedef structure is defined as follows:

```
typedef struct tagNUMERIC {
    BYTE precision;
    BYTE scale;
    BYTE sign;
    BYTE val[16];
} DB_NUMERIC;
```

Members

precision
The maximum number of digits in base 10.

scale
The number of digits to the right of the decimal point.

sign
The sign is 1 for positive numbers, and 0 for negative numbers.

val
A number stored as a 16-byte scaled integer, with the least significant byte on the left.

For example, to specify the base 10 number 20.003 with a scale of 4, the number is scaled to an integer of 200030 (20.003 shifted by four tens digits), which is 186AA in hexadecimal. The value stored in the 16-byte integer is 5E 0D 03 00 00 00 00 00 00 00 00 00 00 00 00 00, the precision is the maximum precision, the scale is 4, and the sign is 1.

Character Code Conversions

Character code conversions under the OLE DB Provider for AS/400 and VSAM are controlled by a hierarchy of parameters. When connecting to mainframes all of these parameters are controlled on the personal computer. However, when connecting to data sources on the AS/400, parameter settings on the AS/400 as well as parameter settings on the personal computer can be involved.

The character code set identifier (CCSID) used by the host for a data source can be specified in several locations. The Host CCSID setting used by the OLE DB provider must be set to match the CCSID actually used on the host; otherwise data loss will occur. Note that some AS/400 systems default to a CCSID of 937 rather than 37 for enabling double-byte character sets (DBCS).

The following table illustrates the separate hierarchy controlling the Host CCSID parameter on the SNA client, AS/400 host, and mainframe host.

SNA client	**AS/400 host**	**Mainframe host**
SNA OLE DB provider (defaults to U.S./Canada 37)	System (DSPSYSVAL, QCCSID)	None. Determined by the Data Description (HCD file) on the SNA Client.
Data Source (the Host CCSID parameter in the Data Links file describing the Data Source)	User identifier (wrk usrprf)	
Data Description (HCD file)	Job (dspjob, crtjobd)	
	File (dspfd, crtpf)	
	Column (dspffd)	

Note Only those fields in a Data Source that contain character data are affected by the Host CCSID parameters and character conversions.

This section contains:

- Host CCSID and SNA OLE DB Provider
- Host CCSID and Data Source
- Host CCSID and Data Description
- Host CCSID and the Process Binary As Character Parameter

Host CCSID and SNA OLE DB Provider

The Host CCSID setting at the OLE DB provider level defaults to U.S./Canada (37).

Host CCSID and Data Source

The Host CCSID setting at the Data Source level is configured using Data Links for each Data Source. The **Host CCSID** parameter is configured under the **All** tab of the **Data Links** dialog box.

Valid values for the Host CCSID registry setting are any CCSID, including 65535. If the Host CCSID attribute is set to 65535, no character conversion occurs (the data is treated as binary). If the Host CCSID setting at the Data Source level does not exist, the value for Host CCSID defaults to the value at the SNA OLE DB provider level.

Host CCSID and Data Description

A Host CCSID attribute can be applied at the Data Description level. Each column in a host column description (HCD) file can have a Host CCSID attribute that determines how the character data in the column is to be converted. These attributes in the HCD file at the Data Description level should be configured using the SNA OLE DB management console snap-in. (For more information, see Configuring Data Descriptions) Valid values are any CCSID including 65535.

The Host CCSID attribute at the column Data Description level can be any value and may be empty. A Host CCSID value at the Data Description level overrides the value specified at the Data Source and OLE DB provider levels. If the Host CCSID is blank, the value for Host CCSID defaults to the value at the Data Source level. If the Host CCSID attribute is set to 65535, no character conversion occurs (the data is treated as binary).

Host CCSID and the Process Binary As Character Parameter

There is a Data Source parameter configurable using Data Links that affects whether binary data is considered as character data and is converted based on the Host CCSID setting. This **Process Binary As Character** parameter defaults to *false*. If this parameter is *false*, binary data is not treated as character (binary data is not affected by the Host CCSID setting). If this parameter is set to *true*, binary data is converted based on the Host CCSID setting.

This parameter is configured for each Data Source using Data Links under the **All** tab of the **Data Links** dialog box.

OLE DB Provider for DB2 Programmer's Guide

Microsoft® OLE DB Provider for DB2 enables users to access IBM Data Base 2 (DB2) from within an OLE-aware application. The object linking and embedding database (OLE DB) is a standard set of interfaces that provides heterogeneous access to disparate sources of information located anywhere—file systems, e-mail folders, and databases. The OLE DB Provider for DB2 combines the universal data access of OLE DB with the IBM Distributed Relational Database Architecture (DRDA).

Organizations have invested in secure, robust, enterprise-wide data storage and management systems. DRDA is a set of rules for distributing or extending relational data from one computer to another, such as from a personal computer server to an IBM DB2 database server running on a mainframe or an AS/400 computer. By combining the OLE DB and DRDA architectures, Microsoft enables organizations to preserve their investments in existing data management infrastructure, while extending universal data access to all enterprise-wide data sources.

For application programming interface (API) references and other technical information about OLE DB providers, see the OLE DB Providers Programmer's Reference section of the software development kit (SDK).

For sample code using the OLE DB Provider and ODBC Driver, see OLE DB Provider and ODBC Driver Samples section of the SDK.

This section contains:

- Goals of the OLE DB Provider for DB2
- Distributed Relational Database Architecture
- Platforms Supported by the OLE DB Provider for DB2
- OLE DB Provider for DB2 Requirements
- Configuring the OLE DB Provider for DB2
- Programming Considerations Using the OLE DB Provider for DB2

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Goals of the OLE DB Provider for DB2

Relational database management systems (RDBMS) are one of the major sources of mission-critical information in today's enterprise organizations. Relational database technology enables departments and individual users to save their information in centrally managed database stores that can be easily maintained by the organization's information systems group. Specific query tools designed for accessing relational database systems have added greater flexibility and ease of access to this information.

These same enterprises rely on vast networks of personal computers to enable their users to achieve business goals. End users invariably rely on network e-mail; Microsoft® Windows® productivity applications, such as Microsoft Office; and personal database programs, such as Microsoft Access, to accomplish their daily tasks. It is essential for these same users to incorporate data stored in relational database systems into their regular correspondence, analysis, and reports.

The challenge you have is how to provide access to this valuable data without the effort involved in developing traditional database applications. Much of the renewed interest in improved access to data sources is a result of the growth in the use of Internet and Web technology as mechanisms for delivering information. Fast and inexpensive methods of accessing data stored in RDBMS systems are necessary to deliver modern, three-tiered information systems during this era of cost cutting and budget tightening. Additional uses of this relational database access include specific queries and Web-based reporting.

IBM DB2 is a popular RDBMS for a significant number of enterprise customers. Customers need a cost-effective and manageable means to integrate DB2 with Microsoft SQL Server™, Microsoft Internet Information Services (IIS), and Microsoft Office applications. The goal of the OLE DB Provider for DB2 is to provide customers and solution providers with the means to integrate desktop applications with this wealth of data residing on DB2 database systems.

Distributed Relational Database Architecture

Database technology has enabled departments and individual users to save their information locally—as opposed to centrally managed stores owned by the organization's information systems group. Along with local storage and database query tools comes greater flexibility and ease of access to information. As more databases became distributed, a need emerged for users to access data stored remotely. IBM devised the Distributed Relational Database Architecture (DRDA) to enable their customers to access remote, distributed database systems across hardware platforms.

DRDA supports most dialects of the Structured Query Language (SQL) for access to relational database management systems (RDBMS). SQL is an international standard that defines a standardized language for accessing database management systems (DBMS). DRDA implementations generally support SQL in two ways: static (embedded) SQL, where the SQL commands are embedded directly in the application program and prepared as an extra step in the process of compiling the application; and dynamic or interactive (callable) SQL, where the user passes SQL commands as function calls at run time. One popular IBM implementation of dynamic SQL is the Call Level Interface (CLI). With dynamic SQL or CLI, SQL preparation is not required.

Clients that comply with DRDA are referred to as application requesters (AR) because they request data from the DRDA server. Servers that comply with DRDA are referred to as application servers (AS). Typically, application servers are implemented as the link to the RDBMS. In some cases, products are implemented as both application requesters and application servers.

DRDA supports access to stored procedures on DB2. SQL applications can invoke stored procedures or user-written programs on DB2 using the SQL **CALL** statement.

The OLE DB Provider for DB2 is an application requester implementation that can initiate DRDA commands to be serviced by a remote target DRDA application server represented by IBM DB2. On the Microsoft® Windows Server™ 2003 and Windows® 2000 Server operating systems, the Microsoft DRDA application requester can run as a service. This enables the integration of the DRDA service with other host applications using the IBM DRDA protocols and DRDA servers resident on the host. Microsoft host software is not required. (For more information, see Platforms Supported by the OLE DB Provider for DB2). IBM offers Data Base 2 servers for most popular environments.

Platforms Supported by the OLE DB Provider for DB2

IBM and other software vendors have implemented Distributed Relational Database Architecture (DRDA) support into database systems, such as IBM DB2, and database tools on a wide range of operating systems. DRDA is an open, published, and widely supported protocol, which requires no additional license for development. This makes DRDA appealing to independent software vendors (ISVs), solution providers, large corporate development groups, as well as their customers.

The Microsoft® OLE DB Provider for DB2 is implemented as an IBM DRDA application requester, which means it connects to popular DRDA-compliant DB2 systems.

The Microsoft OLE DB Provider for DB2 can access DB2 systems through SNA LU 6.2 using Microsoft Host Integration Server 2004, and can access DB2 systems directly using TCP/IP.

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OLE DB Provider for DB2 Requirements

You can find more information about hardware and software requirements for the Microsoft® OLE DB Provider for DB2 in the Host Integration Server 2004 Installation Guide topic Hardware and Software Requirements.

When connecting over SNA using LU 6.2, the OLE DB Provider for DB2 requires the following computer-to-host connectivity software:

- Microsoft Host Integration Server 2004
- Microsoft Host Integration Server Client

When connecting to a host system using TCP/IP, the OLE DB Provider for DB2 does not require any special host connectivity software.

The OLE DB Provider for DB2 supports the following OLE DB and ADO versions:

- OLE DB version 2.5. The Host Integration Server 2004 data access features require the run-time libraries for OLE DB version 2.5. These OLE DB libraries are installed as part of the Windows Server 2003 and Windows 2000 operating systems.
- ADO version 2.5. The Microsoft Host Integration Server 2004 data access features require the run-time libraries for ADO version 2.5. On Windows Server 2003 and Windows 2000, these ADO libraries are installed as part of the Windows Server 2003 and Windows 2000 operating systems.

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Configuring the OLE DB Provider for DB2

Microsoft® Data Access Components (MDAC) include Data Links, a generic method for managing and loading connections to OLE DB data sources. Microsoft Data Links provides a uniform method of creating persistent OLE DB data source object definitions stored in the form of universal data link (.udl) files. The OLE DB Provider for DB2 normally uses Data Links and .udl files for loading and configuring data sources.

The Data Source Wizard in the Microsoft Data Access Tool can help to define .udl files. OLE DB consumer applications, such as Data Transformation Services in Microsoft SQL Server™ can use the .udl files to connect to IBM data sources, such as DB2 and the mainframe file system.

To use Microsoft OLE DB Provider for DB2 with an OLE DB consumer application, the user must either create a Microsoft universal data link (.udl) file and call this from the application, or call the OLE DB provider from within the application using a connection string that includes the provider name and any other needed parameters.

This section contains:

- Creating Data Links for the OLE DB Provider for DB2
- Configuring Data Links for the OLE DB Provider for DB2
- Creating Packages for Use with the OLE DB Provider for DB2

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Creating Data Links for the OLE DB Provider for DB2

Data source information must be configured for each DB2 system data source object that is to be accessed using the Microsoft® OLE DB Provider for DB2. The default parameters for the OLE DB Provider for DB2 are used as the default values for data sources when these parameters are not configured for each data source.

The Microsoft Data Links, a core element of the Microsoft Data Access Components, provides a uniform method for creating file-persistent OLE DB data source object definitions in the form of universal data link (.udl) files.

The Data Source Wizard in the Microsoft Data Access Tool can help to define .udl files. OLE DB consumer applications, such as Data Transformation Services in Microsoft SQL Server can use the .udl files to connect to IBM data sources, such as DB2 and the mainframe file system.

Creating New Data Links for the OLE DB Provider for DB2

You create new Data Links using the Data Source Wizard from the Data Access Tool.

Browsing Data Sources for the OLE DB Provider for DB2

You can browse data sources using the Data Source Browser window in the Data Access Tool.

To find the physical location of the .udl file associated with a data source, right-click the **DB2 OLE DB UDLs** folder, and then click **Locate** on the context menu. Windows Explorer opens which displays the location of the file.

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Configuring Data Links for the OLE DB Provider for DB2

To edit the properties of a universal data link (.udl) file, right-click the file using Windows Explorer and click **Properties**. The **Properties** dialog box appears with property tabs:

- **General**
- **Security**
- **Summary**
- **Provider**
- **Connection**
- **Advanced**
- **All**

The **General**, **Security**, and **Summary** tabs provide access to general file information for the .udl file that is available for other files and is not related to the Data Link properties. This information includes file location, file type, file size, file dates, file security permissions for access, and descriptive summary information (description and origin properties and values such title, subject, and author) for the .udl file. The **General** tab has a text box with the name of the Data Link. This filename must end with the .udl extension if the file is to be recognized as a Data Link file. Note that the **Security** and **Summary** tabs are available on NTFS files systems, and not on the older FAT file systems.

The **Provider**, **Connection**, **Advanced**, and **All** tabs provide access to the Data Link properties that need to be configured to connect to the DB2 system.

The NewSnaDS tool can also be used to open and modify an existing .udl file. The **Data Link Properties** dialog box appears with property tabs.

This section contains:

- Provider
- Connection
- Advanced
- All

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Provider

The **Provider** tab enables you to select the OLE DB provider (the provider name string) to use in the universal data link (.udl) file from a list of possible OLE DB providers. Select **the Microsoft OLE DB Provider for DB2**. The parameters and fields displayed in the remaining tabs (**Connection**, **Advanced**, and **All**) are determined by the OLE DB provider that is selected.

Connection

The **Connection** tab enables you to configure the basic properties required to connect to a data source. The **Connection** tab dialog box contains several sections:

- Data source and Network connectivity
- Authentication
- Database Properties

For the Microsoft OLE DB Provider for DB2, the **Connection** tab includes the following properties for Data source and Network connectivity values.

Property	**Description**
Data source	The data source is an optional property that can be used to describe the data source.
Network	This drop-down list box allows selecting the type of network connection to be used. The allowable options are **TCP/IP Connection** or **APPC Connection**. If **TCP/IP Connection** is selected, click **More Options** (**...**) to open a dialog box for configuring TCP/IP network settings. The properties you can configure include the IP address of the DB2 host (or a hostname alias for this computer) and the Network Port (TCP/IP port) used for communication with the host. The default value for the Network Port is 446. The IP address of the host has no default value. If **APPC Connection** is selected (using SNA LU 6.2), click **More Options** (**...**) to open a dialog box for configuring APPC network settings. The properties you can configure include: the APPC local LU alias, the APPC remote LU alias, and the APPC mode name used for communication with the host. The default value for the APPC mode normally defaults to QPCSUPP. The local and remote LU alias fields do not have default values. The default value for the APPC mode name normally defaults to QPCSUPP. The APPC mode name can be selected from the drop-down list box.

The **Data source** in OLE DB is similar to a Data Source Name (DSN) in ODBC. The data source information is stored in a Microsoft Data Links file and contains the connection information required for the OLE DB Provider for DB2 to access IBM Data Base 2.

For the Microsoft OLE DB Provider for DB2, the **Connection** tab includes the following properties for authentication information:

Property	**Description**
Single sign-on	Click this check box to enable using the Host Integration Server security features providing a Single Sign-On to access this OLE DB data source. When this check box is selected, the **User** name and **Password** fields are dimmed and inaccessible. The user name and password fields are set based on the logon name used for the Windows Server™ 2003 or Windows® 2000 domain logon. When this check box is not selected, the **User** name and **Password** fields must normally contain appropriate values to access data sources on hosts.
User name	A valid user name and password are normally required to access data sources on a host. These values are case-sensitive. Users must not check the **Single sign-on** option if a specific user name and password are to be entered.

Password	A valid user name and password are normally required to access data sources on hosts. These values are case-sensitive. The **Blank password** check box is only applicable for a test connection. To enter a password, the user will need to clear the **Blank password** check box if it is selected. If **Blank password** is selected, a test connection with a blank password does not cause the OLE DB provider to prompt for a password. Optionally, users can choose to save the password in the .udl file by clicking the **Allow saving password** check box. Users and administrators should be warned that this option saves the authentication information (password) in plain text within the .udl file.

The AS/400 computer requires that the **User name** and **Password** properties be in uppercase. When connecting to DB2/400, these parameters must be passed as uppercase strings. When connecting to DB2 on IBM mainframes, the **User name** and **Password** parameters can be in mixed case.

It is possible to connect using a specific user name and password defined in DB2 on the host system or use the Single Sign-On (SSO) feature (often referred to as integrated Windows security). If a specific DB2 user name and password is to be used, this information may need to be saved into the .udl file. The user name and password are saved in plain text in the .udl file. For security reasons in these cases, it is imperative that the .udl file be protected with an access control list (ACL) that restricts access to only authorized users. Saving the user name and password in the data link also forces this .udl file to be updated whenever the password associated with the user name is changed. So for a variety of reasons, specifying a user name and password is not the preferred authentication option. Using the **Single Sign-On** option is the preferred method for authentication.

For the Microsoft OLE DB Provider for DB2, the **Connection** tab includes the following properties for database property values.

Property	Description
Initial catalog	This field is the first entry in the Database section of the **Connection** properties. This OLE DB property is used as the first part of a three-part fully qualified table name. In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 installation manual. In DB2/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, one can be created using the **Add** option. In DB2 Universal Database, this property is referred to as DATABASE. If the provider supports changing the catalog for an initialized data source, the consumer can specify a different catalog name through the DBPROP_CURRENTCATALOG property in the DBPROPSET_DATASOURCE property set after initialization. This is a required property. This property is equivalent to the DBPROP_INIT_CATALOG OLE DB property ID.

Package collection	The name of the DRDA target collection (AS/400 library) where the Microsoft OLE DB Provider for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft OLE DB Provider for DB2, which is implemented as an IBM DRDA application requester, uses packages to issue dynamic and static SQL statements. Package names are not restricted and can be uppercase, lowercase, or mixed case. The OLE DB provider creates packages dynamically in the location to which the user points using the Package Collection property. By default, the OLE DB provider will automatically create one package in the target collection, if one does not exist, at the time the user issues their first SQL statement. The package is created with GRANT EXECUTE authority to a single <AUTH_ID> only, where AUTH_ID is based on the User ID value configured in the data source. The package is created for use by SQL statements issued under the same isolation level specified when calling the OLE DB **ITransactionLocal::StartTransaction** or **ITransactionJoin::JoinTransaction** methods, as well as when setting the ADO **IsolationLevel** property on the **Connection** object. A problem can arise in multi-user environments. For example, if a user specifies a Package Collection value that represents a DB2 collection used by multiple users, but this user does not have authority to GRANT execute rights to the packages to other users (the PUBLIC group on the DB2 system, for example), the package is created for use only by this user. This means that other users may be unable to access the required package. The solution is for an administrative user with package administrative rights to create a set of packages for use by all users. (For more information, see Creating Packages for Use with the OLE DB Provider for DB2). The OLE DB Provider for DB2 ships with a tool program for use by administrators to create packages. The Data Access Tool is used to create packages. This tool can be run using a privileged User ID to create packages in collections accessed by multiple users. This tool creates a set of packages and grants **EXECUTE** privilege on these packages to the PUBLIC group representing all users on the DB2 system. The packages (for more information, see descriptions under the isoLevel parameter of the OLE DB **ITransactionLocal::StartTransaction** or **ITransactionJoin::JoinTransaction** methods, as well as the ADO IsolationLevel property) created are as follows: AUTOCOMMITTED package (MSNC001 is only applicable on DB2/400) READ UNCOMMITTED package (MSUR001) READ COMMITTED package, (MSCS001) REPEATABLE READ package, (MSRS001) SERIALIZABLE package (MSRR001) Note that the AUTOCOMMITTED package (MSNC001) is only created on DB2 for OS/400. Once created, the packages are listed in the DB2 (mainframe) SYSIBM.SYSPACKAGE, the DB2 for OS/400 QSYS2.SYSPACKAGE, and the DB2 Universal Database (UDB) SYSIBM.SYSPACKAGE catalog tables. Note that when upgrading from SNA Server 4.0, any existing SNA 4.0 packages must be re-created using the Host Integration Server CrtPkg tool to make them compatible with Host Integration Server 2004. The package names changed from SNA Server 4.0. This property is equivalent to the DBPROP_DB2OLEDB_PACKAGECOL OLE DB property ID.
Default schema	The name of the collection where the OLE DB Provider for DB2 looks for catalog information. The Default Schema is the SCHEMA name for the target collection of tables and views. The OLE DB Provider uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection. For DB2, the Default Schema is the target AUTHENTICATION (User ID or owner). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, the OLE DB provider uses the USER_ID provided at logon. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. Because this default is inappropriate in many cases, it is essential that the Default Schema value in the data source be defined. This property is equivalent to the DBPROP_DB2OLEDB_CATALOGCOL OLE DB property ID.

The **Connection** tab also includes a **Test Connection** button that can be used to test the connection properties. The connection can only be tested after all of the required parameters are entered. When this button is pressed, an APPC session or a TCP/IP session attempts to be established with the host using the OLE DB Provider for DB2.

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Advanced

The **Advanced** tab enables users to select the character code set identifier used by the host, the personal C code page used on the client, and some specific options when using the OLE DB Provider for DB2.

For the Microsoft OLE DB Provider for DB2, these properties include the following values.

Property	Description
DBMS Platform	The target DB2 platform property value is used to optimize performance of the OLE DB provider when executing operations such as data conversion. The default value is DB2/MVS.
Default Qualifier	The name of the schema (collection/owner) with which to fully qualify unqualified object names. This attribute enables the user to access database objects without fully qualifying the objects using a collection (schema) qualifier. The OLE DB provider sends this value to DB2 using a **SET CURRENT SQLID** statement, instructing the DBMS to use this value when locating unqualified objects (for example, tables and views) referenced in SQL statements. If you do not set a value for default qualifier, no **SET** statement is issued by the OLE DB Provider. This OLE DB property is only valid when connecting to DB2 for MVS (OS/390, z/OS).
Host CCSID	The character code set identifier (CCSID) matching the DB2 data as represented on the remote host computer. The CCSID property is required when processing binary data as character data. Unless the Process Binary as Character value is set to **true**, character data is converted based on the DB2 column CCSID and default ANSI code page. This property defaults to U.S./Canada (37). This property is equivalent to the DBPROP_DB2OLEDB_HOSTCCSID OLE DB property ID.
PC code page	The PC code page property indicates the code page to be used on the computer for character code conversion. This property is required when processing binary data as character data. Unless the **Process binary as character** check box is selected (value is set to **true**), character data is converted based on the default ANSI code page configured in Windows. This property defaults to Latin 1 (1252). This property is equivalent to the DBPROP_DB2OLEDB_PCCODEPAGE OLE DB property ID.
Read only	When this option is selected, the OLE DB Provider for DB2 creates a read-only data source by setting the Mode property to Read (DB_MODE_READ). A user has read access to objects such as tables, and cannot do update operations (**INSERT**, **UPDATE**, or **DELETE**, for example). This property defaults to a **Mode** property of Read/Write (DB_MODE_READ/WRITE). This property is equivalent to the DBPROP_INIT_MODE OLE DB property ID.
Process binary as character	When this option is selected (property is set to **true**), the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This property defaults to **false**. This property is equivalent to the DBPROP_DB2OLEDB_BINASCHAR OLE DB property ID.
Distributed transactions	When this option is selected, two-phase commit (distributed unit of work) is enabled. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and a Host Integration Server 2004 Resync Service. This option requires that an **APPC Connection** is selected as the network transport in the **Connection** tab and Microsoft Transaction Server (MTS) is installed. Note that Host Integration Server 2004 supports 2PC over TCP/IP as well as SNA LU 6.2. This property is equivalent to the DBPROP_DB2OLEDB_UNITSOFWORK OLE DB property ID.

All

The **All** tab enables users to configure essentially all of the properties for the data source except for the OLE DB provider. The properties available in the **All** tab include properties that can be configured using the **Connection** and **Advanced** tabs as well as optional detailed properties used to connect to a data source.

For the Microsoft OLE DB Provider for DB2, these properties include the following values.

Property	Description
Affiliate Application	This property is only used when single sign-on is enabled. It contains the application name to use when retrieving host credentials from the single sign-on database. This property is equivalent to the DBPROP_DB2OLEDB_AFFILIATEAPP OLE DB property ID.
Alternate TP Name	The Alternate Transaction Program (TP) Name property represents the default transaction program name for the DB2 DRDA application server (AS), which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, the Alternative TP Name is set to 0X07F9F9F9. This property is equivalent to the DBPROP_DB2OLEDB_TPNAME OLE DB property ID.
APPC Local LU Alias	When an **APPC Connection** using SNA LU 6.2 is selected for the Network Transport Library, this field is the name of the local LU alias configured in SNA services. This property is equivalent to the DBPROP_DB2OLEDB_LOCALLU OLE DB property ID.
APPC Mode Name	When an **APPC Connection** using SNA LU 6.2 is selected for the Network Transport Library, this field is the APPC mode and must be set to a value that matches the host configuration and SNA services configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bi-directional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This property normally defaults to QPCSUPP. This property is equivalent to the DBPROP_DB2OLEDB_APPCMODE OLE DB property ID.
APPC Remote LU Alias	When an **APPC Connection** using SNA LU 6.2 is selected for the Network Transport Library, this field is the name of the remote LU alias configured in SNA services. This property is equivalent to the DBPROP_DB2OLEDB_REMOTELU OLE DB property ID.
APPC Security Type	When an **APPC Connection** using SNA LU 6.2 is selected for the Network Transport Library, this field is the security type that is used when allocating an SNA connection. The allowable values are: **Program** (default) and **Same**. This property is equivalent to the DBPROP_DB2OLEDB_APPCSEC OLE DB property ID.

Cache Authentication	This property determines whether the OLE DB provider caches authentication information. This property defaults to **false**. The value of this property (**true** or **false**) is selected from the drop-down list box. This property is equivalent to the DBPROP_AUTH_CACHE_AUTHINFO OLE DB property ID.
Client Application Name	Use this property to specify a custom application name that the DB2 Network Client (DRDA AR) will pass to the DB2 Server when connecting. When troubleshooting issues, you can use this value to help identify relevant portions within DB2 or system logs. This property is equivalent to the DBPROP_DB2OLEDB_CLIENTAPPNAME OLE DB property ID.
Connection Pooling	This property determines whether connection pooling is used. Connection pooling keeps a connection active after it is closed in case another connection is opened with the same properties. The default value is **False**. This property is equivalent to the DBPROP_DB2OLEDB_CONNPOOLING OLE DB property ID.
Data Source	The data source is an optional property that can be used to describe the data source. This property does not have a default value.
DBMS Platform	The target DB2 platform property value is used to optimize performance of the OLE DB provider when executing operations such as data conversion. The default value is DB2/MVS.
Default Qualifier	The name of the schema (collection/owner) with which to fully qualify unqualified object names. This attribute enables the user to access database objects without fully qualifying the objects using a collection (schema) qualifier. The OLE DB provider sends this value to DB2 using a **SET CURRENT SQLID** statement, instructing the DBMS to use this value when locating unqualified objects (for example, tables and views) referenced in SQL statements. If you do not set a value for default qualifier, no **SET** statement is issued by the OLE DB Provider. This OLE DB property is only valid when connecting to DB2 for MVS (OS/390, z/OS).
Default Schema	The name of the collection where the OLE DB Provider for DB2 looks for catalog information. The Default Schema is the SCHEMA name for the target collection of tables and views. The OLE DB Provider uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection. For DB2, the Default Schema is the target AUTHENTICATION (User ID or owner). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, the OLE DB Provider uses the USER_ID provided at logon. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. Because this default is inappropriate in many cases, it is essential that the Default Schema value in the data source be defined. This property is equivalent to the DBPROP_DB2OLEDB_CATALOGCOL OLE DB property ID.
Extended Properties	This property is a string containing provider-specific, extended connection information. The use of this property implies that the OLE DB consumer knows how this string will be interpreted and used by the OLE DB provider. This parameter should be used only for provider-specific connection information that cannot be explicitly described through the other property values. This property is equivalent to the DBPROP_INIT_PROVIDERSTRING OLE DB property ID.
Host CCSID	The character code set identifier (CCSID) matching the DB2 data as represented on the remote host computer. The CCSID property is required when processing binary data as character data. Unless the Process Binary as Character value is set to true, character data is converted based on the DB2 column CCSID and default ANSI code page. This property defaults to U.S./Canada (37). This property is equivalent to the DBPROP_DB2OLEDB_HOSTCCSID OLE DB property ID.

Initial Catalog	This OLE DB property is used as the first part of a three-part fully qualified table name. In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 installation manual. In DB2/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, one can be created using the **Add** option. In DB2 Universal Database, this property is referred to as DATABASE. If the provider supports changing the catalog for an initialized data source, the consumer can specify a different catalog name through the DBPROP_CURRENTCATALOG property in the DBPROPSET_DATASOURCE property set after initialization. This is a required property. This property is equivalent to the DBPROP_INIT_CATALOG OLE DB property ID.
Integrated Security	This property determines whether the OLE DB provider uses Host Security Integration (Single Sign-On). When this property is set to SSPI, Single Sign-On is enabled and separate user ID and password parameters are not required. The user name and password fields are set based on the logon name used for the Widows Server 2003 or Windows 2000 domain logon. When this property is null, this Single Sign-On feature is disabled. This property defaults to null (host security integration is disabled) and a user ID and password are required. This property is equivalent to the DBPROP_AUTH_INTEGRATED OLE DB property ID.
Mode	A Mode property is a bitmask specifying access permissions. This bitmask can be a combination of zero or more of the following: DB_MODE_READ—Read-only. DB_MODE_READWRITE—Read/write (DB_MODE_READ | DB_MODE_WRITE). DB_MODE_SHARE_DENY_NONE—Neither read nor write access can be denied to others. DB_MODE_SHARE_DENY_READ—Prevents others from opening in read mode. DB_MODE_SHARE_DENY_WRITE—Prevents others from opening in write mode. DB_MODE_SHARE_EXCLUSIVE—Prevents others from opening in read/write mode (DB_MODE_SHARE_DENY_READ | DB_MODE_SHARE_DENY_WRITE). DB_MODE_WRITE—Write-only. The following values for mode are supported by the OLE DB Provider for DB2: Read (DB_MODE_READ) and Read/Write (DB_MODE_READ/WRITE). This property defaults to Read/Write. When the **Read Only** property is selected in the **Advanced** tab, the OLE DB Provider for DB2 creates a read-only data source by setting the **Mode** property to Read (DB_MODE_READ). A user has read access to objects such as tables, and cannot do update operations (**INSERT**, **UPDATE**, or **DELETE**, for example). This property is equivalent to the DBPROP_INIT_MODE OLE DB property ID.
Network Address	When TCP/IP has been selected for the Network Transport Library, this property indicates the IP address of the DB2 host or a hostname alias for this computer. This property is equivalent to the DBPROP_DB2OLEDB_NETADDRESS OLE DB property ID.
Network Port	When TCP/IP has been selected for the Network Transport Library, this property is the TCP/IP port used for communication with the DB2 host. The default value is TCP/IP port 446. This property is equivalent to the DBPROP_DB2OLEDB_NETPORT OLE DB property ID.

Network Transport Library	The network transport dynamic-link library property designates whether the OLE DB Provider for DB2 connects through an APPC connection using SNA LU 6.2 or a TCP/IP connection. The possible values for this property are TCPIP or SNA. The default value for this property is **SNA**. If the default SNA is selected, values for APPC Local LU Alias, APPC Mode Name, and APPC Remote LU Alias are required. If TCPIP is selected, values for Network Address and Network Port are required. This property is equivalent to the DBPROP_DB2OLEDB_NETTYPE OLE DB property ID.
New Password	This property allows an OLE DB connection to change the host password for the user account used for the connection. If this property is set, the account password will be changed to the property value. This property is equivalent to the DBPROP_DB2OLEDB_NEWPWD OLE DB property ID.
Package Collection	The name of the DRDA target collection (AS/400 library) where the Microsoft OLE DB Provider for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft OLE DB Provider for DB2, which is implemented as an IBM DRDA application requester, uses packages to issue dynamic and static SQL statements. Package names are not restricted and can be uppercase, lowercase, or mixed case. The OLE DB provider creates packages dynamically in the location to which the user points using the Package Collection property. By default, the OLE DB provider automatically creates one package in the target collection, if one does not exist, at the time the user issues the first SQL statement. The package is created with GRANT EXECUTE authority to a single <AUTH_ID> only, where AUTH_ID is based on the User ID value configured in the data source. The package is created for use by SQL statements issued under the same isolation level specified when calling the OLE DB **ITransactionLocal::StartTransaction** or **ITransactionJoin::JoinTransaction** methods, as well as when setting the ADO **IsolationLevel** property on the **Connection** object. A problem can arise in multi-user environments. For example, if a user specifies a Package Collection value that represents a DB2 collection used by multiple users, but this user does not have authority to GRANT execute rights to the packages to other users (the PUBLIC group on the DB2 system, for example), the package is created for use only by this user. This means that other users may be unable to access the required package. The solution is for an administrative user with package administrative rights to create a set of packages for use by all users. (For more information, see Creating Packages for Use with the OLE DB Provider for DB2.) The OLE DB Provider for DB2 ships with a tool program for administrators to create packages. You use the Data Access Tool to create packages. This tool can be run using a privileged User ID to create packages in collections accessed by multiple users. This tool creates a set of packages and grants EXECUTE privilege on these packages to the PUBLIC group representing all users on the DB2 system . The packages (for more information, see descriptions under the isoLevel parameter of the OLE DB **ITransactionLocal::StartTransaction** or **ITransactionJoin::JoinTransaction** methods, as well as the ADO IsolationLevel property) created are as follows: AUTOCOMMITTED package (MSNC001 is only applicable on DB2/400) READ UNCOMMITTED package (MSUR001) READ COMMITTED package, (MSCS001) REPEATABLE READ package, (MSRS001) SERIALIZABLE package (MSRR001) Note that the AUTOCOMMITTED package (MSNC001) is only created on DB2 for OS/400. Once created, the packages are listed in the DB2 (mainframe) SYSIBM.SYSPACKAGE, the DB2 for OS/400 QSYS2.SYSPACKAGE, and the DB2 Universal Database (UDB) SYSIBM.SYSPACKAGE catalog tables. Note that when upgrading from SNA Server 4.0, any existing SNA 4.0 packages must be re-created using the Host Integration Server Data Access Tool to make them compatible with Host Integration Server 2004. The package names changed from SNA Server 4.0. This property is equivalent to the DBPROP_DB2OLEDB_PACKAGECOL OLE DB property ID.
Password	A valid user name and password are normally required to access data sources on hosts. The password is case-sensitive and is displayed as asterisks in this dialog box for security purposes. This property is equivalent to the DBPROP_AUTH_PASSWORD OLE DB property ID.

PC Code Page	The PC Code Page property indicates the code page to be used on the personal computer for character code conversion. This property is required when processing binary data as character data. Unless the Process Binary as Character value is set to **true**, character data is converted based on the default ANSI code page configured in Windows. This property defaults to Latin 1 (1252). This property is equivalent to the DBPROP_DB2OLEDB_PCCODEPAGE OLE DB property ID.
Persist Security Info	This property indicates whether the data source object is allowed to persist sensitive authentication information, such as a password along with other authentication information. This property defaults to **false**. The value of this property (**true** or **false**) is selected from the drop-down list box. This property is equivalent to the DBPROP_AUTH_PERSIST_SENSITIVE_AUTHINFO OLE DB property ID.
Process Binary as Character	When this property is set to true, the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This property defaults to **false**. The value of this property (**true** or **false**) is selected from the drop-down list box. This property is equivalent to the DBPROP_DB2OLEDB_BINASCHAR OLE DB property ID.
Units of Work	This property indicates whether two-phase commit (distributed unit of work) used for transactions is supported for this data source. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the Host Integration Server 2004 Resync Service. The following values for this property are supported by the OLE DB Provider for DB2: RUW (remote unit of work) DUW (distributed unit of work) This property defaults to RUW. Distributed unit of work (two-phase commit) requires an APPC Connection using SNA LU 6.2 or 2PC over TCP/IP as the network transport. Microsoft Transaction Server (MTS) should also be installed. This property is equivalent to the DBPROP_DB2OLEDB_UNITSOFWORK OLE DB property ID.
User ID	A valid user name is normally required to access data sources on hosts. This value is case-sensitive. This property is equivalent to the DBPROP_AUTH_USERID OLE DB property ID.

These properties on the **All** tab may be edited by selecting a property from the list displayed and selecting **Edit Value**. This button invokes a dialog box for the specific property containing a property description describing the property and a property value box for making changes.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating Packages for Use with the OLE DB Provider for DB2

The Microsoft OLE DB Provider for DB2, which is implemented as an IBM Distributed Relational Database Architecture (DRDA) application requester, uses packages to issue SQL statements and call DB2 stored procedures. There is a provider-specific property that the OLE DB Provider for DB2 uses to identify a location in which to create and store DB2 packages. The OLE DB Provider for DB2 creates packages dynamically in the location to which the user points using the Package Collection property corresponding to the DBPROP_DB2OLEDB_PACKAGECOL property ID of OLE DB. This location may be configured using the **Connection** and **Advanced** tabs using Microsoft Data Links or can be passed as part of the connection string as an attribute keyword and argument. This attribute keyword can be either pkgcol or the long form of this attribute, Package Collection.

There are two package creation options:

1. The OLE DB Provider for DB2 autocreates one package for the currently used isolation level at run time if no package already exists. This autocreate process may fail if the user account does not have authority to create packages.
2. An administrator or user can manually creates all four packages (five packages on DB2/400) for use with all isolation levels and for use by all users (the PUBLIC group on DB2 representing all users) or a specific set of users. The OLE DB Provider for DB2 includes a program for use by users with appropriate administrative privilege that will create these packages and grant access to the PUBLIC group for this purpose.

   Data Access Tool

A shortcut for this tool is added to the **Programs** menu off the **Start** button on the Windows taskbar under the **Host Integration Server\Data Integration** folder with a name of **Data Access Tool**. This shortcut is created when the Microsoft Host Integration Server or the Host Integration Client is first installed and support for Data Access is checked.

This tool creates a set of packages and grants EXECUTE privileges on these packages to the PUBLIC group. The PUBLIC group on DB2 systems is a default group that represents all DB2 users. The following packages are created:

- AUTOCOMMITTED package (MSNC001) is only applicable on DB2/400)
- READ UNCOMMITTED package (MSUR001)
- READ COMMITTED package (MSCS001)
- REPEATABLE READ package (MSRS001)
- SERIALIZABLE package (MSRR001)

Note that the AUTOCOMMITTED package (MSNNC001) is only created on DB2 for OS/400.

The descriptive process name used by the Data Access Tool corresponds with the isolation levels defined in the ANSI SQL standard. The following table indicates how these packages correspond with the terms used by IBM for isolation levels in DB2 documentation.

Package description	**Package name**	**IBM documentation**
AUTOCOMMITTED (Note that this applies only to DB2/400 and does not correspond with an ANSI SQL isolation level)	MSNC001	COMMIT(*NONE) (NC). This isolation level is used in DB2/400 autocommit mode only and has no corresponding isolation level on other DB2 platforms or in ANSI SQL.
READ UNCOMMITTED	MSUR001	UNCOMMITTED READ (UR). This isolation level corresponds with ANSI SQL READ UNCOMMITTED.
READ COMMITTED	MSCS001	CURSOR STABILITY (CS). This isolation level corresponds with ANSI SQL READ COMMITTED.
REPEATABLE READ	MSRS001	READ STABILITY (RS). This isolation level corresponds with ANSI SQL REPEATABLE READ.

SERIALIZABLE	MSRR001	REPEATABLE READ (RR). This isolation level corresponds with ANSI SQL SERIALIZABLE.

Note that when upgrading from SNA Server 4.0, any existing SNA 4.0 packages must be re-created using the Host Integration Server Data Access Tool to make them compatible with Host Integration Server 2004. The package names used by the OLE DB Provider for DB2 on SNA Server 4.0 are not compatible with the OLE DB Provider for DB2 included with Host Integration Server. On SNA Server 4.0, these packages used different names as follows:

```
AUTOCOMMITTED package (SNANC001) only applicable on DB2/400
READ UNCOMMITTED package (SNACH001)
READ COMMITTED package, (SNACS001)
REPEATABLE READ package, (SNARR001)
SERIALIZABLE package (SNAAL001)
```

These isolation levels are described in detail under Support for Isolation Levels Using the OLE DB Provider for DB2. These isolation levels are also described under the OLE DB isoLevel parameter and ADO IsolationLevel property. Note that the AUTOCOMMITTED package (MSNC001) is only created on DB2 for OS/400.

Note that the Data Access Tool creates this set of packages and grants EXECUTE privileges to the PUBLIC group. There may be cases for security reasons where EXECUTE privileges to this set of packages on the DB2 system should be restricted to a different group of users or specific users. In these cases, execution privileges on these created packages need to be modified on the host system.

The Data Access Tool creates all of these packages inside the Collection that is specified in the Package Collection property in the data link file, or in the connection string. If the user does not have the appropriate authority to create packages in the specified Collection, or if the specified Collection does not exist, the OLE DB Provider for DB2 will return an error.

In the case of DB2 on MVS or OS/390, the normal error text returned if the user does not have the appropriate authority would be as follows:

```
A SQL error has occurred. Please consult the documentation for your specific DB2 version for
a description of the associated Native Error and SQL State. SQLSTATE: 51002, SQLCODE: -567.
```

In the case of DB2/400, the normal error text returned if the user does not have the appropriate authority would be as follows:

```
A SQL error has occurred. Please consult the documentation for your specific DB2 version for
a description of the associated Native Error and SQL State. SQLSTATE: 51002, SQLCODE: -805.
```

In the case of DB2/400, the normal error returned if the collection does not exist would be as follows:

```
Failed to create AUTOCOMMITTED (NC) package.  RETCODE=-99.
SQL Error: Code=-204, State=42704, Error Text= A SQL error has occurred.  Please consult the
documentation for your specific DB2 version for a description of the associated Native Error
and SQL State. SQLSTATE: 42704, SQLCODE: -204
```

There are two authorities required to execute the create package process on MVS using the Data Access Tool:

```
GRANT BINDADD TO <authorization ID>
GRANT CREATE IN COLLECTION <collection ID> TO <authorization ID>
```

The "authorization ID" is the user who needs the permission to create the packages. The "collection ID" is the name of the collection, which the user specifies in the data link file for the Package Collection property. This collection should be a valid collection within the DB2.
If an administrator executes the preceding statements on behalf of a nonprivileged user, this nonprivileged user can then run the CrtPkg tool. Once run, the CrtPkg process creates four sets of packages (one for each of the four isolation levels supported on DB2 for MVS or OS/390) for use by all (PUBLIC) users of the Microsoft data access features.

The following example illustrates this process on DB2 for MVS or DB2 for OS/390.

Grant rights to run the CrtPkg tool to authorization ID WNW999

```
GRANT BINDADD TO WNW999
GRANT CREATE IN COLLECTION MSPKG TO WNW999
```

Run the Data Access Tool using authorization ID WNW999.

To execute the Data Access Tool on DB2/400, a user ID must have one of the following authorities:

- *CHANGE authority on the DB2 collection
- *ALL authority on the DB2 collection

If the user has *USE authority or if the user has *EXCLUDE authority, the Create Package process will fail.

There are several steps required to change user authority on a DB2/400 collection (AS/400 library): From interactive SQL (STRSQL command) while logged on as user with administrative privileges, create a new collection. This command can also be issued using ADO, OLE DB, and ODBC. However, most administrators typically create collections from the AS/400 console because the administrator must be logged on at the console to issue the Command Language (CL) command with which to change the user authority on the collection.

```
CREATE COLLECTION <collection ID>
```

From the AS/400 command console, type the CL WRKOBJ command with the <collection ID> as a parameter.

```
WRKOBJ <collection ID>
```

The "collection ID" is the name of the collection, which the user specifies in the data link file for the Package Collection property. This collection should be a valid collection within DB2. The **Work with objects** dialog box appears. Place the cursor on the *PUBLIC Object Authority line and change the authority from *USE to *ALL.

If an administrator executes the preceding statements on behalf of a nonprivileged user, this nonprivileged user can then run the CrtPkg tool. Once run, the CrtPkg process creates five sets of packages (one for each of the five isolation levels supported on DB2/400) for use by all (PUBLIC) users of the Microsoft data access features. On DB2/400, five packages are created including the AUTOCOMMITTED packages.

The following example illustrates this process on DB2/400.

Grant rights to run the Data Access Tool to authorization ID WNW999

```
CREATE COLLECTION MSPKG
WRKOBJ MSPKG
```

Run the Data Access Tool.

When using the Data Access Tool, if the package collection specified does not exist, DB2 returns SQLCODE -805.

When using auto-create packages, if a package collection is not specified or the package collection does not exist, during the auto-create package process, the consumer application receives SQLSTATE HY000 and SQLCODE -385. The SQLSTATE HY000 is defined as a provider-specific error. The -385 Error Return Code is not a SQLCODE but rather a DDM DRDA AR (DB2 client) return code. This error code is defined as DDM_VALNSPRM with the following associated text string:

```
"The parameter value is not supported by the target system."
```

The OLE DB Provider for DB2 client error codes are defined in the Db2oledb.h file located on the Host Integration Server 2004 CD.

Note that when upgrading from SNA Server 4.0, any existing SNA 4.0 packages must be re-created using the Host Integration Server Data Access Tool to make them compatible with Host Integration Server 2004.

Programming Considerations Using the OLE DB Provider for DB2

The Microsoft® OLE DB Provider for DB2 provides pass-through support for SQL statements. No SQL parsing is provided. The user must know what SQL syntax is supported for the target DB2 implementation. For information about what SQL syntax is supported, see the specific *DB2 SQL Reference and DB2 Application Programming and SQL Guide* for the DB2-specific platform.

The OLE DB Provider for DB2 does not parse the SQL statements to qualify table names. Consequently, users of the OLE DB Provider for DB2 must use either two-part or three-part (fully qualified) object names when naming tables, views, and stored procedures in DB2. A two-part table name would consist of the user ID and table, <UserID>.<Table>. One-part names (just the table name) do not succeed unless the combination of the DB2 collection and schema name correspond directly to the OLE DB User ID. (The OLE DB DBPROPSET_DBINIT property is equal to the OLE DB DBPROP_AUTH_USERID property.)

All the OLE DB objects exposed by the OLE DB Provider for DB2 support aggregation. Each OLE DB object has two classes, one that delegates its **IUnknown** calls and one that controls the object as a whole.

The free-threading model is supported, allowing multiple threads to access the objects safely.

The current implementation of the OLE DB Provider for DB2 services all OLE DB **Session**, **Command**, and **Rowset** objects present in a given instance of the **DataSource** object through a single APPC connection or TCP/IP connection. One implication of this design is that if two **Rowset** objects, each created from a different OLE DB Session object, use explicit commitment control through the **ITransaction** interface, they will interfere with each other. When a **Commit** or **Abort** for one instance is invoked, all work for the DataSource object will be either committed or aborted. This may yield undesirable results. The work around to this problem is to instantiate two instances of the **DataSource** object.

The OLE DB Provider for DB2 does not work with OLE DB Session Pooling.

The OLE DB Provider for DB2 in Microsoft Host Integration Server 2004 supports distributed transactions, DRDA Distributed Unit of Work, and can participate in a distributed transaction coordinated by Microsoft Distributed Transaction Coordinator.

This option requires that the SNA LU 6.2 service is selected as the network transport and Microsoft® Transaction Server (MTS) is installed. The Microsoft OLE DB Provider for DB2 does not support OLE DB automatic transaction enlistment under Microsoft Transaction Server.

The Microsoft Data Access Components (MDAC) support the option of using a client cursor engine. This service component is implemented as part of OLE DB, ADO, and Remote Data Services (RDS). When using ADO, a client cursor is enabled by setting the **CursorLocation** property on the recordset to **adUseClient**. When using the ADO Client Cursor Engine with DB2 for OS/390, you must set the OLE DB Provider for DB2 Auto Commit Mode property in the data link or connection string to FALSE. This is not required when connecting to DB2 for OS/400.

The OLE DB Provider for DB2 included with Host Integration Server 2004 supports updating capabilities when used with a client cursor engine when the following requirements are met:

- To support updates (UPDATE, INSERT, and DELETE) using a client cursor engine, the values in at least one column in the target table must be unique.

When the intent is to update records, DB2 requires that the SQL SELECT statement also include the FOR UPDATE option. For example, to select all records from the AUTHORS table in the DB2 collection called PUBS with intent to update requires the following SQL syntax:

```
SELECT * FROM PUBS.AUTHORS FOR UPDATE
```

When using DB2 for MVS V4R1 and DB2 for OS/400 V3R2, there are further requirements to indicate the columns that you intend to update. For example, to update the AU_LNAME and AU_FNAME columns in the PUBS.AUTHORS table, the following SQL syntax must be used:

```
SELECT * FROM PUBS.AUTHORS FOR UPDATE OF AU_LNAME, AU_FNAME
```

This section contains:

- Support for Isolation Levels Using the OLE DB Provider for DB2
- Transaction Support Using the OLE DB Provider for DB2
- Stored Procedure Support Using the OLE DB Provider for DB2

- Distributed Query Support Using the OLE DB Provider for DB2
- Query Designer Support Using the OLE DB Provider for DB2
- Data Transformation Services Support Using the OLE DB Provider for DB2
- SQL Server Replication Using the OLE DB Provider for DB2
- Code Page Support Using the OLE DB Provider for DB2
- Data Conversion Using the OLE DB Provider for DB2
- Floating Point Considerations Using the OLE DB Provider for DB2
- Usernames and Passwords Using the OLE DB Provider for DB2
- Two-Phase Commit over TCP/IP Support for the OLE DB Provider for DB2
- Troubleshooting the OLE DB Provider for DB2

Support for Isolation Levels Using the OLE DB Provider for DB2

The OLE DB Provider for DB2 provides flexibility in dealing with issues of isolation levels and transaction state. The isolation level for a session can be set using the DBPROP_SESS_AUTOCOMMITISOLEVELS property on a session.

The OLE DB Provider for DB2 supports the following values for the DBPROP_SESS_AUTOCOMMITISOLEVELS and DBPROP_SUPPORTEDTXNISOLEVELS property.

OLE DB property value	Description
DBPROPVAL_TI_BROWSE	This isolation level is the same as DBPROPVAL_TI_READUNCOMMITTED. Note that the OLE DB specification and the OLEDB.H include file defines two macros with the same value.
DBPROPVAL_TI_CHAOS	An undefined value for isolation level. This value is not supported using the OLE DB Provider for DB2.
DBPROPVAL_TI_CURSORSTABILITY	This isolation level is the same as DBPROPVAL_TI_READCOMMITTED. Note that the OLE DB specification and the OLEDB.H include file defines two macros with the same value.
DBPROPVAL_TI_ISOLATED	This isolation level is the same as DBPROPVAL_TI_SERIALIZABLE. Note that the OLE DB specification and the OLEDB.H include file defines two macros with the same value.
DBPROPVAL_TI_READCOMMITTED	When this property is set, it isolates any data read from changes by others and changes made by others cannot be seen. The re-execution of the Read statement is affected by others. This does not support a repeatable read. This is the default value for isolation level. This isolation level is also called Cursor Stability (CS) in IBM DB2 documentation. This isolation level corresponds with the ADO property set to **adXactReadCommitted**.
DBPROPVAL_TI_READUNCOMMITTED	When this property is set, it does not isolate data read from changes by others and changes made by others can be seen. The re-execution of the Read statement is affected by others. This does not support a repeatable read. This isolation level is called Uncommitted Read (UR) in IBM DB2 documentation. This isolation level corresponds with the ADO property set to **adXactReadUncommitted**.
DBPROPVAL_TI_REPEATABLEREAD	When this property is set, it isolates any data read from changes by others and changes made by others cannot be seen. The re-execution of the read statement is affected by others. This supports a repeatable read. This isolation level is called Read Stability (RS) in IBM DB2 documentation. This isolation level corresponds with the ADO property set to **adXactRepeatableRead**.
DBPROPVAL_TI_SERIALIZABLE	When this property is set, it isolates any data read from changes by others and changes made by others cannot be seen. The re-execution of the read statement is not affected by others. This supports a repeatable read. This isolation level is called Repeatable Read (RR) in IBM DB2 documentation. This isolation level corresponds with the ADO property set to **adXactSerializable**.

The isolation level can also be set by calling **ITransactionLocal::StartTransaction** with the appropriate value for the IsoLevel parameter to start a new transaction. Note that the same integer values used for the DBPROP_SESS_AUTOCOMMITISOLEVELS and DBPROP_SUPPORTEDTXNISOLEVELS property values are also used for the *IsoLevel* parameter passed to the **ITransactionLocal::StartTransaction** method. The legal values for the *IsoLevel* parameter are defined in Transact.h while the OLE DB property values for isolation level are defined in OLEDB.h. While the **#define** macro strings used for the OLE DB property values and the *IsoLevel* parameter values differ, the integer values of these macros are the same.

The following table shows the OLE DB property values for isolation level and the equivalent *IsoLevel* parameter passed to **ITransactionLocal::StartTransaction**.

OLE DB isolation level property	OLE DB IsoLevel parameter

DBPROPVAL_TI_BROWSE	ISOLATIONLEVEL_BROWSE
DBPROPVAL_TI_CURSORSTABILITY	ISOLATIONLEVEL_CURSORSTABILITY
DBPROPVAL_TI_ISOLATED	ISOLATIONLEVEL_ISOLATED
DBPROPVAL_TI_READCOMMITTED	ISOLATIONLEVEL_READCOMMITTED
DBPROPVAL_TI_READUNCOMMITTED	ISOLATIONLEVEL_READUNCOMMITTED
DBPROPVAL_TI_REPEATABLEREAD	ISOLATIONLEVEL_REPEATABLEREAD
DBPROPVAL_TI_SERIALIZABLE	ISOLATIONLEVEL_SERIALIZABLE

Nested transactions are not supported by the OLE DB Provider for DB2. If there is already an active transaction on the session (that is, **StartTransaction** has been called with no matching **ITransaction::Commit** or **ITransaction::Abort**), it is not possible to start a new transaction below the current transaction. Calling **ITransactionLocal::StartTransaction** when there is already an active transaction on the session returns XACT_E_XTIONEXISTS.

IBM documents isolation level in DB2 documentation using somewhat different terms. The following table shows how the OLE DB values for isolation level are mapped to the terms used by IBM DB2 for isolation level.

OLE DB isolation level	**IBM DB2 isolation level**
DBPROPVAL_TI_BROWSE	Uncommitted Read (UR)
DBPROPVAL_TI_CURSORSTABILITY	Cursor Stability (CS)
DBPROPVAL_TI_ISOLATED	Repeatable Read (RR)
DBPROPVAL_TI_READCOMMITTED	Cursor Stability (CS)
DBPROPVAL_TI_READUNCOMMITTED	Uncommitted Read (UR)
DBPROPVAL_TI_REPEATABLEREAD	Read Stability (RS)
DBPROPVAL_TI_SERIALIZABLE	Repeatable Read (RR)

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Transaction Support Using the OLE DB Provider for DB2

The OLE DB Provider for DB2 included with Host Integration Server 2004 supports distributed transactions. This support is enabled by setting the provider-specific property UNITS OF WORK to DUW, or by selecting the **Distributed transactions** option when configuring a universal data link (.udl) file or Data Source Name (DSN). The current DUW implementation does not have a notion of auto committing transactions so it is recommended to join the transaction through **ITransactionJoin->JoinTransaction** prior to performing work through **ICommandExecute** (or other interfaces). ADO applications do not generally join before starting their work, rather, they rely upon automatic transaction enlistment to enlist in the distributed transaction.

The OLE DB Provider for DB2 included with Host Integration Server 2004 supports DBPROP_MULTIPLECONNECTIONS (the default value is VARIANT_TRUE) for RUW connections. This ensures that no transaction state conflicts across OLE DB session objects (ADO commands or recordsets on a single connection). This feature is a property of DBPROPSET_DATASOURCE. Therefore, you can only set this property after the OLE DB data source or ADO connection objects are created.

If the transaction has been auto-enlisted, the default Transaction Isolation level is used (NC for the AS/400, CS for all other host platforms). If a join is requested (not applicable to ADO applications) after auto-enlistment and work, the isolation level specified on the join may differ from the default. This appears to be acceptable, except when a statement was prepared using one isolation level. The isolation level is then changed through **ITransactionJoin**, and the prepared statement is executed again.

Stored Procedure Support Using the OLE DB Provider for DB2

The OLE DB Provider for DB2 supports calling DB2 stored procedures, returning output parameters, and returning single and multiple result sets.

Distributed Query Support Using the OLE DB Provider for DB2

The OLE DB Provider for DB2 supports remote database access when configured as a linked server to SQL Server using distributed queries. The distributed queries feature of SQL Server is sometimes referred to as the Distributed Query Processor (DQP). SQL Server 2000 supports distributed queries to the OLE DB Provider for DB2 supplied with Host Integration Server 2004.

When using Microsoft SQL Server™ 2000 distributed queries and the OLE DB Provider for DB2 supplied with Host Integration Server 2004, the following OLE DB provider options (displayed in the same order as in the Microsoft® SQL Server™ Enterprise Manager) are supported.

Provider options in SQL Server 2000	**Comments**
Dynamic parameter	SQL Server generates parameterized queries as an optimization for providers that support the '?' parameter marker syntax for parameterized queries in dynamic SQL. This option should not be enabled for the OLE DB Provider for DB2.
Nested queries	SQL Server generates nested queries for providers that support nested **SELECT** queries in the **FROM** clause. Some versions of DB2 have support for nested queries. This option should not be enabled for OLE DB Provider for DB2.
Level zero only	A level zero OLE DB provider is a basic provider that does not support commands, and only level zero OLE DB interfaces are invoked against the provider. The Microsoft OLE DB Provider for DB2 is not a basic provider and uses commands. This option should not be enabled for the OLE DB Provider for DB2.
Allow InProcess	SQL Server enables the OLE DB provider to be instantiated as an in-process server. The default behavior is to instantiate the OLE DB provider outside the SQL Server process. Instantiating the provider outside the SQL Server process protects the SQL Server process from errors in the OLE DB provider. SQL Server requires an in-process server for handling specific types of data including long columns, text, and image data. The OLE DB Provider for DB2 does not currently support the DB2 Large Object (LOB) types. This option may be enabled or disabled for the OLE DB Provider for DB2, but this option is normally unnecessary when using SQL Server 2000.
Non transacted updates	SQL Server disables support for transacted updates if this option is enabled. The Microsoft OLE DB Provider supports transactions, so this option is not appropriate. This option should not be enabled for the OLE DB Provider for DB2.
Index as access path	SQL Server uses the OLE DB Index object with OLE DB providers that support this feature. The OLE DB Provider for DB2 does not currently support the Index object, so this option is not appropriate. This option should not be enabled for the OLE DB Provider for DB2.
Disallow ad hoc accesses	SQL Server uses this option when only an ODBC driver is available. This option should not be enabled for the OLE DB Provider for DB2.

The OLE DB provider options for managing distributed queries can be set using SQL Server Enterprise Manager. In the left pane of SQL Server Enterprise Manager, right-click a SQL Server instance and then select the **Security** tree to define a new linked server or change the properties of an existing linked server. Right-click an existing linked server or create a new linked server. On the **General** tab, select the **Other data source** button and select the OLE DB Provider for DB2 for the **Provider name** from the drop-down list box. Click the **Provider Options** button below the selected OLE DB provider to set the options for distributed queries. Select the appropriate check boxes to enable an option for this linked server. Note that these options operate at the provider level. When the appropriate options are set for the OLE DB Provider for DB2, these settings apply to all linked server definitions using the same OLE DB Provider for DB2.

The OLE DB Provider for DB2 performs data type and code page conversions on behalf of the OLE DB consumer application, in this case the SQL Server Distributed Query Processor. First, the provider converts DB2 numeric and datetime data types to OLE DB numeric and datetime data types. The provider does this on a best-match basis using information provided by DB2 in the DRDA SQL reply data structure for the result set. Second, the provider converts the character data from the DB2 Coded Character Set Identifier (CCSID) to the Windows ANSI code page. For example in the case of an SQL **SELECT** fetch of data from DB2 for

OS/400, the provider converts character data from EBCDIC to UNICODE and UNICODE to ANSI. The source EBCDIC CCSID value comes from the table column descriptor or from the DB2 database if the column CCSID is undefined. The target ANSI code page value comes from the value of the PC Code Page data source property. For example, to convert character data from CCSID 1026, IBM EBCDIC Turkish (Latin-5), to ANSI code page 1254, Turkish, the PC CodePage would need to be set to 1254. OLE DB consumers may convert the data once again from OLE DB to some native data type. In this case, the OLE DB consumer application is a distributed query processor. When using distributed queries, SQL Server does perform numeric and datetime conversions from OLE DB to SQL Server data types.

UNIONs in **SELECT** statements are not supported by the current version of the OLE DB Provider for DB2 when used with distributed queries. For example, the following **SELECT** statement will fail:

```
SELECT * FROM ( SELECT TITLE_ID FROM SNA.TITLE )
```

The SQL parser built into the OLE DB Provider for DB2 does not properly parse these **UNION** statements in a way compatible with DB2. The preceding statement will generate a type 199 error "Keyword FROM not expected. Valid Tokens: LEFT CROSS INNER EXCEPTION." When performing the same query with correlation names added, the error becomes a type 104 error "Token . was not valid. Valid tokens: LEFT CROSS INNER EXCEPTION."

Linked server definitions can also be created or deleted using stored procedures as well as through the SQL Server Enterprise Manager.

When creating linked server definitions, the *@catalog* parameter of the **sp_addlinkedserver** procedure corresponds to the OLE DB provider-specific **Initial Catalog** property. Additionally, when creating linked server definitions, you can use the contents of a universal data link (.udl) file for the *@provstr* parameter value or enter the short provider string keyword arguments (for details, see the ADO ConnectionString property), which are consumed through the OLE DB **DBPROP_INIT_PROVIDERSTRING** (Extended Properties) property.

The following example illustrates how to create a linked server for DB2/MVS using an SNA connection.

```
USE master
GO
EXEC sp_dropserver 'DB2MVS_SNA', 'droplogins'
GO
EXEC sp_addlinkedserver
    @server = 'DB2MVS_SNA',
    @srvproduct = 'Microsoft OLE DB Provider for DB2',
    @provider = 'DB2OLEDB',
    @catalog = 'P390D37',
    @provstr='InitCat=P390D37;NetLib=SNA;LOCALLU=MVSRUS;
       REMOTELU=P390L37;MODENAME=IBMRDB;PkgCol=MSPKG;DefSch=DB2DEMO'
GO
EXEC sp_addlinkedsrvlogin
    @rmtsrvname='DB2MVS_SNA',
    @useself=false,
    @locallogin=NULL,
    @rmtuser='wnw999',
    @rmtpassword='wnw999'
GO
```

The following example illustrates how to create a linked server for DB2/MVS using a TCP/IP connection.

```
USE master
GO
EXEC sp_dropserver 'DB2MVS_IP', 'droplogins'
GO
EXEC sp_addlinkedserver
    @server = 'DB2MVS_IP',
    @srvproduct = 'Microsoft OLE DB Provider for DB2',
    @provider = 'DB2OLEDB',
    @catalog = 'P390D37',
    @provstr='InitCat=P390D37;NetLib=TCPIP;NetAddr=MVSrUS;
        NetPort=446;PkgCol=MSPKG;DefSch=DB2DEMO'
GO
EXEC sp_addlinkedsrvlogin
    @rmtsrvname='DB2MVS_IP',
    @useself=false,
    @locallogin=NULL,
    @rmtuser='wnw999',
    @rmtpassword='wnw999'
GO
```

The following example illustrates several DB2 linked server queries using a TCP/IP connection.

```
/* SELECT using four-part linked server query:   */
/*    <Linked Server>.<Catalog>.<Schema>.<Table> */
SELECT * FROM DB2MVS_IP.P390D37.DB2DEMO.DEPARTMENT
SELECT DEPTNAME FROM DB2MVS_IP.P390D37.DB2DEMO.DEPARTMENT WHERE DEPTNO = 'A00'

/* SELECT using pass-through OPENQUERY with      */
/*     three-part naming convention              */
SELECT * FROM OPENQUERY(DB2MVS_IP,"SELECT * FROM P390D37.DB2DEMO.EMP_ACT")

/* SELECT using pass-through OPENROWSET with     */
/*     two-part naming convention                */
SELECT * FROM OPENROWSET
    (
    'DB2OLEDB',
    'InitCat=P390D37;NetLib=TCPIP;NetAddr=MVSrUS;NetPort=446;
         PkgCol=MSPKG;DefSch=DB2DEMO;User ID=WNW999;Password=WNW999',
    'SELECT * FROM DB2DEMO.EMPLOYEE'
    )
```

The following example illustrates several SQL Server Views to access a DB2 linked server using a TCP/IP connection.

```
/* Create SQL Server View using DB2 linked server query */
USE DB2Demo
GO
DROP VIEW DB2VIEW
GO
CREATE VIEW DB2View
AS
SELECT ORD_ID, ORDERDATE, ORDERSTATUS
    FROM DB2MVS_IP.P390D37.DB2DEMO.ORDERS
GO

/* Access Db2 data using SQL Server View */
SELECT * FROM DB2Demo.dbo.DB2View
```

The following example illustrates the SQL **SELECT**, **UPDATE**, and **DELETE** commands using four-part linked server queries to DB2 over a TCP/IP connection.

```
SELECT * FROM DB2MVS_IP.P390D37.DB2DEMO.CUSTOMERS
INSERT INTO DB2MVS_IP.P390D37.DB2DEMO.CUSTOMERS VALUES (1002,
    'password', 'User', 'DB2Demo', 'One Microsoft Way', 'Redmond',
    '425-882-8080', 'WA', '98052', 'mssna@microsoft.com')
UPDATE DB2MVS_IP.P390D37.DB2DEMO.CUSTOMERS  SET PHONE = '206-882-8080'
    WHERE CUST_ID = 1002
DELETE FROM DB2MVS_IP.P390D37.DB2DEMO.CUSTOMERS WHERE CUST_ID = '1002'
```

The following example illustrates invoking DB2 linked server queries from SQL Server stored procedure.

```
USE DB2Demo
DROP PROCEDURE spGetOrderDetails_DB2MVS_IP

CREATE PROCEDURE spGetOrderDetails_DB2MVS_IP
    @ORDER_ID INT
AS
BEGIN
    SELECT a.*, b.Title, b.SubTitle, b.Author, b.ISBN, b.Weight
```

```
          FROM DB2MVS_IP.P390D37.DB2DEMO.ORDERDETAILS AS a
      INNER JOIN Titles AS b
          ON a.Prod_Id = b.TitleId
          WHERE a.Ord_Id >= @ORDER_ID
  END

  EXEC spGetOrderDetails_DB2MVS_IP 1001
```

For more information about the preceding stored procedures, see the Microsoft SQL Server Books Online.

INSERT, **UPDATE**, and **DELETE** statements when using four-part linked server queries invoke the client cursor engine (CCE). This means that some statements may fail or update incorrect columns. For example, if there is not a unique key column on the target tables or if there are not enough unique values for the CCE to accurately determine which columns to update, the statement may fail. For **INSERT**, **UPDATE**, and **DELETE** linked server queries, there must be either a unique index or unique values.

Using distributed queries, SQL Server returns all rows for the target table locally, and then sorts through results using the client cursor engine to find a unique value (composed of all columns if need be). If the CCE cannot find a unique value, the distributed query fails to perform the **INSERT**, **UPDATE**, or **DELETE** statement.

Using the OLE DB Provider for DB2, SQL Server distributed queries return the incorrect precision for DECIMAL data types when running **OPENQUERY**. The correct precision is returned for DECIMAL data types with using a linked server query.

Query Designer Support Using the OLE DB Provider for DB2

The Microsoft OLE DB Provider for DB2 supports using the Query Designer that is included with Microsoft SQL Server. When Query Designer is launched from products such as SQL Server Data Transformation Services (DTS), the OLE DB Provider for DB2 is initialized with no provider-specific properties and an invalid property error may be generated.

To work around this problem, create a data link with the provider-specific properties required to connect to the host. These properties are specified in the Extended Properties field on the **All** tab when configuring a data source. Typically, the remote LU Alias, the local LU Alias, and the Default Schema should be specified using either the full property name (APPC Remote LU Alias=REMLU;APPC Local LU Alias;Default Schema=MYLIB) or the short names (RLU=REMLU;LLU;DEFSCH=MYLIB).

Other properties, such as **APPC Mode Name**, may need to be specified if the default values for that property are not acceptable. You should also specify a Default Schema. If a Default Schema is not specified, Query Designer displays all schemas on the remote system (including items such as libraries and collections), which can result in slow performance.

Data Transformation Services Support Using the OLE DB Provider for DB2

The Microsoft OLE DB Provider for DB2 supports using the Data Transformation Services (DTS) facility provided with Microsoft SQL Server. DTS can be used for file transfer between DB2 and Microsoft SQL Server. There are some special considerations necessary when using DTS and the OLE DB Provider for DB2.

A DB2/400 database member can only be accessed in a SQL statement by using an ALIAS or SYNONYM. For example, if you have several members of a SALES.REVENUE database file, each member storing monthly sales information, you would access one month's data member by using an ALIAS. First, you must create the ALIAS.

```
CREATE ALIAS SALES.REVENUE_JANUARY FOR SALES.REVENUE(JANUARY)
```

Second, you must use this alias when issuing a SQL statement. You can access individual members using an ALIAS in the following SQL statements: SELECT, SELECT INTO, INSERT, UPDATE, and DELETE.

```
SELECT * FROM SALES.REVENUE_JANUARY
```

After the alias is created, you should be able to see the table listed in the systables by issuing the following SQL statement:

```
SELECT * FROM QSYS2.SYSTABLES WHERE TABLE_SCHEMA = 'SALES'
```

The REVENUE_JANUARY table type is "ALIAS". Many OLE DB providers and ODBC drivers do not list an ALIAS as a TABLE when returning catalog schema. Note that DTS does not list the table when using the Microsoft OLE DB Provider for DB2 or the Microsoft ODBC Driver for DB2. If the ALIAS is not listed, utilize the Query option in DTS to specify a SELECT * FROM SALES.REVENUE_JANUARY statement.

Note that it is possible to use the OVRDBF CL command. However, using an override database file has significant overhead, whereas an ALIAS is less demanding on DB2 server resources. Additionally, the OVRDBF command must be issued each time (likely as part of a stored procedure), whereas an ALIAS is persistent.

For more information, see the *DB2/400 IBM SQL Reference Version 4, Document Number SC41-5612-02*.

Microsoft SQL Server Data Transformation Services (DTS) does not automatically create target DB2 tables that can store DBCS or mixed DBCS-SBCS data. When using DTS to move DBCS or mixed data to DB2 as a source, one of the following techniques are recommended:

- Create the target DB2 table ahead of time.
- Edit the CREATE TABLE script within the DTS package to include the required CCSID and FOR MIXED clauses as appropriate for the target DB2 platform and version.

When importing TIME data fields into Microsoft SQL Server using DTS and the OLE DB Provider for DB2, the second field is incorrectly set to a value of **00**. This behavior occurs when the field data type in SQL Server is **Smalldatetime**.

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SQL Server Replication Using the OLE DB Provider for DB2

Host Integration Server 2004 supports using the Microsoft OLE DB Provider for DB2 and Microsoft SQL Server Replication.

When using transactional replication, object names such as tables and constraints can be longer in Microsoft SQL Server than in DB2. Therefore, when moving data from Microsoft SQL Server to DB2, one of the following strategies should be used for compatibility:

- Create the Microsoft SQL Server tables and constraints so that the names do not exceed the limits of DB2. (For details, see the DB2 SQL Reference for the target platform and version of DB2.)
- Create the Microsoft SQL Server tables and constraints with names up to the maximum supported by Microsoft SQL Server, and then run ALTER TABLE SQL scripts against the Microsoft SQL Server distribution database after replication has created the publication, but before creating the subscriptions.

For replication to work properly, SQL Server-to-DB2 data type mapping entries must be provided for several data types. These data type mappings must be stored in the Microsoft SQL Server MSdatatype_mappings table in the msdb database. Data type mapping entries must be provided to properly support the CHAR and VARCHAR data types when used to store SBCS character strings or binary data (BINARY and VARBINARY) with replication. The mappings for CHAR and VARCHAR are needed due to the limits for the boundary values using the OLE DB Provider for DB2. The mappings for binary data types are required because binary data is stored as character data using the OLE DB Provider for DB2.

This SQL Server msdb.MSdatatype_mappings table can be updated using a stored procedure that comes with SQL Server. The exec sp_add_datatype_mapping command is a stored procedure that comes with SQL Server. You should run these data mappings in the SQL Query Analyzer (Isqlw.exe). Each line of the exec sp_add_datatype_mapping procedure will add one data mapping to msdb.Msdatatype_mappings.

The Microsoft OLE DB Provider for DB2 when accessing DB2 on all platforms and versions does not support the following Microsoft SQL Server data types with direct mappings. The following is a summary of the limitations.

Microsoft OLE DB Provider for DB2 does not support DB2 GRAPHIC, VARGRAPHIC, and LONG VARGRAPHIC data types. Mappings to these DB2 types should be avoided.

Microsoft OLE DB Provider for DB2 does not support DB2 Large Object data types, such as CLOB, DBCLOB, and BLOB, which are used in DB2 Universal Database. Microsoft OLE DB Provider for DB2 does not support the DB2 BIGINT data types, which are used in DB2 Universal Database for Windows NT.

Microsoft SQL Server NCHAR, NVARCHAR, NTEXT, and SYSNAME data types do not map well to supported DB2 data types. The Microsoft SQL Server TIMESTAMP data type should be mapped to a DB2 CHAR FOR BIT DATA data type. The TIMESTAMP data type in SQL Server is used only for the purposes of table logging and not for end-user data. Therefore, you should not map the SQL Server TIMESTAMP data type to the DB2 TIMESTAMP.

The sample mapping table entries map Microsoft SQL Server TEXT and IMAGE to DB2 VARCHAR and DB2 VARCHAR FOR BIT DATA respectively. These Microsoft SQL Server data types can represent up to 2 gigabytes (GB) of data. In contrast, the DB2 VARCHAR data types can hold at most approximately 32 kilobytes (KB) of data. As such, data truncation may occur.

For Microsoft SQL Server data types, MONEY, SMALLMONEY, DECIMAL, and NUMERIC, data values can be replicated to DB2 correctly, but these floating-point data types are mapped to STRING instead of FLOAT. After these data values are replicated to DB2, the string values should be converted back to float before performing calculations. An alternative is to do the calculations and update using SQL Server before replicating these data values over to DB2.

This section contains:

- SQL Replication with DB2 for OS/400
- SQL Replication with DB2 for MVS
- SQL Replication with DB2 UDB for AIX
- SQL Replication with DB2 UDB for Windows NT

SQL Replication with DB2 for OS/400

When used with DB2 for OS/400, run the following commands in a stored procedure:

```
exec dbo.sp_add_datatype_mapping 'DB2/400', 'bit',
    'SMALLINT', 1,  0, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'char', 'CHAR', 8000, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'datetime',
    'TIMESTAMP', 26, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'decimal',
    'DECIMAL', 31, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'double precision',
    'DOUBLE', 53, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'float', 'FLOAT', 53, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'int', 'INT', 10, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'money',
    'DECIMAL', 19, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'numeric',
    'NUMERIC', 31, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'real', 'REAL', 24, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'smalldatetime',
    'TIMESTAMP', 26, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'smallint',
    'SMALLINT', 5, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'smallmoney',
    'DECIMAL', 10, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'text',
    'VARCHAR', 32739, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'tinyint',
    'SMALLINT', 1, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'uniqueidentifier',
    'CHAR', 38, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/400', 'varchar',
    'VARCHAR', 8000, 4, 1
```

SQL Replication with DB2 for MVS

When used with DB2 for MVS, run the following commands:

```
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'bit',
    'SMALLINT', 1,  0, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'char', 'CHAR', 254, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'datetime',
    'TIMESTAMP', 26, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'decimal',
    'DECIMAL', 31, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'double precision',
    'DOUBLE', 53, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'float', 'FLOAT', 53, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'int',
    'INT', 10, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'money',
    'DECIMAL', 19, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'numeric',
    'NUMERIC', 31, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'real', 'REAL', 24, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'smalldatetime',
    'TIMESTAMP', 26, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'smallint',
    'SMALLINT', 5, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'smallmoney',
   'DECIMAL', 10, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'text',
   'VARCHAR', 4045, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'tinyint',
    'SMALLINT', 1, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'uniqueidentifier',
    'CHAR', 38, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/MVS', 'varchar',
    'VARCHAR', 4045, 4, 1
```

SQL Replication with DB2 UDB for AIX

When used with DB2 Universal Database for AIX, run the following commands:

```
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'bit',
    'SMALLINT', 1,  0, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'char',
    'CHAR', 8000, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'datetime',
    'TIMESTAMP', 26, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'decimal',
    'DECIMAL', 31, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'double precision',
    'DOUBLE', 53, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'float',
    'FLOAT', 53, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'int', 'INT', 10, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'money',
    'DECIMAL', 19, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'numeric',
    'NUMERIC', 31, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'real', 'REAL', 24, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'smalldatetime',
    'TIMESTAMP', 26, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'smallint',
    'SMALLINT', 5, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'smallmoney',
    'DECIMAL', 10, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'text',
    'VARCHAR', 32739, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'tinyint',
    'SMALLINT', 1, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'uniqueidentifier',
    'CHAR', 38, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/6000', 'varchar',
    'VARCHAR', 8000, 4, 1
```

SQL Replication with DB2 UDB for Windows NT

When used with DB2 Universal Database for Windows NT, run the following commands:

```
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'bit',
    'SMALLINT', 1,  0, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'char', 'CHAR', 8000, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'datetime',
    'TIMESTAMP', 26, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'decimal',
    'DECIMAL', 31, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'double precision',
    'DOUBLE', 53, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'float', 'FLOAT', 53, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'int', 'INT', 10, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'money',
    'DECIMAL', 19, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'numeric',
    'NUMERIC', 31, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'real', 'REAL', 24, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'smalldatetime',
    'TIMESTAMP', 26, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'smallint',
    'SMALLINT', 5, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'smallmoney',
    'DECIMAL', 10, 3, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'text',
    'VARCHAR', 32739, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'tinyint',
    'SMALLINT', 1, 0, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'uniqueidentifier',
    'CHAR', 38, 4, 1
exec dbo.sp_add_datatype_mapping 'DB2/NT', 'varchar',
    'VARCHAR', 8000, 4, 1
```

Code Page Support Using the OLE DB Provider for DB2

When creating data links for use with the OLE DB Provider for DB2, the Host character code set identifier (CCSID) should be configured in the data source to match the DB2 data as represented on the remote host computer. The Host CCSID parameter defaults to EBCDIC U.S./Canada (37) when using the OLE DB Provider for DB2.

Depending on the version of Windows being used, to support specific code page conversions, you may need to install the appropriate National Language Support (NLS) file for your locale.

The appropriate ANSI NLS file for your locale is installed automatically when you install a localized version of Windows Server 2003 or Windows 2000.

The following sections discuss the CCSIDs supported by OLE DB Provider for DB2 in Host Integration Server 2004.

This section contains:

- ANSI Code Page Support Using the OLE DB Provider for DB2
- EBCDIC Code Page Support Using the OLE DB Provider for DB2
- ISO Code Page Support Using the OLE DB Provider for DB2
- DBCS Code Page Support Using the OLE DB Provider for DB2

ANSI Code Page Support Using the OLE DB Provider for DB2

IBM DB2 Universal Database for Windows NT and IBM DB2 Universal Database for AIX are frequently configured to use ANSI code pages, for example ANSI 1253 (Greek). Host Integration Server 2004 includes support for some ANSI code pages for purposes of ANSI-to-UNICODE-to-ANSI conversions when using the OLE DB Provider for DB2 or the ODBC Driver for DB2. These ANSI code pages can be used when accessing IBM DB2 Universal Database on Windows NT and IBM DB2 ON AIX. (Not all of these ANSI code pages are supported on IBM DB2 Universal Database for AIX.)

The following table shows the ANSI character code set identifiers (CCSIDs) supported by OLE DB Provider for DB2 in Host Integration Server 2004.

Microsoft display name	Microsoft NLS code page	IBM CCSID	Comments
ANSI - Arabic	1256	1256	None.
ANSI - Baltic	1257	1257	None.
ANSI - Cyrillic	1251	1251	None.
ANSI - Central Europe	1250	1250	None.
ANSI - Greek	1253	1253	None.
ANSI - Hebrew	1255	1255	None.
ANSI - Latin I	1252	1252	Support for this code page is normally installed as part of the operating system on Windows Server 2003 or Windows 2000.
ANSI - Turkish	1254	1254	None.
ANSI/OEM - Japanese Shift JIS	932	932	None.
ANSI/OEM - Korean	949	949	None.
ANSI/OEM - Simplified Chinese GBK	936	936	None.
ANSI/OEM - Thai	874	874	None.
ANSI/OEM - Traditional Chinese Big5	950	950	None.
ANSI/OEM - Viet Nam	1258	1258	None.

The Microsoft display name is the name found in the Windows Server 2003 or Windows 2000 definitions for these National Language Support (NLS) files. The Microsoft NLS code page column represents the code page number that is registered and associated with an ANSI-to-UNICODE NLS resource file. The Microsoft NLS number should be set as the Host CCSID when configuring data sources when using the OLE DB Provider for DB2. When setting the Host CCSID or PC Code Page attribute or property using a connection string, the Microsoft NLS number should be used for this parameter.

The IBM CCSID column represents the CCSID given to the ANSI code page in IBM publications, which for these supported ANSI CCSIDs are the same as the Microsoft CCSID values. IBM lists their ANSI support in publications by referencing the display name which for these ANSI code pages is the same as the Microsoft display name. The OLE DB Provider for DB2 does not recognize or display the IBM CCSID values when configuring data sources using data links. The OLE DB Provider for DB2 maps the Microsoft NLS numbers to ANSI NLS files which correspond with the appropriate IBM CCSID numbers. The OLE DB Provider for DB2, as well as Microsoft ODBC Driver for DB2, pass the corresponding IBM CCSID to the DB2 system at run time even though you configure the provider or driver to use the Microsoft NLS number.

These are the only ANSI pages currently supported by the OLE DB Provider for DB2 in Host Integration Server 2004. IBM supports additional ANSI pages. However, the ANSI code pages listed in the preceding table are the only cases where the Microsoft NLS pages and IBM ANSI code pages (CCSIDs) match.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

EBCDIC Code Page Support Using the OLE DB Provider for DB2

IBM DB2 for MVS, IBM DB2 for OS/390, and IBM DB2 for OS/400 are frequently configured to use EBCDIC code pages, for example EBCDIC 875 (Greek Modern). Host Integration Server 2004 includes support for most EBCDIC code pages for purposes of EBCDIC-to-UNICODE-to-ANSI, ANSI-to-UNICODE-to-EBCDIC, and EBCDIC-to-UNICODE-to-EBCDIC conversions when using the OLE DB Provider for DB2 or the ODBC Driver for DB2. These EBCDIC code pages can be used when accessing IBM DB2 on a variety of platforms. (Not all of these EBCDIC code pages are supported on all versions of IBM DB2.)

The following table shows the EBCDIC character code set identifiers (CCSIDs) supported by OLE DB Provider for DB2 in Host Integration Server 2004.

Microsoft display name	**Microsoft NLS code page**	**IBM CCSID**	**Comments**
IBM EBCDIC - Arabic	20420	420	None.
IBM EBCDIC - Cyrillic (Russian)	20880	880	None.
IBM EBCDIC - Cyrillic (Serbian, Bulgarian)	21025	1025	None.
IBM EBCDIC - Denmark/Norway	20277	277	None.
IBM EBCDIC - Denmark/Norway (Euro)	1142	1142	None.
IBM EBCDIC - Finland/Sweden	20278	278	None.
IBM EBCDIC - Finland/Sweden (Euro)	1143	1143	None.
IBM EBCDIC - France	20297	297	None.
IBM EBCDIC - France (Euro)	1147	1147	None.
IBM EBCDIC - Germany	20273	273	None.
IBM EBCDIC - Germany (Euro)	1141	1141	None.
IBM EBCDIC - Greek	20423	423	None.
IBM EBCDIC - Greek (Modern)	875	875	None.
IBM EBCDIC - Hebrew	20424	424	None.
IBM EBCDIC - Icelandic	20871	871	None.
IBM EBCDIC - Icelandic (Euro)	1149	1149	None.
IBM EBCDIC - International	500	500	None.
IBM EBCDIC - International (Euro)	1148	1148	None.
IBM EBCDIC - Italy	20280	280	None.
IBM EBCDIC - Italy (Euro)	1144	1144	None.
IBM EBCDIC - Japan English/Kanji (Extended)	939	939	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Japan English/Kanji (Extended)	5035	5035	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Japan Katakana/Kanji (Extended)	930	930	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Japan Katakana/Kanji (Extended)	5026	5026	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Japanese	931	931	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Korea (Extended)	933	933	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Latin America/Spain	20284	284	None.
IBM EBCDIC - Latin America/Spain (Euro)	1145	1145	None.
IBM EBCDIC - Multilingual/ROECE (Latin-2)	870	870	None.
IBM EBCDIC - Simplified Chinese (Extended)	935	935	None.
IBM EBCDIC - Thai	20838	838	None.
IBM EBCDIC - Traditional Chinese (Extended)	937	937	Support for this double-byte character set is supplied using TRNSDT.

IBM EBCDIC - Turkish (Latin-3)	20905	905	None.
IBM EBCDIC - Turkish (Latin-5)	1026	1026	None.
IBM EBCDIC - U.S./Canada	037	37	None.
IBM EBCDIC - U.S./Canada (Euro)	1140	1140	None.
IBM EBCDIC - United Kingdom	20285	285	None.
IBM EBCDIC - United Kingdom (Euro)	1146	1146	None.

The Microsoft display name is the name found in the Windows Server 2003 or Windows 2000 definitions for these National Language Support (NLS) files. The Microsoft NLS code page column represents the code page number that is registered and associated with an EBCDIC-to-UNICODE NLS resource file. The Microsoft NLS number should be set as the Host CCSID when configuring data sources when using the OLE DB Provider for DB2. When setting the Host CCSID or PC Code Page attribute or property using a connection string, the Microsoft NLS number should be used for this parameter.

The IBM CCSID column represents the CCSID given to the EBCDIC code page in IBM publications. IBM lists their EBCDIC support in publications by referencing the display name which for these EBCDIC code pages is the same as the Microsoft display name. The OLE DB Provider for DB2 does not recognize or display the IBM CCSID values when configuring data sources using data links. The OLE DB Provider for DB2 maps the Microsoft NLS numbers to EBCDIC NLS files which correspond with the appropriate IBM CCSID numbers. The OLE DB Provider for DB2, as well as Microsoft ODBC Driver for DB2, pass the corresponding IBM CCSID to the DB2 system at run time even though you configure the provider or driver to use the Microsoft NLS number.

These are the only EBCDIC pages currently supported by the OLE DB Provider for DB2 in Host Integration Server 2004. IBM supports additional EBCDIC pages. However, the EBCDIC code pages listed in the preceding table are the only cases where the Microsoft NLS pages and IBM EBCDIC code pages (CCSIDs) match.

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ISO Code Page Support Using the OLE DB Provider for DB2

IBM DB2 Universal Database for Windows NT and IBM DB2 Universal Database for AIX are frequently configured for an ISO code page, for example ISO 819 (Latin I). Host Integration Server 2004 includes support for some ISO code pages for purposes of ISO-to-UNICODE-to-ANSI, ANSI-to-UNICODE-to-ISO, and ISO-to-UNICODE-to-ISO conversions when using the OLE DB Provider for DB2 or the ODBC Driver for DB2.

The following table shows the ISO character code set identifiers (CCSIDs) supported by OLE DB Provider for DB2 in Host Integration Server 2004.

Microsoft display name	Microsoft NLS code page	IBM CCSID	Comments
ISO 8859-1 Latin 1	28591	819	None.
ISO 8859-2 Central Europe	28592	912	None.
ISO 8859-5 Cyrillic	28595	915	None.
ISO 8859-6 Arabic	28596	1089	None.
ISO 8859-7 Greek	28597	813	None.
ISO 8859-8 Hebrew	28598	916	None.
ISO 8859-9 Turkish	28599	920	None.
ISO 6937 Non-Spacing Accent	20269	819	Note that ISO 6937 (CCSID 20269) is not supported by the OLE DB Provider for DB2, but is displayed in the list of configuration options when creating or modifying data sources.
ISO 8859-15 Latin 9 (Euro)	20865	923	NLS Code Page 819 with support for the euro.

The Microsoft National Language Support (NLS) code page column represents the code page number that is registered and associated with an ISO-to-UNICODE NLS resource file. The Microsoft NLS number should be set as the Host CCSID when configuring data sources when using the OLE DB Provider for DB2. When setting the Host CCSID or PC Code Page attribute or property using a connection string, use the Microsoft NLS number for this parameter.

The IBM CCSID column represents the CCSID given to the ISO code page in IBM publications. IBM lists their ISO support in publications by referencing the locale name (Bulgaria for ISO8859-5 and 915, for example) rather than using ISO 8859-5 Cyrillic as used by Microsoft. The OLE DB Provider for DB2 does not recognize or display the IBM CCSID values when configuring data sources using data links. The OLE DB Provider for DB2 maps the Microsoft NLS numbers to ISO NLS files which correspond with the appropriate IBM CCSID numbers. The OLE DB Provider for DB2, as well as Microsoft ODBC Driver for DB2, pass the corresponding IBM CCSID to the DB2 system at run time even though you configure the provider or driver to use the Microsoft NLS number.

Note that IBM CCSID 819 is associated with both ISO 8859-1 Latin 1 and ISO 6937 Non-Spacing Accent. It is up to you to choose the standard ISO 8859-1 Latin 1 code page by selecting NLS code page 28591 or the modified code page ISO 6937 Non-Spacing Accent by selecting NLS code page 20269. Note that ISO 6937 Non-Spacing Accent (CCSID 20269) is not currently supported by the OLE DB Provider for DB2, but is displayed in the configuration options when creating or modifying data sources.

IBM CCSID 916 (ISO 8859-8) supports Hebrew visual sort order. IBM CCSID 920 (ISO 8859-8 derivation) supports Hebrew logical sort order. Microsoft supports the logical sort order with NLS 38598.

The OLE DB Provider for DB2 has not been tested using the ISO 8859-8 derivation matching IBM CCSID 920 and does not support this configuration.

These are the only ISO pages currently supported in Host Integration Server 2004. Microsoft supports a number of additional ISO pages. IBM also supports additional ISO pages. However, the code pages listed in the preceding table re the only cases where the Microsoft NLS pages and IBM CCSIDs match.

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DBCS Code Page Support Using the OLE DB Provider for DB2

The OLE DB Provider for DB2 supports Double-Byte Character String (DBCS) data, including conversions between DBCS and ANSI code pages. Conversions between DBCS and ISO code pages are also supported, as are positioned updates against DBCS EBCDIC implementations of DB2.

The DB2 GRAPHIC data types (GRAPHIC, VARGRAPHIC, and LONG VARGRAPHIC) are now explicitly supported. These DB2 data types support DBCS (not mixed) data. Mixed data types are supported using CHAR FOR MIXED DATA, VARCHAR FOR MIXED DATA, and LONGVARCHAR FOR MIXED DATA.

Parameterized SQL statements and calling stored procedures when the parameter values contain mixed or DBCS characters are supported.

When performing a SQL statement with inline data, character strings can be prefixed with a ‘G’ or ‘g’ to denote that the data is DBCS and is to be used with a graphic column. Only double-byte characters can be used with a graphic column. For example:

```
CREATE TABLE NAMES (COL1 GRAPHIC(64), COL2 CHAR(64))
INSERT INTO NAMES (COL1, COL2) VALUES (G’DBCS data’, ‘MBCS or SBCS data’)
```

The prefixes ‘n’ (graphic) and ‘gx’ (hexadecimal graphic) are also supported.

Data Conversion Using the OLE DB Provider for DB2

The design of the OLE DB application programming interfaces (APIs) is similar to the APIs provided by ODBC and other ISAM APIs. The APIs are handle-based. After opening a file, the application can determine the buffer size required to store a row, use the cursor APIs to move, and optionally retrieve one or more rows of data using the row-level binding.

Data is converted to default C data types as defined in ODBC and OLE DB illustrated in the following table.

DB2 data type	**Default C data type**	**Comments**
BIGINT	Not applicable.	An 8-byte integer. This data type is converted to DBTYPE_I8 for use by OLE DB. This data type is supported on DB2 UDB only.
BLOB	Not applicable.	A Binary Large Object (BLOB) is a varying-length string that can be up to 2 gigabytes in length. A BLOB is primarily intended to hold binary data. This data type is converted to a DBTYPE_STR for use by OLE DB. This data type is not supported by the OLE DB Provider for DB2.
CHAR (Bit)	char string[]	A fixed length string. This data type is converted to a DBTYPE_BSTR for use by OLE DB.
CHAR (SBCS)	char string[]	A fixed-length SBCS character string. This data type is converted to a DBTYPE_BSTR for use by OLE DB.
CHAR (Mixed Data)	char string[]	A fixed-length mixed character string. This data type is converted to a DBTYPE_BSTR for use by OLE DB.
CLOB	Not applicable.	A Character Large Object (CLOB) is a varying-length string that can be up to 2 gigabytes in length. A CLOB is used to store large single-byte character set data. A CLOB is considered to be a character string. This data type is converted to a DBTYPE_STR for use by OLE DB. This data type is not supported by the OLE DB Provider for DB2.
DATE	date struct	A 10-byte date string. This data type is converted to a DBTYPE_DATE for use by OLE DB.
DEC	unsigned char number[]	A packed decimal number. This data type is converted to a DBTYPE_DECIMAL for use by OLE DB.
DOUBLE	double	An 8-byte double-precision floating point number. This data type is converted to a DBTYPE_R8 for use by OLE DB.
FLOAT	double	An 8-byte double-precision floating point number. This data type is the same as a DOUBLE. This data type is converted to a DBTYPE_R8 for use by OLE DB.
GRAPHIC (DBCS)	unsigned char binary[]	A fixed-length graphic string consisting of a sequence of double byte character string (DBCS) data. This data type is converted to a DBTYPE_WSTR for use by OLE DB.
INTEGER	int	A 4-byte integer ranging in value from -2,147,463,648 to +2,147,483,647. This data type is converted to a DBTYPE_I4 for use by OLE DB.
LONG VARCHAR (Bit)	char string[]	A varying-length character string up to 32,740 characters in length. This data type is converted to a DBTYPE_STR for use by OLE DB.

LONG VARCHAR (SBCS)	char string[]	A varying-length SBCS character string up to 32,740 characters in length. This data type is converted to a DBTYPE_STR for use by OLE DB.
LONG VARCHAR (Mixed)	char string[]	A varying-length mixed-character string. This data type is converted to a DBTYPE_STR for use by OLE DB.
LONG VARGRAPHIC (DBCS)	unsigned char binary[]	A varying-length graphic string consisting of a sequence of double byte character string (DBCS) data ranging up to 16,383 DBCS characters in length. This data type is converted to a DBTYPE_WSTR for use by OLE DB.
SMALLINT	short	A SMALLINT (small integer) is a two-byte integer with a precision of 5 digits ranging from -32,768 to +32,767. This data type is converted to a DBTYPE_I2 for use by OLE DB.
REAL	float	A 4-byte single-precision floating point number. This data type is converted to a DBTYPE_R4 for use by OLE DB.
TIME	time struct	An 8-byte time string. This data type is converted to a DBTYPE_TIME for use by OLE DB. When using ActiveX Data Objects to return data from a DB2 TIME data type, ADO returns a DATETIME value.
TIMESTAMP	timestamp struct	A 26-byte string representing the date, time, and microseconds. This data type is converted to a DBTYPE_DBTIMESTAMP for use by OLE DB.
VARCHAR (Bit)	char string[]	A varying-length character string. The maximum length of the string is dependent on the version and the platform that DB2 is running on. This data type is converted to a DBTYPE_STR for use by OLE DB.
VARCHAR (SBCS)	char string[]	A varying-length character string. The maximum length of the string is dependent on the version and the platform that DB2 is running on. This data type is converted to a DBTYPE_STR for use by OLE DB.
VARCHAR (Mixed)	char string[]	A varying-length character string. The maximum length of the string is dependent on the version and the platform that DB2 is running on. This data type is converted to a DBTYPE_STR for use by OLE DB.
VARGRAPHIC (DBCS)	unsigned char binary[]	A varying-length graphic string consisting of a sequence of double byte character string (DBCS) data. The maximum length of the string is dependent on the version and the platform that DB2 is running on. This data type is converted to a DBTYPE_WSTR for use by OLE DB.

Note that the maximum length of fixed-length CHAR, fixed-length GRAPHIC, VARCHAR, and VARGRAPHIC data types is dependent on the version of DB2 that is being accessed. For example, the maximum length of the CHAR data type on DB2 for OS/390 is 254 characters, while the maximum length of this same host data type is 32,765 on DB2/400.

Data conversions from a large numeric type to a small numeric type are supported (from DOUBLE to SINGLE and from INT to SMALLINT, for example). However, truncation and conversion errors can occur that will not be reported by the OLE DB Provider for DB2.

Using the OLE DB Provider for DB2, certain conversions of strings from EBCDIC to ASCII and then back to EBCDIC are asymmetric, and can result in strings that are different from the original. The EBCDIC specification contains ordinals for which there is no defined character. The OLE DB Provider for DB2 translates all such undefined characters to the question mark character (?). So when ASCII strings containing these characters are converted back to EBCDIC, these undefined characters will be replaced with question marks. To protect EBCDIC strings containing undefined characters, these fields should be tagged as binary strings and mapped by the application.

The ANSI to EBCDIC character conversions affected include the following.

Character value (decimal)	Character value (hexadecimal)	ANSI code page 1252	EBCDIC character after conversion to CCSID 37
128	0x80	Not used	?
130	0x82	Single low quote	?
131	0x83	Latin F with hook	?
132	0x84	Double low quote	?
133	0x85	Ellipsis	?
134	0x86	Dagger	?
135	0x87	Double dagger	?
136	0x88	Per mile	?
137	0x89	S with caron	?
138	0x8A	Left angle	?
139	0x8B	Ligature OE	?
140	0x8C	Not used	?
142	0x8E	Not used	?
145-156	0x91-0x9C		?
158-159	0x9E-0x9F		?

Floating Point Considerations Using the OLE DB Provider for DB2

When real or double (synonymous with float) data is inserted into a DB2 table as a floating point data type, it is stored in scientific notation. For example, FLOAT(1.1) would be stored as +1.10000E+000.

Care must be taken when executing SQL statements to make sure that the proper data type specified in the SQL statement matches the values stored in DB2. For example, the following select statement would match values in DB2 stored as decimal 1.1.

```
SELECT * FROM TEST WHERE C1 = 1.1
```

If the data in DB2 was stored as real numbers, there would not be a match because decimal 1.1 is stored as 1.1, not the representation of +1.10000E+000. When DB2 parses and executes the SQL select statement, it interprets 1.1 as a decimal type. When doing the select query, DB2 does not implicitly do the conversion to floating point. In this case, the SQL statement should explicitly typecast the 1.1 so that DB2 looks for the correct format (the scientific notation format). The select query would look like the following:

```
SELECT * FROM TEST WHERE C1 = REAL(1.1)
```

This will give the results expected. The SQL REAL function will convert the decimal 1.1 to the proper format before DB2 executes the actual select.

Usernames and Passwords Using the OLE DB Provider for DB2

When connecting to remote DB2 systems, most users must be authenticated by the remote system by passing a valid user ID and password.

The AS/400 computer is case-sensitive with regard to user ID and password. The AS/400 only accepts a user ID and password in uppercase. The Microsoft OLE DB Provider for DB2 will force the user ID and password into uppercase when it knows that it is connecting to a DB2/400 system.

The mainframe is not case-sensitive. This means that on mainframe computers, one can enter the user ID and password in any case.

DB2 Universal Database (UDB) for Windows NT is case-sensitive. UDB supports mixed-case passwords. The user must enter the password in the correct mixed case. When entering a user ID, use only the Windows NT user name and do not include the Windows NT domain name.

Two-Phase Commit over TCP/IP Support for the OLE DB Provider for DB2

Two-phase commit (2PC) is a host server-installed protocol that ensures that updates to multiple instances of a database on a network will either succeed or fail in their entirety. Host Integration Server 2004 supports 2PC over TCP/IP, allowing you to gain the security of a 2PC connection over the Internet.

Host Integration Server supports 2PC using three components: the DTC, the Resync Service, and the transaction log. The DTC governs the normal DTC transaction flow: enlist, prepare, commit, and abort. The Resync Service coordinates transaction recovery in case of any failure or disconnection, while the transaction log maintains a log of information that is needed in case of recovery.

You can perform a 2PC transaction with the OLE DB Provider for DB2 using the **ITransactionJoin** interface. However, you may need to configure your 2PC connection using tools such as the OLE DB data links tool.

Troubleshooting the OLE DB Provider for DB2

The Windows Server 2003 and Windows 2000 Event Viewer can be a useful tool for troubleshooting data access in some cases. The OLE DB Provider for DB2 does not issue events. However, when SNA (APPC/LU 6.2) is used for the network transport for the OLE DB Provider for DB2, the low-level SNA APPC transport issues events on the SNA connection.

The Microsoft OLE DB Provider for DB2 supplied with Host Integration Server 2004 has the ability to trace DRDA data flows when used over TCP/IP.

This DB2 tracing capability is accessible from the DB2 Network Library inside the Trace utility. This facility will show the same data as an APPC trace but without the control indicators (for example, What_Received). Socket errors are traced and the error codes can be looked up in Winsock2.h supplied with the platform software development kit (SDK).

The OLE DB Provider for DB2 can return the following types of errors:

- DB2 SQL errors from the remote database
- Microsoft OLE DB Provider-specific errors
- Errors from the underlying DRDA application requester network client

When the OLE DB Provider for DB2 passes an error code, the best source in which to look up the meaning of the return code is often the SQL Reference or SQL Messages and Codes Reference for the target SQL database. In this case, the target database would be one of the DB2 platforms supported by the Microsoft OLE DB Provider for DB2.

The OLE DB Provider for DB2 maintains an internal integer variable named SQLCODE and an internal 5-byte character string variable named SQLSTATE used to check the execution of SQL statements on DB2. SQLCODE is set by DB2 after each SQL statement is executed. DB2 returns the following values for SQLCODE:

- If SQLCODE = 0, execution was successful.
- If SQLCODE > 0, execution was successful with a warning.
- If SQLCODE < 0, execution was not successful.
- SQLCODE = 100, no data was found. For example, a FETCH statement returned no data because the cursor was positioned after the last row of the result table.

SQLSTATE is also set by DB2 after the execution of each SQL statement. Application programs can check the execution of SQL statements by testing SQLSTATE instead of SQLCODE. SQLSTATE provides application programs with common codes for common error conditions. (The values of SQLSTATE are product-specific only if the error or warning is product-specific.) Furthermore, SQLSTATE is designed so that application programs can test for specific errors or classes of errors.

SQLSTATE values consist of a two-character class code value, followed by a three-character subclass code value. The first character of an SQLSTATE value indicates whether the SQL statement was executed successfully or unsuccessfully (equal to or not equal to zero, respectively). Class code values represent classes of successful and unsuccessful execution conditions. The following SQLSTATE class codes are used by DB2.

Class Code	**Description of Error Class**
00	Successful completion (execution of the SQL statement was successful and did not result in any type of warning or exception condition)
01	Warning
02	No data
07	Dynamic SQL error
08	Connection exception
0A	Feature not supported
0F	Invalid token
21	Cardinality violation
22	Data exception
23	Constraint violation
24	Invalid cursor state
25	Invalid transaction state
26	Invalid SQL statement identifier
2D	Invalid transaction termination
34	Invalid cursor name

39	External function call exception
40	Transaction rollback
42	Syntax error or access rule violation
44	WITH CHECK OPTION violation
51	Invalid application state
53	Invalid operand or inconsistent specification
54	SQL or product limit exceeded
55	Object not in prerequisite state
56	Miscellaneous SQL or product error
57	Resource not available or operator intervention
58	System error

The SQLSTATE value of HY000 is defined as a provider-specific error. An SQLSTATE of 08S01 (connection exception with a subclass code of S01) also indicates a provider-specific error. This means the SQLCODE should be looked up in the driver-specific documentation included with the OLE DB Provider for DB2.

If the SQLSTATE does not indicate a driver-specific error when the OLE DB Provider for DB2 passes back an SQLSTATE of 08S01, it indicates a network error. For example, an SQLCODE of -603 is a provider-specific error that is mapped to DB2OLEDB_COMM_HOST_CONNECT_FAILED in the Ddb2oledb.h include file supplied with the OLE DB Provider for DB2. Errors with an SQLSTATE of 08S01 are documented in the Db2oledb.h include file (the SQLCODE value), which is located on the Host Integration Server 2004 CD in the SDK\Include subdirectory.

The following steps are useful in researching an error. Start by reading the provided error text returned by the OLE DB Provider for DB2. In some cases, the error text provides limited useful information. For example, error text from an SQLCODE of -603 states the following:

```
Test connection failed because of an error in initializing provider.
Could not connect to specified host.
```

The next step is to lookup the SQLSTATE to determine the source of the error. Is the error a DB2 error, a network client error, or an OLE DB provider error? An SQLSTATE of 08S01 is defined as follows:

```
Communication link failure.
```

This definition is intended to inform the user, administrator, or developer that the error is one related to the OLE DB provider's underlying network client.

Unfortunately, many of the SQLSTATE codes returned by the OLE DB Provider for DB2 are DB2 errors and are not documented in the OLE DB Provider for DB2 Help.

The SQLSTATE of HY000 is defined as a provider-specific error. An SQLSTATE of 08S01 also indicates a provider-specific error. This means the SQLCODE should be looked up in the provider-specific documentation included with the OLE DB Provider for DB2.

If the SQLSTATE does not indicate a driver-specific error, the SQLCODE should be looked up in the appropriate DB2 manual for the target platform. For example, an SQLCODE of -603 is documented in Appendix B, "SQLCODEs and SQLSTATEs," in the *AS/400 Advanced Series DB2 for AS/400 SQL Programming, Version 4*, Document Number SC41-5611-00 published by IBM. An SQLCODE of -603 corresponds to SQLSTATE 23515 in the DB2 for OS/400 error code list. For example, the explanation for this SQLCODE is as follows:

```
Unique index cannot be created because of duplicate keys.
```

When the SQLSTATE and the SQLCODE definitions documented in these appendices create a mismatch with the actual errors returned, this usually indicates a provider-specific error condition.

A final step to understand an error is to check the Db2oledb.h file. This file is not installed by the Host Integration Server or Host Integration Client Setup program, but can be found on the Host Integration Server 2004 product CD in the SDK\Include subdirectory. An SQLCODE (for example, -603) can be looked up by searching the right-most column of the Db2oledb.h file for a value near to 603. In this case, one will see a comment "/* -600 */" and can then count down three additional lines to line number 603. The internal error code -603 is defined as follows:

```
DB2OLEDB_COMM_HOST_CONNECT_FAILED
```

This particular error usually indicates a problem with the configuration parameters or the connection string passed.

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ADO Object, Method, Property, and Collection Support for AS/400, VSAM and DB2

Microsoft® ActiveX® Data Objects (ADO) version 2.0 defines a number of objects, methods, properties, and collections.

Microsoft OLE DB Provider for AS/400 and VSAM supports the ADO objects, methods, properties, and collections that are appropriate for an OLE DB data provider accessing a non-SQL host file system.

Microsoft OLE DB Provider for DB2 supports the ADO objects, methods, properties, and collections that are appropriate for an OLE DB data provider accessing an SQL database.

Similar support for ODBC can be found in the topic ADO Object Support in the ODBC Driver for DB2.

This section contains:

- ADO Object Support in the OLE DB Provider for AS/400 and VSAM
- ADO Object Support in the OLE DB Provider for DB2

ADO Object Support in the OLE DB Provider for AS/400 and VSAM

The following table summarizes the Microsoft® ActiveX® Data Objects (ADO) version 2.0 objects that the current version of Microsoft OLE DB Provider for AS/400 and VSAM supports.

ADO object	Support
Collection	Yes, most methods
Command Object	Yes, some methods, some properties, and all collections
Connection Object	Yes, some methods, some properties, and all collections
Error Object	Yes, some properties
Field Object	Yes, all methods, properties, and collections
Parameter Object	No
Recordset Object	Yes, most methods, most properties, and all collections

This section contains:

- ADO Method Support in the OLE DB Provider for AS/400 and VSAM
- ADO Property Support in the OLE DB Provider for AS/400 and VSAM
- ADO Collection Support in the OLE DB Provider for AS/400 and VSAM
- Command Object in the OLE DB Provider for AS/400 and VSAM (ADO)
- Connection Object in the OLE DB Provider for AS/400 and VSAM (ADO)
- Error Object in the OLE DB Provider for AS/400 and VSAM (ADO)
- Field Object in the OLE DB Provider for AS/400 and VSAM (ADO)
- Recordset Object in the OLE DB Provider for AS/400 and VSAM (ADO)

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ADO Method Support in the OLE DB Provider for AS/400 and VSAM

The following table summarizes the ActiveX® Data Objects (ADO) version 2.0 object methods that the current version of Microsoft OLE DB Provider for AS/400 and VSAM supports.

ADO object	Method	Support
Collection object	**Append** Method	No
	Clear Method	Yes
	Delete Method	Yes
	Item Method	Yes
	Refresh Method	Yes
Command Object	**CreateParameter** Method	No
	Cancel Method	No
	Execute Method	Yes, but options must be **adCmdText**
Connection Object	**BeginTrans** Method	No
	Cancel Method	No
	Close Method	Yes
	CommitTrans Method	No
	Execute Method	Yes, but options must be **adCmdText**
	Open Method	Yes
	OpenSchema Method	Yes
	RollbackTrans Method	No
Field Object	AppendChunk Method	Yes
	GetChunk Method	Yes
	ReadFromFile Method	No
	WriteToFile Method	No
Parameter Method	**AppendChunk** Method	No
Recordset Object	AddNew Method	Yes
	Cancel Method	No
	CancelBatch Method	Yes
	CancelUpdate Method	Yes
	Clone Method	Yes
	Close Method	Yes
	Delete Method	Yes
	Find Method	Yes
	GetRows Method	Yes
	Move Method	Yes
	MoveFirst Method	Yes
	MoveLast Method	Yes
	MoveNext Method	Yes
	MovePrevious Method	Yes
	NextRecordset Method	No
	Open Method	Yes
	Requery Method	Yes
	Resync Method	No
	Save Method	Yes
	Seek Method	No
	Supports Method	Yes
	Update Method	Yes
	UpdateBatch Method	Yes

Note The **Collection** object is a special case, representing a collection of other ADO objects. These collection objects support several methods:

- **Append** to add an object to a collection
- **Clear** to empty all objects from a collection
- **Delete** to remove a single object from a collection
- **Item** to return a specific member object of a collection by name or ordinal number
- **Refresh** to update the objects in a collection to reflect objects available from and specific to the OLE DB provider

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ADO Property Support in the OLE DB Provider for AS/400 and VSAM

The following table summarizes the ActiveX® Data Objects (ADO) version 2.0 object properties that the current version of Microsoft OLE DB Provider for AS/400 and VSAM supports.

ADO object	Property	Support
Command Object	ActiveConnection Property	Yes
	CommandText Property	Yes
	CommandTimeout Property	No
	CommandType Property	Yes
	Prepared Property	No
	State Property	Yes
Connection Object	Attributes Property	Yes
	CommandTimeout Property	No
	ConnectionString Property	Yes
	ConnectionTimeout Property	No
	CursorLocation Property	Yes
	DefaultDatabase Property	No
	IsolationLevel Property	No
	Mode Property	Yes
	Provider Property	Yes
	State Property	Yes
	Version Property	Yes
Error Object	Description Property	Yes
	HelpContext Property	No
	HelpFile Property	No
	NativeError Property	Yes
	Number Property	Yes
	Source Property	Yes
	SQLState Property	No
Field Object	ActualSize Property	Yes
	Attributes Property	Yes
	DataFormat Property	No
	DefinedSize Property	Yes
	Name Property	Yes
	NumericScale Property	Yes
	OriginalValue Property	Yes
	Precision Property	Yes
	Type Property	Yes
	UnderlyingValue Property	Yes
	Value Property	Yes
Parameter Object	**Attributes** Property	No
	Direction Property	No
	Name Property	No
	NumericScale Property	No
	Precision Property	No
	Size Property	No
	Type Property	No
	Value Property	No
Recordset Object	**AbsolutePage** Property	No
	AbsolutePosition Property	No
	ActiveCommand Property	Yes

	ActiveConnection Property	Yes
	BOF Property	Yes
	Bookmark Property	Yes
	CacheSize Property	Yes
	CursorLocation Property	Yes
	CursorType Property	Yes
	DataMember Property	No
	DataSource Property	No
	EditMode Property	Yes
	EOF Property	Yes
	Filter Property	Yes
	Index Property	No
	LockType Property	Yes
	MarshalOptions Property	No
	MaxRecords Property	No
	PageCount Property	No
	PageSize Property	No
	RecordCount Property	No
	Sort Property	Yes
	Source Property	Yes
	State Property	Yes
	Status Property	Yes
	StayInSync Property	No

ADO Collection Support in the OLE DB Provider for AS/400 and VSAM

The following table summarizes the ActiveX® Data Objects (ADO) version 2.0 object collections that the current version of Microsoft OLE DB Provider for AS/400 and VSAM supports.

ADO object	Collection	Support
Command Object	**Parameters**	No
	Properties	Yes
Connection Object	**Errors**	Yes
	Properties	Yes
Field Object	**Properties**	Yes
Parameter	**Properties**	No
Recordset Object	**Fields**	Yes
	Properties	Yes

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Command Object in the OLE DB Provider for AS/400 and VSAM (ADO)

The ActiveX® Data Objects (ADO) **Command** object is a definition of a specific command that is executed against an OLE DB data source.

You use **Command** objects to create a **Recordset** object and obtain records, execute a bulk operation, or manipulate the structure of a database. When using Microsoft OLE DB Provider for AS/400 and VSAM, some collections, methods, or properties of a **Command** object may generate an error when called.

The primary purpose of the **Command** object in the context of OLE DB Provider for AS/400 and VSAM is to issue AS/400 command language (CL) commands for execution by the remote OS/400 DDM target server. For a listing of legal distributed data management (DDM) command-line strings, see *AS/400 DDM User's Guide* published by IBM.

The following table lists the **Command** object methods, properties, and collections that the current version of OLE DB Provider for AS/400 and VSAM supports.

Name	**Comment**
Execute Method	Evaluates command text as a text string. (The only supported *Options* parameter for this method is **adCmdText**, which indicates that this is not an SQL command.)
ActiveConnection Property	Sets or returns the information used to establish a connection to a data source. (For more information, see the notes that follow.)
CommandText Property	Sets or returns the command text to be executed.
CommandType Property	Sets or returns the type of command in a **CommandText** property.
State Property	Describes the current state of an object.
Properties collection	Collections of properties on the command.

The **Execute** method executes a command and returns a **Recordset** object, if appropriate. You can use the **Command** object to open tables or execute DDM commands on a remote DDM server. If errors occur, they can be examined with the **Errors** collection on the **Connection** object.

A **Command** object can be created independently of a previously defined **Connection** object by setting the **ActiveConnection** property of the Command object to a valid connection string. ADO still creates a **Connection** object, but it does not assign that object to an object variable. However, if multiple **Command** objects are to be associated with the same connection, the **Connection** object needs to be explicitly created and opened. This assigns the **Connection** object to an object variable. If the **ActiveConnection** property of the **Command** object is not set to this object variable, ADO creates a new **Connection** object for each **Command** object, even if the same connection string is used.

The **ActiveConnection** property associates an open connection with a **Command** object. The **CommandText** property defines the text version of a command. The syntax for the string in the **CommandText** property when used with OLE DB Provider for AS/400 and VSAM is as follows:

```
EXEC COMMAND DDMCmd
```

Where **DDMCmd** represents a valid OS/400 control language (CL) command. Note that only OS/400 CL commands are supported. These commands enable you to request functions from the OS/400 operating system. Some examples are the **DLTF** (Delete File) or **DSPFFD** (Display File Description) commands. These are the same commands that you could type at the command prompt if you were connected to an AS/400 computer through a 5250 terminal session. For a detailed list of possible commands, see the OS/400 CL Reference for your platform.

The **CommandType** property specifies the type of command described in the **CommandText** property prior to execution to optimize performance. The **CommandType** property must be set to **adCmdText** for use with OLE DB Provider for AS/400 and VSAM.

You can also use the **Command** object to open a data file after a **Connection** object has been opened and the **ActiveConnection** property has been set to this open connection. The **CommandText** property defines the data file to open (an **EXEC OPEN *DataSetName*** statement, for example, where *DataSetName* represents a valid data file or library member on the host). You must set the **CommandType** property to **adCmdText** for use with OLE DB Provider for AS/400 and VSAM. If you open a host data file from a **Command** object, the data file is opened as read-only. This results from the limitation that no argument or option is passed by ADO that supplies a parameter describing whether the data set should be opened as read-only or updateable.

Connection Object in the OLE DB Provider for AS/400 and VSAM (ADO)

The ActiveX Data Objects (ADO) **Connection** object represents an open connection to an OLE DB data source. The **Provider** property sets the OLE DB provider. You can configure the connection before opening the data source by setting the **ConnectionString** properties. The **Version** property determines the version of the ADO implementation in use.

The **Open** method establishes the physical connection to the data source and the **Close** method terminates the connection. If errors occur, you can examine them with the **Errors** collection.

The following table lists the methods, properties, and collections for the **Connection** object that the current version of Microsoft OLE DB Provider for AS/400 and VSAM supports.

Name	**Comment**
Close Method	Closes a connection to a data source.
Execute Method	Evaluates command text as a table name. (The only supported *Options* parameter for this method is **adCmdTable**.)
Open Method	Opens a connection to a data source and may optionally pass **ConnectionString** parameters with this method. (The only supported *Options* parameter for this method is **adCmdText**.)
OpenSchema Method	Obtains database schema information from the OLE DB provider.
Attributes Method	Indicates one or more characteristics supported for a given **Connection** object.
ConnectionString Property	Contains the information used to establish a connection to a data source. (For more information, see the note that follows.)
CursorLocation property	Sets or returns the location of the cursor (whether the cursor is on the client or the server side).
Mode Property	Indicates the available permissions for modifying data in a connection.
Provider Property	Sets or returns the name of the provider for a connection.
State Property	Describes the current state of an object.
Version Property	Returns the version number of the ADO implementation in use.
Errors collection	Collections of **Error** objects on the connection.
Properties collection	Collections of properties on the connection.

Note that the information needed to establish a connection to a data source can be set in the **ConnectionString** property or passed as part of the **Open** method. In either case, this information must be in a specific format for use with OLE DB Provider for AS/400 and VSAM or OLE DB Provider for DB2. This information is either a data source name (DSN) or a detailed connection string containing a series of *argument=value* statements separated by semicolons.

ADO supports several standard ADO-defined arguments for the **ConnectionString** property, as listed in the following table.

Argument	**Description**
Data Source	Name of the data source for the connection. This argument is optional when using OLE DB Provider for AS/400 and VSAM.
File Name	Name of the provider-specific file containing preset connection information. This argument cannot be used if a *Provider* argument is passed and is not supported by OLE DB Provider for AS/400 and VSAM.
Location	The remote database name used for connecting to OS/400 systems. This parameter is optional when connecting to mainframe systems.
Password	Valid mainframe or AS/400 password to use when opening the connection. Host Integration Server 2004 uses this password to validate that the user can log on to the target host system and has appropriate access rights to the file.
Provider	Name of the provider to use for the connection. To use OLE DB Provider for AS/400 and VSAM, the Provider string must be set to "SNAOLEDB." To use OLE DB Provider for DB2, the Provider string must be set to "DB2OLEDB."
User ID	Valid mainframe or AS/400 user name to use when opening the connection. Host Integration Server 2004 uses this user name to validate that the user can log on to the target host system and has appropriate access rights to the file.

OLE DB Provider for AS/400 and VSAM also supports a number of provider-specific arguments, some of which default to values in the registry. The following table lists these arguments.

Argument	**Description**
BinAsChar	This parameter indicates whether to process binary fields as character fields. (The default is 0; do not process binary fields as character fields.) This parameter is equivalent to the DBPROP_SNAOLEDB_BINASCHAR OLE DB property ID.
CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If you omit this argument, the default value is U.S./Canada (37). This parameter is equivalent to the DBPROP_SNAOLEDB_HOSTCCSID OLE DB property ID.
Default Library	The default AS/400 library to be accessed. This parameter is not required for mainframe access and is optional when connecting to AS/400 files. This parameter is equivalent to the DBPROP_SNAOLEDB_LIBRARY OLE DB property ID.
HCD File Name	The fully qualified file name of the distributed data management (DDM) Host Column Description (HCD) file. This parameter can be a UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the Host Integration Server 2004 system directory. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400. This parameter is equivalent to the DBPROP_SNAOLEDB_HCDPATH OLE DB property ID.
LocalLU	The name of the local logical unit (LU) alias configured in the SNA server. This parameter is equivalent to the DBPROP_SNAOLEDB_LOCALLU OLE DB property ID.
ModeName	The Advanced Program-to-Program Communications (APPC) mode must be set to a value that matches the host configuration and Host Integration Server 2004 configuration. Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes. This parameter is equivalent to the DBPROP_SNAOLEDB_APPCMODE OLE DB property ID.
NetAddr	When you select TCP/IP for the Network Transport Library (NTL), this parameter indicates the IP address of the host. This parameter is equivalent to the DBPROP_SNAOLEDB_NETADDRESS OLE DB property ID.
NetPort	When you select TCP/IP for the NTL, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446. This parameter is equivalent to the DBPROP_SNAOLEDB_NETPORT OLE DB property ID.
NetLib	This parameter determines whether you use TCP/IP or SNA APPC for network communication. The possible values for this parameter are TCPIP or SNA. The default value is SNA. This parameter is equivalent to the DBPROP_SNAOLEDB_NETTYPE OLE DB property ID.
PCCodePage	The character code page to use on the computer. If you omit this argument, the default value is set to Latin 1 (1252). This parameter is equivalent to the DBPROP_SNAOLEDB_PCCODEPAGE OLE DB property ID.
RDB	The remote database name for OS/400. You only need to specify this value if it is different from the remote LU alias configured in the SNA server.
RepairHostKeys	This parameter indicates whether the OLE DB provider should repair any host key values set in the registry, The default is **false**. This parameter is equivalent to the DBPROP_SNAOLEDB_REPAIRKEY OLE DB property ID.
RemoteLU	The name of the remote logical unit (LU) alias configured in the Host Integration Server 2004 computer. This parameter is equivalent to the DBPROP_SNAOLEDB_REMOTELU OLE DB property ID.

StrictVal	This parameter indicates whether strict validation should be used. The default is **false**. This parameter is equivalent to the DBPROP_SNAOLEDB_STRICTVAL OLE DB property ID.

A sample **ConnectionString** for use with OLE DB Provider for AS/400 and VSAM is as follows:

```
Conn.Provider="SNAOLEDB"
Conn.ConnectionString = "User ID=USERNAME;Password=password",&_
  "LocalLU=LOCAL;RemoteLU=DATABASE",&_
  "ModeName=QPCSUPP;CCSID=37;PCCodePage=437"
Conn.Properties("PROMPT")=adPromptNever
Conn.Open
```

> **Note** The &_ character combination is used for continuing long lines in Visual Basic®.

When opening a connection object in ADO 2.0, you must specify the **Prompt** connection property. For example, the following is valid with ADO 1.5 and ADO 2.0 and prompts the user for **ConnectionString** properties:

```
Conn.ConnectionString = "Provider=SNAOLEDB
Conn.Properties("PROMPT")=adPromptAlways
Conn.Open
```

A sample **Open** method call with these parameters is as follows:

```
RS.Open "library/member",Conn,2,1,1
```

The last three parameters to the **Open** method correspond with the *CursorType* (for example, the **adOpenDynamic** enum is 2), *LockType* (for example, the **adLockReadOnly** enum is 1), and *Options* (**adCmdText** is 1, which indicates that the source name should be evaluated as a table name). The *Options* parameter must be set to **adCmdText** (1) when used with a data source name with OLE DB Provider for AS/400 and VSAM.

The allowable values for CCSID when using SNA National Language Support (SNANLS) for character code conversions (the default) are listed in the following table.

EBCDIC character set	CCSID value
Arabic	20420
Binary (No Conversion)	65535
Chinese (Simplified)	935
Chinese (Traditional)	937
Cyrillic (Russian)	20880
Cyrillic (Serbian, Bulgarian)	21025
Denmark/Norway (Euro)	1142
Denmark/Norway	20277
Finland/Sweden (Euro)	1143
Finland/Sweden	20278
France (Euro)	1147
France	20297
Germany (Euro)	1141
Germany	20273
Greek (Modern)	875
Greek	20423
Hebrew	20424
Icelandic (Euro)	1149
Icelandic	20871
International (Euro)	1148
International	500
Italy (Euro)	1144

Italy	20280
Japanese (English-lower)	931
Japanese (Extend English)	939
Japanese (Extend Katakana)	930
Japanese (Katakana)	290
Japanese (Katakana-Kanji)	5026
Japanese (Latin-Kanji)	5035
Korean	933
Latin America/Spain (Euro)	1145
Latin America/Spain	20284
Latin-1 Open System (Euro)	20924
Latin-1 Open System	1047
Multilingual/ROECE (Latin-2)	870
Thai	20838
Turkish (Latin-5)	1026
Turkish	20905
U.S./Canada (Euro)	1140
U.S./Canada	37
United Kingdom (Euro)	1146
United Kingdom	20285

> **Note** SNANLS conversion uses the locale configured for the data sources using data links. For more information on SNANLS, see SNA National Language Support Programmer's Guide.

Error Object in the OLE DB Provider for AS/400 and VSAM (ADO)

The ActiveX Data Objects (ADO) **Error** object contains details about data access errors pertaining to a single operation involving ADO. You can read the properties of an **Error** object to obtain specific details about each error.

The **Error** object does not support any methods or collections. However, the **Errors** collection supported by other objects provides the standard **Collection** methods (**Clear** and **Delete**). OLE DB Provider automatically appends **Error** objects to the **Errors** collection when they occur.

The following table lists the **Error** object properties that the current version of Microsoft OLE DB Provider for AS/400 and VSAM supports.

Property Name	**Comment**
Description Property	The text of the error alert that is returned based on the minor error code (specific to OLE DB Provider for AS/400 and VSAM) contained in the **Error** object resulting from an error.
NativeError Property	A **Long** integer value of the error code returned by OLE DB Provider for AS/400 and VSAM.
Number Property	The **Long** integer value of the error constant.
Source Property	A **string** that indicates the name of the object or application that originally generated an error.

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Field Object in the OLE DB Provider for AS/400 and VSAM (ADO)

The ActiveX Data Objects (ADO) **Field** object represents a column of data with a common data type. Each **Field** object corresponds to a column in a **Recordset** object.

The following table lists the **Field** object methods, properties, and collections that the current version of Microsoft OLE DB Provider for AS/400 and VSAM supports.

Name	**Comment**
AppendChunk Method	Appends data to a large text or binary data **Field** object.
GetChunk Method	Returns all or portions of the contents of a large text or binary data **Field** object.
ActualSize Property	Actual length of the value of a field.
Attributes Property	One or more characteristics supported for a given **Field** object.
DefinedSize Property	Defined size of a **Field** object.
Name Property	Name of the **Field** object.
NumericScale Property	Scale of numeric values in a **Field** object for numeric data.
OriginalValue Property	Value of a **Field** object that existed in the record before changes were made.
Precision Property	Degree of precision for numeric values in a **Field** object for numeric data.
Type Property	Operational type or data type for a **Field** object.
UnderlyingValue Property	Current value of a **Field** object.
Value Property	Value assigned to a **Field** object in a **Recordset**.
Properties collection	Collections of properties on the field.

Recordset Object in the OLE DB Provider for AS/400 and VSAM (ADO)

The ActiveX Data Objects (ADO) **Recordset** object represents the entire set of records from a base table. At any time, the **Recordset** object refers to only one record within the set as the current record.

The following table lists the **Recordset** object methods, properties, and collections that the current version of Microsoft OLE DB Provider for AS/400 and VSAM supports.

Name	Comment
AddNew Method	Creates a new record for an updateable **Recordset** object.
CancelBatch Method	Cancels a pending batch update.
CancelUpdate Method	Cancels any changes made to a current record or to a new record prior to calling the **UpdateBatch** method.
Clone Method	Creates a duplicate **Recordset** object from an existing **Recordset** object.
Close Method	Closes an open object and any dependent objects.
Delete Method	Deletes the current record in an open **Recordset** object or an object from a collection.
Find Method	Finds the next record to match a condition (ADO 1.5 and later).
GetRows Method	Retrieves multiple records of a **Recordset** into an array.
Move Method	Moves the position of the current record in a **Recordset** object.
MoveFirst Method	Moves to the first record in a specified **Recordset**.
MoveLast Method	Moves to the last record in a specified **Recordset**.
MoveNext Method	Moves to the next record in a specified **Recordset**.
MovePrevious Method	Moves to the previous record in a specified **Recordset**.
Open Method	Opens a cursor on a **Recordset**.
Requery Method	Updates the data in a **Recordset** object by re-executing the query on which the object is based (equivalent to calling the **Close** and **Open** methods in succession).
Save Method	Saves a **Recordset** in a file or **Stream** object.
Seek method	
Supports Method	Determines whether a specified **Recordset** object supports a particular type of function.
Update Method	Saves any changes you make to the current record of a **Recordset** object.
UpdateBatch Method	Writes all pending batch updates to disk.
ActiveCommand Property	Returns the **Command** object that created the specified **Recordset**.
ActiveConnection Property	Sets or returns the **Connection** object that the specified **Recordset** object currently belongs.
BOF Property	Indicates whether the current record position is before the first record in a **Recordset** object.
Bookmark Property	Returns a bookmark that uniquely identifies the current record in a **Recordset** object or sets the current record in a **Recordset** object identified by a valid bookmark.
CacheSize Property	Sets or returns the number of records from a **Recordset** object that are cached locally in memory.
CursorLocation Property	Sets or returns the location of the cursor (whether the cursor is on the client or the server side).
CursorType Property	Sets or returns the type of cursor used in a **Recordset** object. Only the **adOpenDynamic CursorType** is supported by the current version of OLE DB Provider for AS/400 and VSAM.
EditMode Property	Indicates the editing status of the current record type.
EOF Property	Indicates whether the current record position is after the last record in a **Recordset** object.
Filter Property	Indicates a filter for data in a **Recordset** (revised in ADO 1.5 and later).

LockType Property	Sets or returns the types of locks placed on records during editing. All four lock types (**adLockReadOnly**, **adLockOptimistic**, **adLockPessimistic**, and **adLockBatchOptimistic**) are supported by the OLE DB Provider for AS/400 and VSAM. Note that the OLE DB provider internally maps **adLockPessimistic** to a LockType of **adLockBatchOptimistic**.
Sort Property	Indicates the column names and order to sort data in a **Recordset** object (new property in ADO 1.5 and later).
Source Property	Sets or returns the source (table name or command object) for the data in a **Recordset**.
State Property	Describes the current state of an object.
Status Property	Indicates the status of the current record with respect to batch updates or other bulk operations.
Fields collection	Collections of fields on the **Recordset**.
Properties collection	Collections of properties on the **Recordset**.

The syntax supported by the OLE DB Provider for AS/400 and VSAM to open a recordset (table) using the **Recordset.Open** method is as follows:

```
EXEC OPEN TableName
```

where *TableName* represents one of the host file naming conventions listed in the following table.

Host file type	**File naming convention**
VSAM Data Sets	DATASETNAME.FILENAME
Partitioned Data Sets	DATASETNAME.FILENAME(MEMBER)
OS/400 Files	LIBRARY/FILE
OS/400 Files	LIBRARY/FILE.NAME
OS/400 File Members	LIBRARY/FILE(MEMBER)
OS/400 File Members	LIBRARY/FILE.NAME(MEMBER)

Note that if a member of a library contains a dot in the member name, you must surround the member name with double quotes. For example, if the member name is NAMES.DAT, the proper syntax for command text used for the **Recordset.Open** method is:

```
RecordSet.Open "EXEC OPEN LIBRARY/FILE(""NAMES.DAT"")",...
```

You must specify the full path to the mainframe data set. In the preceding example, there are two path elements (LIBRARY/FILE) and one name element (NAMES.DAT).

Whenever a data set is allocated, it is given a unique name composed of one or more segments. Each segment of the data set name is joined by periods and represents a level of qualification. For example, the following data set has four segments that comprise the fully qualified data set name (three path elements and one name element):

```
SAMPLES.DEMO.KSDS.TITLES
```

The high-level qualifier is SAMPLES. The low-level qualifier is TITLES. Each segment can be from 1 through 8 characters in length. (The first character must be alphabetical, and the remainder can be alphanumeric or hyphens.) The full data set name must be no more than 44 characters in length and contain no more than 22 segments.

The Recordset **Bookmark** method is supported for all AS/400 physical and logical files, as well as the following mainframe file types:

- KSDS if the file has a unique key
- RRDS if the file has a unique key

You can use the Recordset **AddNew** method on Entry-Sequenced Data Sets (ESDS) files on the AS/400 only when you are positioned at the end of the **Recordset** object (file). With Alternate Index files on the AS/400, you can use the **AddNew** method to add records when at the end of the **Recordset** object or by key. With Key-Sequenced Data Sets (KSDS) or Fixed-Length Relative Record Data Sets (RRDS) files on the mainframe, the **AddNew** method adds new records by key.

To use the Recordset **Find** method or the **Filter** property, an AS/400 logical file, an AS/400 keyed physical file, a mainframe KSDS file with a unique key, or a mainframe RRDS file with a unique key must be used. If you use these methods or properties on an AS/400 non-keyed physical file or any other mainframe file type, the method fails.

The Recordset **Sort** property is used with an open **Recordset** object based on an AS/400 physical file. The **Sort** property enables the user to indicate which logical view to apply to an AS/400 physical file. The logical view must be a valid index specified in the description of the AS/400 physical file. The AS/400 logical file provides the logical view. OLE DB Provider for AS/400 and VSAM responds to the **Sort** property request by first closing the open physical file, and then opening the logical file that points back to the data in the physical file.

The **Recordset Sort** property is only supported on AS/400 hosts. If the user opens a **Recordset** object based on an AS/400 logical file, there is probably no need to use **Recordset**.**Sort**. For performance reasons, applications should be written to open the AS/400 logical file first, because the overhead is so much greater when opening a physical file first.

ADO Object Support in the OLE DB Provider for DB2

The following table summarizes the Microsoft® ActiveX® Data Objects (ADO) version 2.0 objects that the current version of Microsoft OLE DB Provider for DB2 supports.

ADO object	**Support**
Collection	Yes, most methods
Command Object	Yes, some methods, some properties, and all collections
Connection Object	Yes, some methods, some properties, and all collections
Error Object	Yes, some properties
Field Object	Yes, no methods, most properties, and all collections
Parameter Object	Yes, most methods, most properties, and all collections
Recordset Object	Yes, most methods, most properties, and all collections

This section contains:

- ADO Method Support in the OLE DB Provider for DB2
- ADO Property Support in the OLE DB Provider for DB2
- ADO Collection Support in the OLE DB Provider for DB2
- Command Object in the OLE DB Provider for DB2 (ADO)
- Connection Object in the OLE DB Provider for DB2 (ADO)
- Error Object in the OLE DB Provider for DB2 (ADO)
- Field Object in the OLE DB Provider for DB2 (ADO)
- Recordset Object in the OLE DB Provider for DB2 (ADO)

ADO Method Support in the OLE DB Provider for DB2

The following table summarizes the ActiveX Data Objects (ADO) version 2.0 object methods that the current version of Microsoft OLE DB Provider for DB2 supports.

ADO object	Method	Support
Collection	**Append**	No
	Clear Method	Yes
	Delete Method	Yes
	Item Method	Yes
	Refresh Method	Yes
Command Object	**CreateParameter** Method	Yes
	Cancel Method	No
	Execute Method	Yes
Connection Object	**BeginTrans** Method	Yes
	Cancel Method	No
	Close Method	Yes
	CommitTrans Method	Yes
	Execute Method	Yes
	Open Method	Yes
	OpenSchema Method	Yes
	RollbackTrans Method	Yes
Field Object	**AppendChunk** Method	No
	GetChunk Method	No
	ReadFromFile Method	No
	WriteToFile Method	No
Parameter Object	**AppendChunk** Method	No
Recordset Object	AddNew Method	Yes
	Cancel Method	No
	CancelBatch Method	Yes
	CancelUpdate Method	Yes
	Clone Method	Yes
	Close Method	Yes
	Delete Method	Yes
	Find Method	No
	GetRows Method	Yes
	Move Method	Yes
	MoveFirst Method	Yes
	MoveLast Method	No
	MoveNext Method	Yes
	MovePrevious Method	No
	NextRecordset Method	No
	Open Method	Yes
	Requery Method	Yes
	Resync Method	No
	Save Method	Yes
	Seek Method	No
	Supports Method	Yes
	Update Method	Yes
	UpdateBatch Method	Yes

Note The **Collection** object is a special case, representing a collection of other ADO objects. These collection objects support several methods:

- **Append** to add an object to a collection

- **Clear** to empty all objects from a collection
- **Delete** to remove a single object from a collection
- **Item** to return a specific member object of a collection by name or ordinal number
- **Refresh** to update the objects in a collection to reflect objects available from and specific to the OLE DB provider

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ADO Property Support in the OLE DB Provider for DB2

The following table summarizes the ActiveX Data Objects (ADO) version 2.0 object properties that the current version of Microsoft OLE DB Provider for DB2 supports.

ADO object	**Property**	**Support**
Command Object	ActiveConnection Property	Yes
	CommandText Property	Yes
	CommandTimeout Property	No
	CommandType Property	Yes
	Prepared Property	Yes
	State Property	Yes
Connection Object	Attributes Property	Yes
	CommandTimeout Property	No
	ConnectionString Property	Yes
	ConnectionTimeout Property	No
	CursorLocation Property	Yes
	DefaultDatabase Property	No
	IsolationLevel Property	Yes
	Mode Property	Yes
	Provider Property	Yes
	State Property	Yes
	Version Property	Yes
Error Object	Description Property	Yes
	HelpContext Property	No
	HelpFile Property	No
	NativeError Property	Yes
	Number Property	Yes
	Source Property	Yes
	SQLState Property	Yes
Field Object	ActualSize Property	Yes
	Attributes Property	Yes
	DataFormat Property	No
	DefinedSize Property	Yes
	Name Property	Yes
	NumericScale Property	Yes
	OriginalValue Property	Yes
	Precision Property	Yes
	Type Property	Yes
	UnderlyingValue Property	Yes
	Value Property	Yes
Parameter Object	**Attributes** Property	Yes
	Direction Property	Yes
	Name Property	Yes
	NumericScale Property	Yes
	Precision Property	Yes
	Size Property	Yes
	Type Property	Yes
	Value Property	Yes
Recordset Object	**AbsolutePage** Property	No
	AbsolutePosition Property	No
	ActiveCommand Property	Yes
	ActiveConnection Property	Yes
	BOF Property	Yes

	Bookmark Property	Yes
	CacheSize Property	Yes
	CursorLocation Property	Yes
	CursorType Property	Yes
	DataMember Property	No
	DataSource Property	No
	EditMode Property	Yes
	EOF Property	Yes
	Filter Property	No
	Index Property	No
	LockType Property	Yes
	MarshalOptions Property	No
	MaxRecords Property	Yes
	PageCount Property	No
	PageSize Property	No
	RecordCount Property	No
	Sort Property	No
	Source Property	Yes
	State Property	Yes
	Status Property	Yes
	StayInSync Property	No

ADO Collection Support in the OLE DB Provider for DB2

The following table summarizes the ActiveX Data Objects (ADO) version 2.0 object collections that Microsoft OLE DB Provider for DB2 supports.

ADO object	Collection	Support
Command Object	**Parameters** Collection	Yes
	Properties Collection	Yes
Connection Object	**Errors** Collection	Yes
	Properties Collection	Yes
Field Object	**Properties** Collection	Yes
Parameter Object	**Properties** Collection	Yes
Recordset Object	**Fields** Collection	Yes
	Properties Collection	Yes

Command Object in the OLE DB Provider for DB2 (ADO)

The ActiveX Data Objects (ADO) **Command** object is a definition of a specific command that is to be executed against an OLE DB data source.

You can use **Command** objects to create a **Recordset** object and obtain records, to execute a bulk operation, or to manipulate the structure of a database. When using Microsoft OLE DB Provider for DB2, some collections, methods, or properties of a **Command** object may generate an error when called.

The primary purpose of the **Command** object in the context of OLE DB Provider for DB2 is to issue SQL commands for execution by the remote DB2 target server. Legal SQL commands are documented for the target DB2 platforms in SQL Reference Guides published by IBM.

The following table lists the **Command** object methods, properties, and collections that the current version of OLE DB Provider for DB2 supports.

Name	**Comment**
Execute Method	Evaluates command text (only supported *Options* parameter for this method is **adCmdText**, which indicates that this is an SQL text command).
ActiveConnection Property	Sets or returns the information used to establish a connection to a data source. (For more information, see the notes that follow.)
CommandText Property	Sets or returns the command text to be executed.
CommandType Property	Sets or returns the type of command in a **CommandText** property.
State Property	Describes the current state of an object.
Properties collection	Collections of properties on the command.

The **Execute** method executes a command and returns a **Recordset** object, if appropriate. You can use the **Command** object to open tables or execute SQL commands on a remote DB2 server. If errors occur, you can examine these with the **Errors** collection on the **Connection** object.

You can create a **Command** object independently of a previously defined **Connection** object by setting the **ActiveConnection** property of the **Command** object to a valid connection string. (For the proper syntax, see the **ConnectionString** property of the **Connection** object.) ADO still creates a **Connection** object, but it does not assign that object to an object variable. However, if multiple **Command** objects are to be associated with the same connection, the **Connection** object needs to be explicitly created and opened. This assigns the **Connection** object to an object variable. If the **ActiveConnection** property of the **Command** object is not set to this object variable, ADO creates a new **Connection** object for each **Command** object, even if the same connection string is used.

The **ActiveConnection** property associates an open connection with a **Command** object. The **CommandText** property defines the text version of a command (for example, **SELECT ALL FROM TABLE**). The **CommandType** property specifies the type of command described in the **CommandText** property prior to execution to optimize performance. The **CommandType** property must be set to **adCmdText** for use with OLE DB Provider for DB2.

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Connection Object in the OLE DB Provider for DB2 (ADO)

The ActiveX Data Objects (ADO) **Connection** object represents an open connection to an OLE DB data source. The **Provider** property sets the OLE DB provider to use. The connection can be configured before opening the data source by setting the **ConnectionString** properties. The version of the ADO implementation in use can be determined from the **Version** property.

The physical connection to the data source is established using the **Open** method and terminated with the **Close** method. If errors occur, these can be examined with the **Errors** collection.

The following table lists the **Connection** object methods, properties, and collections that the current version of Microsoft OLE DB Provider for DB2 supports.

Name	**Comment**
Close Method	Closes a connection to a data source.
Execute Method	Evaluates command text.
Open Method	Opens a connection to a data source and may optionally pass **ConnectionString** parameters with this method.
OpenSchema Method	Obtains database schema information from the OLE DB provider.
Attributes Property	One or more characteristics supported for a given **Connection** object.
ConnectionString Property	Contains the information used to establish a connection to a data source. (For more information, see the notes that follow.)
CursorLocation Property	Sets or returns the location of the cursor (whether the cursor is on the client or the server side).
IsolationLevel Property	Sets or returns the level of isolation for a **Connection** object.
Mode Property	Indicates the available permissions for modifying data in a connection.
Provider Property	Sets or returns the name of the provider for a connection.
State Property	Describes the current state of an object.
Version Property	Returns the version number of the ADO implementation in use.
Errors collection	Collections of **Error** objects on the connection.
Properties collection	Collections of properties on the connection.

You can set the information needed to establish a connection to a data source in the **ConnectionString** property or pass it as part of the **Open** method. In either case, this information must be in a specific format for use with OLE DB Provider for DB2. This information can be a data source name (DSN) or a detailed connection string containing a series of *argument=value* statements separated by semicolons. ADO supports several standard ADO-defined arguments for the **ConnectionString** property as listed in the following table.

Argument	**Description**
Data Source	Name of the data source for the connection. This argument is optional when using OLE DB Provider for DB2.
File Name	Name of the provider-specific file containing preset connection information. This argument cannot be used if a *Provider* argument is passed.
Location	The remote database name used for connecting to OS/400 systems. This parameter is optional when connecting to mainframe systems.
Password	Valid mainframe or AS/400 password to use when opening the connection. This password is used to verify that the user can log on to the target DB2 host system and has appropriate access rights to the database. This parameter is equivalent to the DBPROP_AUTH_PASSWORD OLE DB property ID.
Provider	Name of the provider to use for the connection. To use OLE DB Provider for DB2, you must set the Provider string to "DB2OLEDB."
User ID	Valid mainframe or AS/400 user name to use when opening the connection. This user name validates that the user can log on to the target DB2 host system and has appropriate access rights to the database. This parameter is equivalent to the DBPROP_AUTH_USERID OLE DB property ID.

The OLE DB Provider for DB2 also supports a number of provider-specific arguments, some of which have default values as specified in the following tables.

The following table lists the arguments supported by the OLE DB Provider for DB2 supplied with Host Integration Server 2004.

Argument	Description
BinAsChar	When this parameter is set to **true**, the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This parameter defaults to **false**.
CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If you omit this argument, the default value is U.S./Canada (37).
DefSch	The name of the default schema (collection/owner) where the system catalogs resides. This parameter can be QSYS2, SYSIBM, SYSTEM, CURLIB, or USERID depending on platform. This parameter does not have a default value.
InitCat	You use this parameter as the first part of a three-part fully qualified table name. In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. In DB2/400, this parameter is referred to as RDBNAM. The RDBNAM value can be determined by invoking the **WRKRDBDIRE** command from the console to the OS/400 system. If there is no RDBNAM value, you can create one using the **Add** option. In DB2 Universal Database, this property is referred to as DATABASE. This parameter has no default value.
LocalLU	The name of the local logical unit (LU) alias configured in Host Integration Server.
ModeName	The Advanced Program-to-Program Communications (APPC) mode must be set to a value that matches the host configuration and Host Integration Server configuration. Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes.
NetAddr	When you select TCP/IP for the Network Transport Library, this parameter indicates the IP address of the host.
NetPort	When you select TCP/IP for the Network Transport Library, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446.
NetLib	This parameter determines whether you use TCP/IP or SNA APPC for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA.
PCCodePage	The character code page to use on the computer. If you omit this argument, the default value is set to Latin 1 (1252).
PkgCol	The name of the Distributed Relational Database Architecture (DRDA) target collection (AS/400 library) where Microsoft OLE DB Provider for DB2 should store and bind DB2 packages. This could be same as the Default Schema. Microsoft OLE DB Provider for DB2 uses packages to issue dynamic and static SQL statements. The OLE DB provider creates packages dynamically in the location to which the user points using the Package Collection parameter.

RemoteLU	The name of the remote LU alias configured in Host Integration Server.
TPName	The transaction program name when used with SQL/DS.
UOW	This parameter determines whether two-phase commit is enabled. The possible values for this parameter are distributed unit of work (DUW) or remote unit of work (RUW). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

> **Note** Not all of these parameters are required. The user can also be prompted for this information.

A sample **ConnectionString** using OLE DB Provider for DB2 is as follows:

```
Conn.Provider="DB2OLEDB"
Conn.ConnectionString = "User ID=USERNAME;Password=password",&_
  "LocalLU=LOCAL;RemoteLU=DATABASE",&_
  "ModeName=QPCSUPP;CCSID=37;PcCodePage=437"
Conn.Properties("PROMPT")=adPromptNever
Conn.Open
```

> **Note** The &_ character combination is used for continuing long lines in Visual Basic®.

When opening a connection object in ADO 2.0, you must specify the **Prompt** connection property. For example, the following is valid with ADO 1.5 and ADO 2.0 and will prompt the user for **ConnectionString** properties:

```
Conn.ConnectionString = "Provider=DB2OLEDB
Conn.Properties("PROMPT")=adPromptAlways
Conn.Open
```

A sample **Open** method call with these parameters is as follows:

```
RS.Open "Accounting",Conn,0,1,1
```

The last three parameters to the **Open** method correspond with the *CursorType* (for example, the **adOpenForwardOnly** enum is 0), *LockType* (for example, the **adLockReadOnly** enum is 1), and *Options* (**adCmdText** is 1, which indicates that the source name should be evaluated as SQL text). The *Options* parameter must be set to **adCmdText** (1) when used with a data source name with OLE DB Provider for DB2.

The allowable values for the Character Code Set Identifier (CCSID) when using SNA National Language Support (SNANLS) for character code conversions (the default) are listed in the following table.

EBCDIC character set	CCSID value
Arabic	20420
Binary (No Conversion)	65535
Chinese (Simplified)	935
Chinese (Traditional)	937
Cyrillic (Russian)	20880

Cyrillic (Serbian, Bulgarian)	21025
Denmark/Norway (Euro)	1142
Denmark/Norway	20277
Finland/Sweden (Euro)	1143
Finland/Sweden	20278
France (Euro)	1147
France	20297
Germany (Euro)	1141
Germany	20273
Greek (Modern)	875
Greek	20423
Hebrew	20424
Icelandic (Euro)	1149
Icelandic	20871
International (Euro)	1148
International	500
Italy (Euro)	1144
Italy	20280
Japanese (English-lower)	931
Japanese (Extend English)	939
Japanese (Extend Katakana)	930
Japanese (Katakana)	290
Japanese (Katakana-Kanji)	5026
Japanese (Latin-Kanji)	5035
Korean	933
Latin America/Spain (Euro)	1145
Latin America/Spain	20284
Latin-1 Open System (Euro)	20924
Latin-1 Open System	1047
Multilingual/ROECE (Latin-2)	870
Thai	20838
Turkish (Latin-5)	1026
Turkish	20905
U.S./Canada (Euro)	1140
U.S./Canada	37
United Kingdom (Euro)	1146
United Kingdom	20285

Note that the SNA National Language Support (SNANLS) conversion uses the locale configured for the data sources using data links. For more information, see the SDK documentation under the SNA National Language Support Programmer's Guide.

The allowable values for CCSID when using ANSI/OEM for character code conversions are listed in the following table.

ANSI/OEM character set	CCSID value
ANSI - Arabic	1256
ANSI - Baltic	1257
ANSI - Cyrillic	1251
ANSI - Eastern Europe	1250
ANSI - Greek	1253
ANSI - Hebrew	1255
ANSI - Latin I	1252
ANSI - Turkish	1254
ANSI/OEM - Korean (Extended Wansung)	949
ANSI/OEM - Japanese Shift-JIS	932
ANSI/OEM - Simplified Chinese GBK	936
ANSI/OEM - Traditional Chinese Big5	950

ANSI/OEM - Thai	874
ANSI/OEM - Vietnam	1258

Error Object in the OLE DB Provider for DB2 (ADO)

The ActiveX Data Objects (ADO) **Error** object contains details about data access errors pertaining to a single operation involving ADO. You can read the properties of an **Error** object to obtain specific details about each error.

The **Error** object does not support any methods or collections. However, the **Errors** collection supported by other objects provides the standard **Collection** methods (**Clear** and **Delete**). The OLE DB provider automatically appends **Error** objects to the **Errors** collection when they occur.

The following table lists the **Error** object properties that the current version of Microsoft OLE DB Provider for DB2 supports.

Property Name	**Comment**
Description Property	The text of the error alert that is returned based on the minor error code (specific to the OLE DB Provider for DB2) contained in the **Error** object resulting from an error.
NativeError Property	A **Long** integer value of the error code returned by the OLE DB Provider for DB2.
Number Property	The **Long** integer value of the OLE DB error constant.
Source Property	A string that indicates the name of the object or application that originally generated an error.

Field Object in the OLE DB Provider for DB2 (ADO)

The ActiveX Data Objects (ADO) **Field** object represents a column of data with a common data type. Each **Field** object corresponds to a column in a **Recordset** object.

The following table lists the **Field** object methods, properties, and collections that the current version of Microsoft OLE DB Provider for DB2 supports.

Name	Comment
ActualSize Property	Actual length of a field's value.
Attributes Property	One or more characteristics supported for a given **Field** object.
DefinedSize Property	Defined size of a **Field** object.
Name Property	Name of the **Field** object.
NumericScale Property	Scale of numeric values in a **Field** object for numeric data.
OriginalValue Property	Value of a **Field** object that existed in the record before changes were made.
Precision Property	Degree of precision for numeric values in a **Field** object for numeric data.
Type Property	Operational type or data type for a **Field** object.
UnderlyingValue Property	Current value of a **Field** object.
Value Property	Value assigned to a **Field** object in a **Recordset**.
Properties collection	Collections of properties on the field.

Recordset Object in the OLE DB Provider for DB2 (ADO)

The ActiveX Data Objects (ADO) **Recordset** object represents the entire set of records from a base table. At any time, the **Recordset** object refers to only one record within the set as the current record.

The following table lists the **Recordset** object methods, properties, and collections that the current version of Microsoft OLE DB Provider for DB2 supports.

Name	**Comment**
AddNew Method	Creates a new record for an updateable **Recordset** object.
CancelBatch Method	Cancels a pending batch update.
CancelUpdate Method	Cancels any changes made to a current record or to a new record prior to calling the **UpdateBatch** method.
Clone Method	Creates a duplicate **Recordset** object from an existing **Recordset** object.
Close Method	Closes an open object and any dependent objects.
Delete Method	Deletes the current record in an open **Recordset** object or an object from a collection.
GetRows Method	Retrieves multiple records of a **Recordset** into an array.
Move Method	Moves the position of the current record in a **Recordset** object.
MoveFirst Method	Moves to the first record in a specified **Recordset**.
MoveNext Method	Moves to the next record in a specified **Recordset**.
Open Method	Opens a cursor on a **Recordset**.
Requery Method	Updates the data in a **Recordset** object by re-executing the query on which the object is based (equivalent to calling the **Close** and **Open** methods in succession).
Save Method	Saves a **Recordset** in a file or **Stream** object.
Supports Method	Determines whether a specified **Recordset** object supports a particular type of function.
Update Method	Saves any changes you make to the current record of a **Recordset** object.
UpdateBatch Method	Writes all pending batch updates to disk.
ActiveCommand Property	Returns the **Command** object that created the specified **Recordset**.
ActiveConnection Property	Sets or returns the **Connection** object that the specified **Recordset** object currently belongs.
BOF Property	Indicates whether the current record position is before the first record in a **Recordset** object.
Bookmark Property	Returns a bookmark that uniquely identifies the current record in a **Recordset** object or sets the current record in a **Recordset** object identified by a valid bookmark.
CacheSize Property	Sets or returns the number of records from a **Recordset** object that are cached locally in memory.
CursorLocation Property	Sets or returns the location of the cursor (whether the cursor is on the client or the server side).
CursorType Property	Sets or returns the type of cursor used in a **Recordset** object. The current version of OLE DB Provider for DB2 supports only the **adOpenForwardOnly CursorType**.
EditMode Property	Indicates the editing status of the current record type.
EOF Property	Indicates whether the current record position is after the last record in a **Recordset** object.
LockType Property	Sets or returns the types of locks placed on records during editing. OLE DB Provider for DB2 supports locks of type **adLockReadOnly** and **adLockPessimistic**.
MaxRecords Property	Sets or returns the maximum number of records to return to a **Recordset** from a query.
Source Property	Sets or returns the source (table name or command object) for the data in a **Recordset**.
State Property	Describes the current state of an object.
Status Property	Indicates the status of the current record with respect to batch updates or other bulk operations.
Fields collection	Collections of fields on the **Recordset**.
Properties collection	Collections of properties on the **Recordset**.

ODBC Driver for DB2 Programmer's Guide

The Microsoft® ODBC Driver for DB2 enables users to access IBM Data Base 2 (DB2) from within an ODBC-aware application. ODBC defines a standard set of interfaces that provide access to disparate databases. The ODBC Driver for DB2 combines the data access of ODBC with the underlying Microsoft Distributed Relational Database Architecture (DRDA) application requester also used by the Microsoft OLE DB Provider for DB2. Using this combination of technologies, the ODBC Driver for DB2 can provide database access to IBM's Distributed Relational Database Architecture and IBM DB2.

Organizations have invested in secure, robust, enterprise-wide data storage and management systems. DRDA is a set of rules for distributing or extending relational data from one computer to another, such as a server computer to an IBM DB2 database server running on a mainframe or an AS/400 computer. By combining the ODBC and DRDA architectures, Microsoft allows organizations to preserve their investments in an existing data management infrastructure, while extending data access to all enterprise-wide DB2 data sources.

The ODBC Driver for DB2 can be used interactively or from an application program to issue SQL statements and execute DB2 stored procedures. From Microsoft Excel, users can import DB2 tables into worksheets and use Excel graphing tools to analyze the data. From Microsoft Access, users can import from and export to DB2. With Microsoft Internet Information Services (IIS), developers can publish DB2-stored information to users through a Web browser.

For API reference and other technical information about the ODBC Driver for DB2, see the ODBC Driver for DB2 Programmer's Reference section of the SDK.

For sample code using the OLE DB Provider and ODBC Driver, see the OLE DB Provider and ODBC Driver Samples section of the SDK.

This section contains:

- Goals of the ODBC Driver for DB2
- ODBC Driver for DB2 Architecture
- Platforms Supported by the ODBC Driver for DB2
- ODBC Driver for DB2 Requirements
- Configuring ODBC Data Sources
- Creating Packages for Use with the ODBC Driver for DB2

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Goals of the ODBC Driver for DB2

Relational database management systems (RDBMS) are one of the major sources of mission-critical information in today's enterprise organizations. Relational database technology enables departments and individual users to save their information in centrally managed database stores that can be maintained by the organization's information systems group.

IBM DB2 is a popular RDBMS for a significant number of enterprise customers. Customers need a cost-effective and manageable means to integrate DB2 with Microsoft® SQL Server™, Microsoft Internet Information Services (IIS), and Microsoft Office applications. The goal of Microsoft ODBC Driver for DB2 is to provide customers and solution providers with the means to integrate desktop database applications with this wealth of data residing on IBM DB2 database systems.

ODBC Driver for DB2 Architecture

The Microsoft® ODBC Driver for DB2 is an ODBC-compliant database driver for Microsoft Windows Server™ 2003 and Windows® 2000 that enables your existing ODBC applications access data residing in IBM DB2 database servers without changing any code. The ODBC Driver for DB2 can connect ODBC-compliant applications with DB2 data sources using the underlying Microsoft Distributed Relational Database Architecture (DRDA) application requester. The ODBC application connects to the ODBC Driver for DB2. These ODBC requests are processed by the underlying Microsoft DRDA application requester. The data is then passed by an SQL interface to the DB2 data store.

The ODBC Driver for DB2 shares the same DRDA application requester that is used by the Microsoft OLE DB Provider for DB2. The DRDA application requester is the network client that provides remote database access to DB2 across an SNA LU 6.2 and TCP/IP network.

The ODBC Driver for DB2 is compliant with the Microsoft Open Database Connectivity (ODBC) specification. ODBC is a specification for an application program interface (API) that enables applications to access multiple database systems using SQL.

Platforms Supported by the ODBC Driver for DB2

The Microsoft® ODBC Driver for DB2 supports popular DB2 platforms supported by the Microsoft OLE DB Provider for DB2 because both use the same underlying Distributed Relational Database Architecture (DRDA) application requester.

The ODBC Driver for DB2 offers network connectivity using SNA APPC LU 6.2 connectivity, as well as native TCP/IP (not reliant on any special IBM or third-party routers).

ODBC Driver for DB2 Requirements

Information about hardware and software requirements for The Microsoft® The ODBC Driver for DB2 can be found in the Host Integration Server 2004

When connecting over SNA using LU 6.2, the ODBC Driver for DB2 requires the following computer-to-host connectivity software:

- Microsoft Host Integration Server 2004
- Microsoft Host Integration Server Client

Note that the The ODBC Driver for DB2 does not require any special host connectivity software when connecting directly to a host system using TCP/IP.

The The ODBC Driver for DB2 supports the following OLE DB and ADO versions:

The ODBC Driver for DB2 supplied with Microsoft Host Integration Server 2004 supports the following ADO version:

- ADO version 2.5. The Microsoft Host Integration Server 2004 data access features require the runtime libraries for ADO version 2.5. On Windows Server 2003 and Windows 2000, these ADO libraries are installed as part of the Windows Server 2003 operating systems or Windows 2000.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Configuring ODBC Data Sources

A data source associates a particular ODBC driver with the data to be accessed through that driver. Data source information must be configured for each DB2 system that is to be accessed using the Microsoft® ODBC Driver for DB2. The default parameters for the ODBC Driver for DB2 are used for the data source only when these parameters are not configured for each data source.

An ODBC data source name (DSN) can be one of the following types:

- User. A data source local to a computer and accessible only by the current user that created the data source.
- System. A data source local to a computer but not dedicated to a specific user, so any user with appropriate privileges can access a system DSN. A System data source is visible to all users on a computer, including Windows NT® services.
- File. A data source stored in a file that can be shared among all users who have the same ODBC drivers installed. These data sources need not be dedicated to a specific user or local to a computer.

User and System data sources are stored in the registry. File data sources are stored as files with a file extension of .dsn. File DSNs can be stored in any location on the file system including remotely mounted shares. By default, File DSNs are stored in the following location:

C:\Program Files\Common Files\ODBC\Data Sources

ODBC data sources can be configured using the **ODBC Data Source Administrator**. On Microsoft® Windows Server™ 2003 and Windows® 2000, a shortcut to the **ODBC Data Source Administrator** is located in the Control Panel under **Administrative Tools** as **Data Sources (ODBC)**. The Data Access Tool provided as part of the ODBC Driver for DB2 enables users to create and modify ODBC data sources. This tool makes calls to the ODBC Data Source Administrator application to provide these functions.

- Using the Microsoft ODBC Driver for DB2 Configuration Dialog Box
- Configuration Property Mappings Between the ODBC Driver for DB2 and the OLE DB Provider for DB2
- ODBC Connection String Attributes

Using the Microsoft ODBC Driver for DB2 Configuration Dialog Box

The **Microsoft ODBC Driver for DB2 Configuration** dialog box contains five tabs, which are described in the following topics.

This section contains:

- General
- Connection
- Security
- Target Database
- Locale

General

The **General** tab enables the user to configure the data source name required to connect to DB2. For the Microsoft® ODBC Driver for DB2 supplied with Host Integration Server 2004, the **General** tab contains the following fields.

Parameter	Comments
Data Source Name	A blank field for specifying the name of the data source. Enter a string that identifies this ODBC data source. The data source is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For file data sources, this field is used to name the DSN file, which is stored in C:\Program Files\Common Files\ODBC\Data Sources.
Description	A blank field to provide a comment describing this ODBC data source. The description is an optional parameter and may be left blank.

Connection

The **Connection** tab enables the user to configure the basic attributes required to connect to a data source. For the Microsoft® ODBC Driver for DB2, the **Connection** tab has the following fields.

Parameter	Comments
Network transport	An option button is used to select the network transport. Valid options are **APPC Connection (SNA LU 6.2)** or **TCP/IP Connection**. For the default, **APPC Connection**, the values for APPC local LU alias, APPC remote LU alias, and APPC mode name are required. For **TCP/IP Connection**, the values for IP address and Network port are required.
APPC local LU alias	When **APPC Connection** is selected, this field is the name of the local LU alias configured in Host Integration Server.
APPC remote LU alias	When **APPC Connection** is selected, this field is the name of the remote LU alias configured in Host Integration Server.
APPC mode name	When **APPC Connection** is selected, this field is the APPC mode and must be set to a value that matches the host configuration and SNA service configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bidirectional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). The default is QPCSUPP.
IP address	When **TCP/IP Connection** is selected as the network transport, this field indicates the IP address of the host DB2 server.
Network port	When **TCP/IP Connection** is selected as the network transport, this field indicates the TCP/IP port used for communication with the target DB2 DRDA service. The default is IP port 446.

The **Connection** tab also includes a **Test connection** button that may be used to test the connection parameters. A connection can only be tested after all of the required parameters for the **Connection** tab and other ODBC data source parameters are configured properly. When this button is clicked, a session is established with the remote DB2 system using ODBC Driver for DB2

Security

The **Security** tab enables the user to configure optional attributes used to restrict connections to a data source.

For the Microsoft® ODBC Driver for DB2 in Host Integration Server 2004, the **Security** tab has the following fields.

Parameter	Comments
Authentication	An option button is used to select the type of authentication. Valid options are **Use this username** or **Use single sign on**. For the default **Use this username** option, the value for the user name is required.
Use this username	When this option is selected, authentication is based on the user name entered in the text box. A valid user name is normally required to access data on DB2. A user name can remain optionally in the DSN. The ODBC Driver for DB2 prompts the user at run time to enter a valid password. Additionally, the prompt dialog box enables the user to override the user name that is stored in the DSN.
Use Single Sign-On	An option button to select whether Single Sign-On (SSO) or a specific user name should be used. SSO is an optional Host Security feature. SSO enables the administrator to create data source definitions that isolate the logon process from the end user.

The AS/400 computer is case-sensitive with regard to user IDs and passwords. When connecting to DB2 for OS/400, user names and passwords must be in uppercase. The AS/400 only accepts a DB2 for OS/400 user ID and password in uppercase. If a DB2 for OS/400 connection fails due to incorrect authentication, the ODBC driver resends the authentication, forcing the user ID and password into uppercase.

When connecting to DB2 on IBM mainframes, user names and passwords can be of mixed case. The mainframe is not case-sensitive. The ODBC driver sends these values in uppercase.

DB2 Universal Database (UDB) for Windows Server 2003 or for Windows 2000 is case-sensitive. The user ID is stored in uppercase. The password is stored in mixed case and users must enter the password in the correct case. The ODBC driver sends the password exactly in the case entered by the user. The user ID should contain only the user name, not a combination of the Windows NT® domain name and user name.

It is possible to connect using a specific user name and password defined in DB2 on the host system or use the Single Sign-On feature (often referred to as integrated Windows security). If a specific DB2 user name and password are to be used, this information may need to be saved to a data source name (DSN) file. The user name and password are saved in plain text in the DSN file or to registry keys if a System or User DSN is selected. For security reasons when using File DSNs, it is imperative that the DSN file be protected with an access control list (ACL) that restricts access to only authorized users. System and User DSNs are preferred for security reasons if the locations where these ODBC DSNs are stored in the registry have appropriate security protections. Saving the user name and password in the DSN also forces this DSN to be updated whenever the password associated with the user name is changed. So for a variety of reasons, specifying a user name and password is not the preferred authentication option. Using the **Single Sign-On** option is the preferred method for authentication.

Target Database

The **Target Database** tab enables the user to configure required, as well as optional, attributes used to define the target DB2 system.

For the Microsoft® ODBC Driver for DB2 in Host Integration Server 2004, the **Target Database** tab has the following fields.

Parameter	Comments
Initial catalog	This parameter is used as the first part of a three-part fully qualified DB2 table name. It is referred to by different names depending on the DB2 platform. In DB2 for OS/390 and DB2 for MVS, this parameter is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 that you need to connect to on these platforms, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 Installation Manual. In DB2/400 on OS/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, a value can be created using the **Add** option. In DB2 Universal Database, this property is referred to as DATABASE.
Package collection	The name of the DRDA target collection (AS/400 library) where the Microsoft ODBC Driver for DB2 should store and bind DB2 packages. This can be the same as the default schema. The ODBC Driver for DB2, which is implemented as an IBM DRDA application requester, uses packages to issue dynamic and static SQL statements. The ODBC driver creates packages dynamically in the location that the user points to using the Package Collection parameter. By default, the ODBC Driver for DB2 automatically creates one package in the target collection, if one does not exist, at the time the user issues the first SQL statement. The package is created with GRANT EXECUTE authority to a single <AUTH_ID> only, where AUTH_ID is based on the user ID value configured in the data source. The package is created for use by SQL statements issued under the same isolation level based on the Isolation Level value specified in the connection. Problems can arise in multi-user environments. For example, if a user specifies a Package Collection value that represents a DB2 collection used by multiple users, but this user does not have authority to GRANT execute rights to the packages to other users (the PUBLIC group on the DB2 system, for example), the package is created only for use by this user. This means that other users may be unable to access the required package. The solution is for an administrative user with package administrative rights to create a set of packages for use by all users. (For more information, see Creating Packages for Use with the ODBC Driver for DB2.) The ODBC Driver for DB2 supplied with Host Integration Server 2004 includes the Data Access Tool for use by administrators to create packages. This tool can be run using a privileged User ID to create packages in collections accessed by multiple users. This tool will create a set of packages and grant EXECUTE privilege on these packages to the PUBLIC group representing all users on the DB2 system. The packages (see descriptions under the SQL_ATTR_TXN_ISOLATION connection attribute) created are as follows: AUTOCOMMITTED package (MSNC001 is only applicable on DB2/400) READ UNCOMMITTED package (MSUR001) READ COMMITTED package (MSCS001) REPEATABLE READ package (MSRS001) SERIALIZABLE package (MSRR001) Note that the AUTOCOMMITTED package (MSNC001) is only created on DB2 for OS/400. Once created, the packages are listed in the DB2 (mainframe) SYSIBM.SYSPACKAGE, the DB2 for OS/400 QSYS2.SYSPACKAGE, and the DB2 Universal Database (UDB) SYSIBM.SYSPACKAGE catalog tables. Note that when upgrading from SNA Server 4.0, any existing SNA Server 4.0 packages must be re-created using the Host Integration Server Data Access Tool to make them compatible with Host Integration Server 2004. The package names changed from SNA Server 4.0.

Default Schema	The name of the collection where the ODBC Driver for DB2 looks for catalog information. Default schema is the SCHEMA name for the target collection of tables and views. The ODBC driver uses the Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection (for example, ODBC Catalog SQLTables). For DB2, the Default Schema is the target AUTHENTICATION (User ID or owner). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, the ODBC driver uses the USER_ID provided at log on. For DB2/400, the driver uses QSYS2 if no collection is found matching the USER_ID value. This default is inappropriate in many cases so it is essential that the Default Schema value in the data source be defined.
DBMS Platform	The target DB2 platform property value is used to optimize performance of the ODBC driver when executing operations such as data conversion. The default value is DB2/MVS.
Default Qualifier	The name of the schema (collection/owner) with which to fully qualify unqualified object names. This attribute enables the user to access database objects without fully qualifying the objects using a collection (schema) qualifier. The ODBC driver sends this value to DB2 using a **SET CURRENT SQLID** statement, instructing the DBMS to use this value when locating unqualified objects (for example, tables and views) referenced in SQL statements. If you do not set a value for the default qualifier, no **SET** statement is issued by the ODBC driver. This ODBC connection attribute is only valid when connecting to DB2 for MVS (OS/390, z/OS).
Alternate TP Name	The Alternate Transaction Program (TP) Name property represents the default transaction program name for the DB2 DRDA application server (AS), which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the Alternate TP Name in the offline demo configuration (DRDADEMO.UDL). In that case, the Alternative TP Name is set to 0X07F9F9F9.
Distributed transactions	When this option is checked, two-phase commit (distributed unit of work) is enabled. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the Host Integration Server 2004 Resync Service.
Process binary as character	When this option is checked, it indicates that binary data fields should be processed as characters. This option treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. For more information, see the Locale tab.

Locale

The **Locale** tab enables the user to configure the parameters used for character conversion between the client and the DB2 server.

For the Microsoft® ODBC Driver for DB2 in Host Integration Server 2004, the **Locale** tab has the following fields.

Parameter	Comments
Host CCSID	The coded character set identifier (CCSID) matching the DB2 data as represented on the remote computer. This property is required when processing binary data as character data. Unless the Process Binary as Character value is set, character data is converted based on the DB2 column CCSID and configured ANSI code page. This parameter defaults to U.S./Canada (37).
PC code page	This parameter indicates the personal computer code page to use. It is required when processing binary data as character data. Unless the Process Binary as Character value is set, character data is converted based on the default ANSI code page configured in Windows. The default value for this property is Latin 1 (1252).

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Configuration Property Mappings Between the ODBC Driver for DB2 and the OLE DB Provider for DB2

This table compares the configuration parameters used by the ODBC Driver for DB2 and the OLE DB Provider for DB2.

Microsoft ODBC Driver for DB2	Microsoft OLE DB Provider for DB2
General	**General**
Data Source Name	Data Source
Data Source Description	None
Connection	**Connection**
Connection	Network Transport Library
APPC Connection	SNA
TCP/IP Connection	TCPIP
APPC local LU Alias	APPC Local LU Alias
APPC remote LU Alias	APPC Remote LU Alias
APPC mode name	APPC Mode Name
IP address	Network Address
Network port	Network Port
Security	**Security**
Use this username	None
User Name	User ID
Use Single Sign-on	Integrated Security
Affiliate Application	Affiliate Application
Target Database	**Target Database**
Initial catalog	Initial Catalog
Package collection	Package Collection
Default schema	Default Schema
Default qualifier	Default qualifier
DBMS Platform	DBMS Platform
Alternate TP name	Alternate TP Name
Distributed transactions	Distributed transactions
Process binary as character	Process binary as character
Locale	**Locale**
Host CCSID	Host CCSID
PC code page	PC Code Page
Extended	**Extended**
Client Application Name	None
Connection Pooling	None

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ODBC Connection String Attributes

The ODBC **SQLBrowseConnect** and **SQLDriverConnect** functions allow passing in a connection string containing a series of attribute/value pairs to the ODBC Driver Manager to establish a connection with a data source. An example of a connection string is as follows:

```
"DSN=MYDATA;NTL=SNA;LLU=Local;RMU=Remote;RDB=BigData;PC=QSYS2;
DS=QSYS2;RO=false;UID=myname;PWD=Secret"
```

Some ODBC attributes are required as part of the connection string when used with the ODBC Driver for DB2.

The following tables compare the configuration parameters used by the ODBC Driver for DB2 and the ODBC attribute keywords that are supported by the OLE DB Driver for DB2 as part of the passed-in connection string.

For the Microsoft® ODBC Driver for DB2 in Host Integration Server 2004, these attribute keywords compare as follows.

Microsoft ODBC Driver for DB2	ODBC attribute keyword	Comments
General	**General**	**General**
Data Source Name	DSN	Required parameter.
Data Source Description	DESC	None.
Connection	**Connection**	**Connection**
Connection	NTL	Required parameter.
APPC connection	NTL=SNA	None.
TCP/IP connection	NTL=TCPIP	None.
APPC local LU alias	LLU	Applicable only if SNA (an APPC connection) is used for the network transport library (NTL=SNA).
APPC remote LU alias	RLU	Applicable only if SNA (an APPC connection) is used for the network transport library (NTL=SNA).
APPC mode name	MN	Applicable only if SNA (an APPC connection) is used for the network transport library (NTL=SNA).
APPC Security Type	AST	Applicable only if SNA (an APPC connection) is used for the network transport library (NTL=SNA). Valid values are “PROGRAM” (the default), or “SAME”.
IP address	NA	Applicable only if TCPIP (a TCP/IP connection) is used for the network transport library (NTL=TCPIP).
Network port	NP	Applicable only if TCPIP (a TCP/IP connection) is used for the network transport library (NTL=TCPIP).
Security	**Security**	**Security**
Use this username	None	None.
User Name	UID	None.
	PWD	The Password parameter is not on the Security tab and is not configurable from the ODBC Administrator tool used to configure ODBC data sources. This parameter can only be preset using the ODBC connection string. Most applications prompt the user for this parameter.
Use single sign-on	None	Not applicable.
Affiliate application	AAP	Applicable only if using single sign-on.
Target Database	**Target Database**	**Target Database**
Initial Catalog	RDB	Required parameter.

Package Collection	PC	Required parameter.
Default Schema	DS	Required parameter.
Default Qualifier	DQ	None.
DBMS Platform	DP	Can be one of the following values: DB2/AS400, DB2/MVS (the default), DB2/6000, or DB2/NT.
Alternate TP Name	TPN	None.
Distributed transactions	RUW	None.
Process binary as character	BAC	None.
Locale	**Locale**	**Locale**
Host CCSID	CCSID	Required parameter.
PC code page	CP	Required parameter.

Creating Packages for Use with the ODBC Driver for DB2

The Microsoft® ODBC Driver for DB2, which is implemented as an IBM Distributed Relational Database Architecture (DRDA) application requester, uses packages to issue SQL statements and call DB2 stored procedures. There is a configuration parameter that the ODBC Driver for DB2 uses to identify a location in which to create and store DB2 packages. The ODBC Driver for DB2 creates packages dynamically in the location to which the user points using the *Package Collection* parameter. This location may be configured using the **Target Database** tab from the Microsoft ODBC Data Source Administrator tool or can be passed as part of the ODBC connection string as an attribute keyword and argument. The attribute keyword for *Package Collection* is PC.

There are two package creation options:

- The ODBC Driver for DB2 autocreates one package for the currently used isolation level at run time if no package already exists. This auto-create process may fail if the user account does not have authority to create packages.
- An administrator or user can manually create all four packages (five packages on DB2/400) for use with all isolation levels and for use by all users (the PUBLIC group on DB2 representing all users) or a specific set of users. The ODBC Driver for DB2 includes a utility program for use by users with appropriate administrative privilege that will create these packages and grant access to the PUBLIC group for this purpose.

However, some users may not have the security level when manually creating packages to GRANT authority to the packages to other users (grant authority to the DB2 PUBLIC group representing all users, for example). This can be a problem if two or more users with different user IDs try to access a single collection of packages. The first user that created the packages will have access to the packages, but the second user likely will not. The Host Integration Server 2004 CD includes a program for use by an administrator or a user with appropriate privileges to create packages. This tool can be run using a privileged user ID to create packages in collections accessed by multiple users. The Data Access Tool can be used to create packages for use with DB2.

This tool creates a set of packages and grants EXECUTE privileges on these packages to the PUBLIC group. The PUBLIC group on DB2 systems is a default group that represents all DB2 users. The following packages are created:

- AUTOCOMMITTED package (MSNC001), only applicable on DB2/400
- READ UNCOMMITTED package (MSUR001)
- READ COMMITTED package (MSCS001)
- REPEATABLE READ package (MSRS001)
- SERIALIZABLE package (MSRR001)

Note that the AUTOCOMMITTED package (MSNC001) is only created on DB2 for OS/400.

The descriptive process name used by the Data Access Tool corresponds with the isolation levels defined in the ANSI SQL standard. The following table indicates how these packages correspond with the terms used by IBM for isolation levels in DB2 documentation.

Package description	Package name	IBM documentation
AUTOCOMMITTED (Note that this applies only to DB2/400 and does not correspond with an ANSI SQL isolation level)	MSNC001	COMMIT(*NONE) (NC). This isolation level is used in DB2/400 autocommit mode only and has no corresponding isolation level on other DB2 platforms or in ANSI SQL.
READ UNCOMMITTED	MSUR001	UNCOMMITTED READ (UR). This isolation level corresponds with ANSI SQL READ UNCOMMITTED.
READ COMMITTED	MSCS001	CURSOR STABILITY (CS). This isolation level corresponds with ANSI SQL READ COMMITTED.
REPEATABLE READ	MSRS001	READ STABILITY (RS). This isolation level corresponds with ANSI SQL REPEATABLE READ.

SERIALIZABLE	MSRR 001	REPEATABLE READ (RR). This isolation level corresponds with ANSI SQL SERIALIZABLE.

Note that when upgrading from SNA Server 4.0, any existing SNA Server 4.0 packages must be re-created using the Host Integration Server Data Access Tool to make them compatible with Host Integration Server 2004. The package names used by the ODBC Driver for DB2 on SNA Server 4.0 are not compatible with the ODBC Driver for DB2 included with Host Integration Server. On SNA Server 4.0, these packages used different names as follows:

```
AUTOCOMMITTED package (SNANC001) only applicable on DB2/400
READ UNCOMMITTED package (SNACH001)
READ COMMITTED package, (SNACS001)
REPEATABLE READ package, (SNARR001)
SERIALIZABLE package (SNAAL001)
```

These isolation levels are described in detail in Support for Isolation Levels Using the ODBC Driver for DB2. These isolation levels are also described in IsolationLevel Property (ADO). Note that the AUTOCOMMITTED package (MSNC001) is only created on DB2 for OS/400.

Note that the Data Access Tool tool creates this set of packages and grants EXECUTE privileges to PUBLIC. There may be cases for security reasons where EXECUTE privileges to this set of packages should be restricted to a certain group of users or specific users. In these cases, execution privileges on these created packages will need to be modified on the host system.

The Data Access Tool creates all of these packages inside the collection that is specified in the **Package Collection** property in the datalink file, or in the connection string. If the user does not have the appropriate authority to create packages in the specified collection, or if the specified collection does not exist, the ODBC Driver for DB2 returns an error.

In the case of DB2 on MVS or OS/390, the normal error text returned if the user does not have the appropriate authority is as follows:

```
A SQL error has occurred. Please consult the documentation for your specific DB2 version for
a description of the associated Native Error and SQL State. SQLSTATE: 51002, SQLCODE: -567.
```

In the case of DB2/400, the normal error text returned if the user does not the appropriate authority is as follows:

```
A SQL error has occurred. Please consult the documentation for your specific DB2 version for
a description of the associated Native Error and SQL State. SQLSTATE: 51002, SQLCODE: -805.
```

In the case of DB2/400, the normal error returned if the collection does not exist is as follows:

```
Failed to create AUTOCOMMITTED (NC) package.  RETCODE=-99.
SQL Error: Code=-204, State=42704, Error Text= A SQL error has occurred.  Please consult the
documentation for your specific DB2 version for a description of the associated Native Error
and SQL State. SQLSTATE: 42704, SQLCODE: -204
```

There are two authorities required to execute the create package process on OS/390 or MVS using the Data Access Tool:

```
GRANT BINDADD TO <authorization ID>
GRANT CREATE IN COLLECTION <collection ID> TO <authorization ID>
```

The authorization ID is the user who needs the permission to create the packages. The collection ID is the name of the collection, which the user specifies in the datalink file for the **Package Collection** property. This collection should be a valid collection within the DB2.

If an administrator executes the preceding statements on behalf of a nonprivileged user, this nonprivileged user can then run the Data Access Tool. Once run, the process creates four sets of packages (one for each of the four isolation levels supported on DB2 for MVS or OS/390) for use by all (PUBLIC) users of the Microsoft data access features.

The following example illustrates this process on DB2 for MVS or DB2 for OS/390:

Grant rights to run the Data Access Tool to authorization ID WNW999:

```
GRANT BINDADD TO WNW999
GRANT CREATE IN COLLECTION MSPKG TO WNW999
```

Run the Data Access tool using authorization ID WNW999 .

To execute the Data Access Tool on DB2/400, a user ID must have one of the following authorities:

- *CHANGE authority on the DB2 collection
- *ALL authority on the DB2 collection

If the user only has *USE authority or if the user has *EXCLUDE authority, the Create Package process will fail.

There are several steps required to change user authority on a DB2/400 collection (AS/400 library). From interactive SQL (STRSQL command) while logged in as user with administrative privileges, create a new collection. This command can also be issued using ADO, OLE DB, and ODBC. However, most administrators typically create collections from the AS/400 console because the administrator must be logged in at the console to issue the Command Language (CL) command with which to change the user authority on the collection:

```
CREATE COLLECTION <collection ID>
```

From the AS/400 command console, issue the CL WRKOBJ command with the <collection ID> as a parameter:

```
WRKOBJ <collection ID>
```

The collection ID is the name of the collection, which the user specifies in the datalink file for the Package Collection property. This collection should be a valid collection within DB2. The Work with objects window appears. Place the cursor on the *PUBLIC Object Authority line and change the authority from *USE to *ALL.

If an administrator executes the preceding statements on behalf of a nonprivileged user, this nonprivileged user can run the Data Access Tool. Once run, the process creates five sets of packages (one for each of the five isolation levels supported on DB2/400) for use by all (PUBLIC) users of the Microsoft data access features. On DB2/400, five packages are created including the AUTOCOMMITTED packages.

The following example illustrates this process on DB2/400:

Grant rights to run the Data Access Tool to authorization ID WNW999:

```
CREATE COLLECTION MSPKG
WRKOBJ MSPKG
```

Run the Data Access tool.

When using the create package tool, if the package collection specified does not exist, DB2 returns SQLCODE -805.

When using autocreate packages, if a package collection is not specified or the package collection does not exist, during the autocreate package process, the consumer application receives SQLSTATE HY000 and SQLCODE -385. The SQLSTATE HY000 is defined as a driver-specific error. The -385 Error Return Code is not a SQLCODE but rather a DDM DRDA AR (DB2 client) return code. This error code is defined as DDM_VALNSPRM with the following associated text string:

```
"The parameter value is not supported by the target system."
```

Note that when upgrading from SNA Server 4.0, any existing SNA Server 4.0 packages must be re-created using the Host Integration Server Data Access Tool to make them compatible with Host Integration Server 2004.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to

http://go.microsoft.com/fwlink/?linkid=29507.

ActiveX Controls Programmer's Guides

This section provides information about how to integrate your applications using the Data Queue and Host File Transfer ActiveX® controls.

For API references and other technical information about ActiveX controls, see the ActiveX Controls Programmer's Reference section in the SDK.

For sample code using ActiveX controls, see the ActiveX Controls Samples section in the SDK.

This section contains:

- Host File Transfer ActiveX Control Programmer's Guide
- Data Queue ActiveX Control Programmer's Guide

Host File Transfer ActiveX Control Programmer's Guide

The Microsoft® Host File Transfer ActiveX® control provides the ability to transfer files between a local computer and an MVS, OS/390, AS/400, or AS/36 host system. Microsoft Host Integration Server 2004 provides this service via a single ActiveX control that depends on other core Host Integration Server DLLs. This extends the ability for a client application to perform file transfer operations from a large number of client development environments.

The Microsoft Host File Transfer ActiveX control uses the record-level input/output (RLIO) protocol of IBM's Distributed Data Management (DDM) architecture to transfer files. The Host File Transfer ActiveX control is implemented as a Distributed Data Management (DDM) source requester, which communicates through APPC LU 6.2 or TCP/IP to a DDM target server.

DDM is a set of rules for distributing or extending data management from one computer to another, such as from a mainframe to an AS/400 computer or from one of these host computers to a server computer. By combining the Microsoft File Transfer ActiveX control and DDM architectures, Microsoft enables organizations to preserve their investments in existing data management infrastructure, while extending universal file transfer to all enterprise-wide data sources.

The information in this section is required to develop applications with Host Integration Server that use ActiveX or COM objects to transfer files from local machines to hosts in a Systems Network Architecture (SNA) environment or over TCP/IP using RLIO and DDM.

This section contains:

- Platforms Supported by the Host File Transfer ActiveX Control
- Configuring Data Descriptions for Host File Transfer
- Registry Settings Used By Host File Transfer
- Object Support Using Host File Transfer
- Programming Considerations Using Host File Transfer

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Platforms Supported by the Host File Transfer ActiveX Control

On the mainframe platform, IBM offers a target DDM server implementation in IBM Distributed File Manager (DFM), a component of IBM Data Facility Storage Management Subsystem (DFSMS).

On the mainframe platform, the Host File Transfer ActiveX control supports the following data set types:

Sequential Access Method (SAM) data sets

- Basic Sequential Access Method data sets (BSAM)
- Queued Sequential Access Method data sets (QSAM)

Basic Partitioned Access Method (PDS) data sets

- Partitioned Data Set Extended members (PDSE)
- Partitioned Data Set members (PDS)

Virtual Storage Access Method (VSAM) data sets

- Entry-Sequenced Data Sets (ESDS)
- Key-Sequenced Data Sets (KSDS)
- Fixed-Length Relative Record Data Sets (RRDS)
- Variable-Length Relative Record Data Sets (VRRDS)
- Relative Record Data Set (RRDS)
- VSAM Alternate Indexes for ESDS and KSDS data sets

The preceding data set types are supported by IBM DFM/MVS. The following data set types are not supported by DFM/MVS and cannot be accessed using the Host File Transfer ActiveX control.

- VSAM Linear Data Sets (LDS)
- Generation Data Groups (GDG)
- Generation Data Sets (GDS)
- Basic Direct Access Method data sets (BDAM)
- Indexed Sequential Access Method data sets (ISAM)
- Sequential Data Striping data sets
- OpenEdition MVS Hierarchical File System (HFS) files
- Tape Media

All mainframe data sets accessible through IBM Distributed File Manager must be cataloged in an Intersystem communications function (ICF) catalog and reside on direct access storage devices (DASD).

More information about hardware and software requirements can be found in the Host Integration Server 2004 Installation Guide topic Hardware and Software Requirements.

Configuring Data Descriptions for Host File Transfer

In order to use the Microsoft® Host File Transfer ActiveX® control to transfer files, a user or client application must describe the data format of the host file to transfer. A host data description is normally configured using the Data Access Tool.

The Data Access Tool contains one high-level object for configuring Host Column Description files:

- **Host Column Descriptions**—Stored in Host Column Description (HCD) files that contain the information required to convert host data types to PC computer data types.

When creating a Data Description for use with the Host File Transfer ActiveX control, the **Use Table for File Transfer** check box must be selected and values must be entered for the following additional parameters:

Parameter	Comment

FieldDelimiter	This value represents the delimiter used to mark the end of one field and the beginning of another within a single record. The position of the field elements within a record is assumed to be absolute as configured and variable-length fields are not supported. This element is used in order to inform the conversion routine to remove this character if it is found at the position within the record as indicated by the Data Description. This parameter is required and has no default value. The comma character "," or tab character "\t" is commonly used with desktop applications as a field separator.
RecordDelimiter	This value represents the character or characters that appear at the ending of a record. This element is used in order to inform the conversion routine to remove this character if it is found in the last position of the record as indicated by the Data Description. This parameter is required and has no default value. The end-of-line character sequence is commonly used as a record delimiter. The carriage return and linefeed character sequence "\n\r" is commonly used with desktop applications. The newline character "\n" is standard for use on UNIX systems and with some desktop applications.
TextQualifier	This value is used in order to allow elements that may contain the **FieldDelimiter** character to be properly parsed by the parsing engine. If this element is enabled on a particular field, then the inclusion of this character at the beginning of the field is an indication to the parsing engine that all characters up to the next instance of the **TextQualifier** should be treated as part of the current field being processed. This parameter has no default value. The single quote or double quote character is sometimes used as a text qualifier to protect a comma character included in a field from being misinterpreted as a field delimiter.

Registry Settings Used By Host File Transfer

The Microsoft® Host File Transfer ActiveX® control uses a number of registry settings for configuration and proper operation. The configuration registry settings are located under the HKEY_LOCAL_MACHINE\Software\Microsoft\SNA Server\CurrentVersion\Setup key. These registry settings include the following subkey:

Subkey	Comment
RootDir	Stores the path to root directory where the Host Integration Server was installed. The system directory below this root directory is the location where the Host File Transfer ActiveX control DLL and other support DLLs are installed.

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Object Support Using Host File Transfer

The Microsoft® Host File Transfer ActiveX® control supports a number of standard COM interfaces as well some custom objects and interfaces.

This section contains:

- COM Interface Support Using Host File Transfer
- IEIGFileTransferCtl Object
- IEIGFileTransferCtlEvents Notification

COM Interface Support Using Host File Transfer

The Microsoft Host File Transfer ActiveX control supports a number of standard COM interfaces as well as a single custom interface, **IEIGFileTransferCtl**. The ActiveX control object has the ability to register and de-register itself via standard control mechanisms. Support for a number of standard COM interfaces makes it easy to develop applications using the Host File Transfer ActiveX control with Microsoft Visual Basic® and Microsoft Visual C++® as well as from Microsoft Internet Explorer and Microsoft Access. Supporting a variety of standard COM interfaces also provides different ways for a client to save information.

The following table summarizes the standard COM interfaces supported by the Host File Transfer ActiveX control.

COM interface	Comments
ICategorizeProperties	This interface divides up the properties into an intelligent presentation to the client.
IConnectionPointContainer	None.
IDispatch	A dual interface deriving from **IDispatch** is exposed to provide support and flexibility to clients. Clients that provide support for automation interfaces will utilize the **IDispatch** interface, while more robust clients may use the custom interface. Using the custom interface provides for the greatest execution speed.
IOleControl	None.
IOleInPlaceActiveObject	None.
IOleInPlaceObject	None.
IOleInPlaceObjectWindowless	None.
IOleObject	None.
IOleWindow	None.
IPerPropertyBrowsing	This interface provides support for client browsing of properties in an intelligent manner. This interface exposes to the client property lists used in the population of a dropdown list. This interface is required for the control to be hosted by Microsoft Access.
IPropertyNotifySink	The interface is implemented by a sink object to receive notifications about property changes from an object that supports **IPropertyNotifySink** as an outgoing interface. The client that needs to receive the notifications in this interface (from a supporting connectable object) creates a sink with this interface and connects it to the connectable object through the connection point mechanism.
IPersist	None.
IPersistPropertyBag	This interface is the preferred method of property persisting for Internet Explorer and Visual Basic. Using this interface, persisted properties are stored as a set of name/VARIANT value pairs.
IPersistStorage	This interface stores persistent properties into a structured storage object.
IPersistStreamInit	This interface is responsible for saving the persisted properties in binary form using a stream interface. This is the method used by the Microsoft Visual C/C++ compiler to persist properties.
IProvideClassInfo	None.

IProvideClassInfo2	None.
IQuickActivate	None.
ISupportErrorInfo	This interface is the preferred method to return error indications to scripting clients. Using this interface, error codes and explanation text are returned to the client. This information may be used in order to provide diagnostic information to the user and in cases of failure.
IViewObject	None.
IViewObject2	None.
IViewObjectEx	None.

IEIGFileTransferCtl Object

The Microsoft Host File Transfer ActiveX control supports a number of standard COM interfaces as well as a single custom interface. The **IEIGFileTransferCtl** object supports a number or properties and methods that provide the ability to transfer files to and from MVS, OS/390, AS/400, or AS/36 hosts. The Host File Transfer ActiveX control also supports a set of events notifying a client application of connection status, file transfer status, and error reporting. These events are handled by the client supporting several callback functions and setting these callbacks using the IConnectionPointContainer.

The following IEIGFileTransferCtl object methods are supported by the Microsoft Host File Transfer ActiveX control:

Method name	**Comment**
Cancel method	Terminates a file transfer operation that is already in progress.
Connect method	Establishes a connection to the configured host and reports to the user an indication of the success or failure of the action.
Disconnect method	Terminates an existing connection to a host machine.
GetFile method	Copies a file from host storage to local storage. This method requires the two file names as parameters.
PutFile method	Copies a file from local storage to host storage. This method requires the two file names as parameters.

The following **IEIGFileTransferCtl** object properties are supported by the Microsoft Host File Transfer ActiveX control:

Property name	**Comment**
AppendToEnd property	Sets or returns whether a file transfer should append to the end of a file (eigAnswerYes) if the file exists, or should it overwrite the existing contents replacing the data with the new information (eigAnswerNo). This property defaults to eigAnswerYes (0).
CCSID property	Sets or returns the character code set identifier (CCSID) that must match the data in the file as represented on the remote host computer. This property defaults to U.S./Canada (37).
ConnectionState property	Returns the current state of the connection. The state of a connection can be unspecified, idle, connecting, connected, or disconnecting.
ConnectionType property	Sets or returns the network transport used for this connection. The **ConnectionType** property designates whether the Host File Transfer ActiveX control connects through APPC (SNA LU 6.2) or TCP/IP. The possible values for this parameter are a TCP/IP or an APPC connection using an enumerated value. The default value for this parameter is an APPC (SNA) connection type. If APPC is selected, then values for the **LocalLU**, **ModeName**, and **RemoteLU** properties are required. If TCP/IP is selected, then values for the **NetAddr** and **NetPort** properties are required.
CreateIfNonExisting property	Sets or returns whether a file operation should create a new destination file if one does not already exist (eigAnswerYes). This property defaults to eigAnswerNo (1)
LocalLU property	Sets or returns the Local LU Alias. When LU 6.2 (SNA) is selected for the ConnectionType property, this property must match the name of the local LU alias configured using SNA Manager. This property defaults to the string value of "LOCAL" represented as a BSTR.
ModeName property	Sets or returns the APPC mode. When APPC (LU 6.2 SNA) is selected for the ConnectionType property, this field must bet set to the APPC mode that matches the host configuration and Host Integration Server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bi-directional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This property defaults to the string value of "QPCSUPP" represented as a BSTR.

NetAddr property	Sets or returns the IP address of the host computer. When TCP/IP has been selected for the **ConnectionType** property, this property indicates the IP address of the host. This property can be an IP address or the name representing the host IP address using the Domain Name System (sna.microsoft.com, for example). This property is a string (BSTR) and has no default value.
NetPort property	Sets or returns the TCP/IP port used for communication with the host. When TCP/IP has been selected for the ConnectionType property, this parameter is the TCP/IP port used for communication with the host. The default value for this property is the string (BSTR) "446" representing TCP/IP port 446.
OverwriteHostFile property	Sets or returns whether a file operation request to copy a file that will write over an existing file will fail. When this property is set to eigAnswerNo, a request to write a file over an existing file will fail. This property defaults to eigAnswerNo (1)
Password property	Sets or returns the password used for authentication. A valid user name and password are normally required to access files on a host computer. The password is case sensitive and is normally displayed as asterisks in a dialog box for security purposes. This property is a string (BSTR) and has no default value.
PCCodePage property	Sets or returns the PC codepage The **PCCodePage** property indicates the codepage to be used on the PC for character code conversion. This property defaults to Latin 1 (1252).
RDBName property	Sets or returns the name of the remote database name and the host column description (HCD) file that describes the data types and data conversions used to transfer this file. The HCD file describing the data should be located in the system subdirectory below the root directory where Host Integration Server was installed. Setup defaults to the following location: C:\Program Files\Host Integration Server When TCP/IP is selected for the **ConnectionType** property, the **RDBName** must also match the name of the remote database system.
RemoteLU property	Sets or returns the Remote LU Alias. When APPC (LU 6.2 SNA) is selected for the **ConnectionType** property, this property is the name of the local LU alias configured using SNA Manager. This property is a string (BSTR) has no default value.
UserID property	Sets or returns the user name used for authentication. A valid user name and password are normally required to access files on a host computer. This value is case sensitive. This property is a string (BSTR) and has no default value.

IEIGFileTransferCtlEvents Notification

The Microsoft Host File Transfer ActiveX control also supports a set of events notifying a client application of connection status, file transfer status, and error reporting. These events are handled by the client supporting several callback interfaces and setting these callbacks derived from the standard **IConnectionPointContainer** COM object.

The following IEIGFileTransferCtlEvents notification interface methods are supported by the Microsoft Host File Transfer ActiveX control:

Event notifications	Comment
ConnectionStateChange	This event is fired when the state of a connection has changed. A *ConnectionState* parameter is passed to the client callback function that receives this event method call. This parameter is an eigConnectionStateEnum value representing the new state of the ConnectionState property.
ReportError	This event is used in order to return error conditions that occur during the synchronous processing of methods. This event passes two parameters to the client callback function that receives this event method call. The first parameter is a long value representing an error code. The second parameter is a BSTR string containing a brief text description of the error.
TransferComplete	This event is an indication to the client that the requested transfer operation has completed.
TransferProgress	This event will be fired periodically in order to inform the client of the progress of an unattended file transfer. A *PercentageDone* parameter is passed to the client callback function that receives this event method call. This parameter is a short value representing the percentage complete of the requested operation ranging from 0 to 100. A client application has the option to terminate a file transfer when this event is fired.

Programming Considerations Using Host File Transfer

The Microsoft® Host File Transfer ActiveX® control exposes a dual interface deriving from **IDispatch**. This provides support and flexibility to clients wishing to use the object. Clients that provide support automation interfaces can use the **IDispatch** interface while more robust clients may use the custom interface. Using the custom interface offers the greatest execution speed.

The single-threading model is supported, allowing only single threads to access the objects safely.

The Host File Transfer ActiveX control does not support uploading Direct Relative Record Data Set (RRDS) files on System/36. An error (381) will occur and the following error message will be received.

```
"Target Not Supported"
```

The Host File Transfer ActiveX control also does not support uploading RRDS files with the CreateIfNonExisting property option set to yes on System/36. An error will occur (381) and the following message will be received.

```
"Target Not Supported"
```

If there is existing data in a file on OS/390, setting the OverwriteHostFile and AppendToEnd properties to "no" should cause an error (58) to occur and the following error message should be received.

```
"File contains existing data. Upload not configured to append data - upload aborted"
```

On OS/390, this error is not triggered for sequential or KSDS files. Instead the data is appended to the existing data in the file for sequential files and duplicate records are not appended to KSDS files.

The **AppendToEnd** property and the **OverwriteHostFile** property are mutually exclusive, so it is not possible to enable (set to yes) one of these properties before the opposing property is disabled (set to no). The **AppendToEnd** property takes precedence over the **OverwriteHostFile** property, since **AppendToEnd** defaults to yes and **OverwriteHostFile** defaults to no. Consequently, the order in which these properties are set will affect the outcome. For example, the following order will result in the properties being set correctly:

```
FileTransfer.AppendToEnd = eigAnswerNo         // correctly set to no
FileTransfer.OverwriteHostFile = eigAnswerYes  // correctly set to yes
```

In contrast, setting the properties in the improper order will cause the properties to be set incorrectly as follows:

```
FileTransfer.OverwriteHostFile = eigAnswerYes   // remains at no
// AppendToEnd defaults to eigAnswerYes, so this change is illegal
FileTransfer.AppendToEnd = eigAnswerNo          // correctly set to no
```

In this second case, the **OverwriteHostFile** property cannot be set to yes (enabled) until the **AppendToEnd** property is set to no (disabled).

Using the Data Descriptions tool, setting the Ascending/Descending option on an OS/390 or MVS/ESA key sequenced file has no effect. Using the Host File Transfer ActiveX control, data is always uploaded and downloaded in the ascending key order.

If the **Cancel** method is executed while uploading a file with the **AppendToEnd** property set to yes, this will result in no change to the host file. However, if the **Cancel** method is executed while uploading a file with the **OverwriteHostFile** property set to yes, this will result in an empty host file. The **Cancel** method implies the transfer has been stopped and all the files are at their original values, but this is not really the case when the **OverwriteHostFile** property is set to yes.

This section contains:

- Code Page Support Using Host File Transfer
- Data Conversion Using Host File Transfer
- Usernames and Passwords Using Host File Transfer
- Troubleshooting the Host File Transfer ActiveX Control

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Code Page Support Using Host File Transfer

When using the Host File Transfer ActiveX control, the Host CCSID (character code set identifier) property should be configured to match the data as represented on the remote host computer. The Host CCSID parameter defaults to EBCDIC U.S./Canada (37) when using the Host File Transfer ActiveX control.

This section contains:

- ISO Code Page Support Using Host File Transfer
- DBCS Code Page Support Using Host File Transfer

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ISO Code Page Support Using Host File Transfer

Microsoft Host Integration Server 2004 includes support for some ISO code pages for purposes of ISO-to-UNICODE-to-ANSI, ANSI-to-UNICODE-to-ISO, and ISO-to-UNICODE-to-ISO conversions when using the Host File Transfer ActiveX control. These ISO code pages can be used when accessing host files containing ISO code pages.

Depending on the version of Windows being used, to support ISO-to-UNICODE-to-ANSI (Windows), ANSI-to-UNCODE-to-ISO, and ISO-to-UNICODE-to-ISO code page conversions, you may need to install the appropriate ISO National Language Support (NLS) file for your locale.

On Microsoft Windows® 2000, the appropriate ISO NLS file for your locale is installed automatically when you install a localized version of Windows 2000. On Windows Server™ 2003, the appropriate ISO NLS file for your locale is installed automatically when you install the US-English version.

The following table shows the ISO character code set identifiers (CCSIDs) supported by Host File Transfer ActiveX control in Host Integration Server 2004.

Microsoft display name	Microsoft NLS code page	IBM CCSID	Comments
ISO 8859-1 Latin 1	28591	819	
ISO 8859-2 Central europe	28592	912	
ISO 8859-5 Cyrillic	28595	915	
ISO 8859-6 Arabic	28596	1089	
ISO 8859-7 Greek	28597	813	
ISO 8859-8 Hebrew	28598	916	
ISO 8859-9 Turkish	28599	920	
ISO 6937 Non-Spacing Accent	20269	819	Note that ISO 6937 (CCSID 20269) is not supported by the OLE DB Provider for DB2, but is displayed in the list of configuration options when creating or modifying data sources.
ISO 8859-15 Latin 9 (euro)	20865	923	NLS Code Page 819 with support for the euro.

The Microsoft display name is the name found in the Windows 2000 definitions for these NLS files.

The Microsoft NLS code page column represents the code page number that is registered and associated with an ISO-to-UNICODE NLS resource file. The Microsoft NLS number should be set as the Host CCSID when using the Host File Transfer ActiveX control. When setting the Host CCSID or PC Code Page property, use the Microsoft NLS number for this parameter.

The IBM CCSID column represents the CCSID given to the ISO code page in IBM publications. IBM lists their ISO support in publications by referencing the locale name (Bulgaria for ISO8859-5 and 915, for example) rather than simply using ISO 8859-5 Cyrillic as used by Microsoft. The Host File Transfer ActiveX control does not recognize or display the IBM CCSID values.

The Host File Transfer ActiveX control maps the Microsoft NLS numbers to ISO NLS files which correspond with the appropriate IBM CCSID numbers. The Host File Transfer ActiveX control passes the corresponding IBM CCSID to the host system at run time even though you configure this property using the Microsoft NLS number.

> **Note** The IBM CCSID 819 is associated with both ISO 8859-1 Latin 1 and ISO 6937 Non-Spacing Accent. It is up to the user to choose the standard ISO 8859-1 Latin 1 code page by selecting NLS code page 28591 or the modified code page ISO 6937 Non-Spacing Accent by selecting NLS code page 20269.

> **Note** The ISO 6937 Non-Spacing Accent (CCSID 20269) is not currently supported by the Host File Transfer ActiveX control.

IBM CCSID 916 (ISO 8859-8) supports Hebrew "visual sort order". IBM CCSID 920 (ISO 8859-8 derivation) supports Hebrew "logical sort order". Although Microsoft supports the logical sort order with NLS 38598, this NLS file is only distributed with Internet Explorer 5 or Windows 2000.

The Host File Transfer ActiveX control has not been tested using the ISO 8859-8 derivation matching IBM CCSID 920 and does not support this configuration.

These are the only ISO pages currently supported in Host Integration Server 2004. Microsoft supports a number of additional ISO pages. IBM also supports additional ISO pages. However, the code pages listed in the table above are the only cases where the Microsoft NLS pages and IBM CCSIDs match.

DBCS Code Page Support Using Host File Transfer

Support for Double-Byte Character String (DBCS) data is limited using the Host File Transfer ActiveX control. Conversions between DBCS and ANSI code pages are not supported. Conversions between DBCS and ISO code pages are not supported.

Data Conversion Using Host File Transfer

Using the Host File Transfer ActiveX control, host data is converted to default C data types as defined in ODBC and OLE DB and illustrated in the following table:

Host data type **(description in HCD file)**	**Default C data type**	**Comments**
BINARY		A free-form binary data type of specified length. This data type is transferred without being converted.
CHAR	char string[]	A fixed-length string. This data type is converted to a DBTYPE_BSTR for use by Host File Transfer ActiveX control.
DATE	date struct	A 10-byte date string. This data type is converted to a DBTYPE_DATE for use by OLE DB.
DOUBLE	double	An 8-byte double-precision floating-point number. This data type is converted to a DBTYPE_R8 for use by OLE DB.
FLOAT	double	An 8-byte double-precision floating point number. This data type is the same as a DOUBLE. This data type is converted to a DBTYPE_R8 for use by OLE DB.
LONG	int	A 4-byte integer ranging in value from -2,147,463,648 to +2,147,483,647. This data type is converted to a DBTYPE_I4 for use by OLE DB.
LONG VARBINARY	char string[]	A varying-length binary string up to 32,740 bytes in length. This data type is converted to a DBTYPE_STR for use by OLE DB.
LONG VARCHAR	char string[]	A varying-length character string up to 32,740 characters in length. This data type is converted to a DBTYPE_STR for use by OLE DB.
PACKED	unsigned char number[]	A packed decimal number. This data type is converted to a DBTYPE_DECIMAL for use by OLE DB
REAL	float	A 4-byte single-precision floating-point number. This data type is converted to a DBTYPE_R4 for use by OLE DB.
SHORT	short	A SMALLINT (small integer) is a two-byte integer with a precision of 5 digits ranging from -32,768 to +32,767. This data type is converted to a DBTYPE_I2 for use by OLE DB.
SINGLE	float	A 4-byte single-precision floating-point number. This data type is converted to a DBTYPE_R4 for use by OLE DB.
TIME	time struct	An 8-byte time string. This data type is converted to a DBTYPE_TIME for use by OLE DB. When using ActiveX Data Objects to return data from a DB2 TIME data type, ADO returns a DATETIME value.

TIMESTAMP	timestamp struct	A 26-byte string representing the date, time, and microseconds. This data type is converted to a DBTYPE_DBTIMESTAMP for use by OLE DB.
VARBINARY	char string[]	A varying-length binary field. The maximum length of the binary is dependent on the version and the host platform. This data type is transferred without being converted. This data type is converted to a DBTYPE_STR for use by OLE DB.
VARCHAR	char string[]	A varying-length character string. The maximum length of the string is dependent on the version and the host platform. This data type is converted to a DBTYPE_STR for use by OLE DB.
ZONED	unsigned char number[]	A zoned numeric number. This data type is converted to a DBTYPE_NUMERIC for use by OLE DB

> **Note** The maximum length of fixed-length BINARY, fixed-length CHAR, VARBINARY, and VARCHAR data types is dependent on the version of the host software that is being accessed. For example, the maximum length of the CHAR data type on OS/390 is 254 characters, while the maximum length of this same host data type is 32,765 on OS/400.

Data conversions from a large numeric type to a small numeric type are supported (from DOUBLE to SINGLE and from INT to SMALLINT, for example), however truncation and conversion errors can occur that will not be reported by the Host File Transfer ActiveX control.

Using the Host File Transfer ActiveX control, certain conversions of strings from EBCDIC to ASCII and then back to EBCDIC are asymmetric, and can result in strings that are different from the original. The EBCDIC specification contains ordinals for which there is no defined character. The Host File Transfer ActiveX control translates all such undefined characters to the question mark character ("?"). So when ASCII strings containing these characters are converted back to EBCDIC, these undefined characters will be replaced with question marks. To protect EBCDIC strings containing undefined characters, these fields should be tagged as binary strings and mapped by the application.

The ANSI to EBCDIC character conversions affected include the following:

Character value (decimal)	Character value (hexadecimal)	ANSI code page 1252	EBCDIC character after conversion to CCSID 37
128	0x80	Not used	?
130	0x82	Single low quote	?
131	0x83	Latin F with hook	?
132	0x84	Double low quote	?
133	0x85	Ellipsis	?
134	0x86	Dagger	?
135	0x87	Double dagger	?
136	0x88	Per mile	?
137	0x89	S with caron	?
138	0x8A	Left angle	?
139	0x8B	Ligature OE	?
140	0x8C	Not used	?
142	0x8E	Not used	?
145-156	0x91-0x9C		?
158-159	0x9E-0x9F		?

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Usernames and Passwords Using Host File Transfer

When connecting to host systems, most users must be authenticated by the remote system by passing a valid user ID and password.

The AS/400 computer is case-sensitive with regard to user ID and password. The AS/400 only accepts a user ID and password in uppercase. The Microsoft Host File Transfer ActiveX control forces the User ID and Password into uppercase when it knows that it is connecting to an AS/400 system.

The mainframe is not case-sensitive. This means that on mainframe computers, one can enter the user ID and password in any case.

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Troubleshooting the Host File Transfer ActiveX Control

The Microsoft Host File Transfer ActiveX control supplied with Host Integration Server 2004 has the ability to trace DRDA data flows when used over TCP/IP.

This tracing capability is accessible from the SNADDM Service tracing inside the Trace tool. This facility will show the same data as an APPC trace but without the control indicators (For example, What_Received). Socket errors are traced and the error codes can be looked up in Winsock2.h supplied with the Platform SDK.

The Host File Transfer ActiveX control can return the following types of errors:

- Errors from the remote hosts
- Microsoft Host File Transfer-specific errors
- Errors from the underlying DDM application requester network client

Data Queue ActiveX Control Programmer's Guide

A data queue is an AS/400 system object that is used for inter-process communications between multiple programs or jobs. Data queues allow multiple programs to send and receive shared messages via a central repository without first writing the message data to a physical database file. Typically, when a data record is read from the queue, the record is erased from the queue. The advantage of using data queues to share data in comparison with using database files is that data queues require much less file I/O and therefore improve overall system performance.

The Microsoft® Data Queue ActiveX® control provides the ability to access AS/400 data queues. Microsoft Host Integration Server 2004 provides this service via a single ActiveX control that depends on other core Host Integration Server DLLs. Developers can move part or all of their AS/400 applications from an AS/400 computer to a PC platform, while retaining access in the program running on the PC to a remote data queue on the AS/400.

The Data Queue ActiveX control is implemented as a Distributed Data Management (DDM) Application Requester. The Data Queue ActiveX control uses the Data Queue interfaces in the DDM Level 4 architecture, which are extensions to the record-level input/output (RLIO) protocol of IBM's Distributed Data Management architecture.

DDM is a set of rules for distributing or extending data management from one computer to another, such as from a mainframe to an AS/400 computer or from one of these host computers to a server computer. By combining the Microsoft Data Queue ActiveX control and DDM architectures, Microsoft enables organizations to preserve their investments in existing data management infrastructure, while extending universal file and data transfer to all enterprise-wide data sources.

The information in this section is required to develop applications with Host Integration Server 2004 that use ActiveX or COM objects to transfer data from local machines to AS/400 Data Queues in a Systems Network Architecture (SNA) environment.

For information on the platform requirements for the Data Queue ActiveX Control, see the Host Integration Server 2004 Installation Guide topic Hardware and Software Requirements.

This section contains:

- Advantages of Data Queues
- Object Support Using Data Queues
- Programming Considerations Using the Data Queue ActiveX Control

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Advantages of Data Queues

Data queues provide a fast means of inter-process communication, requiring low system overhead and minimal setup. AS/400 Data Queues are designed to provide a flexible, highly efficient, yet temporary means of inter-process communication. Data queues are familiar to most AS/400 programmers as a simple method of passing information to another program.

Data queues provide considerable flexibility to the application programmer. The data queues interfaces require no communications programming and can be used either for connected or disconnected communication. AS/400 and PC applications can be developed using any supported language, yet still communicate with each other. PC programs can communicate with AS/400 programs through a common AS/400 data queue. The use of data queues requires little knowledge of communication and no knowledge of APPC if the programmer utilizes the Microsoft® Data Queue ActiveX® control. The data queue messages are merely described at the record level, allowing the application programmer to define the field-level structure as required.

By default, when one program reads an entry in the queue, the entry is then deleted. Pointers to the queue entries are then updated to reflect the change in the record stack. A data queue can exist with no entries, a single entry, or multiple entries. Multiple concurrent jobs and programs can access data queues.

When receiving data, the requesting application can set a time-out value to wait for data to arrive in the queue. Waits can be applied based on entry of the data record or for a time period (zero seconds to many days in length). A program that reads from a queue need not be running when the queue is created or when records are inserted. A single data queue can support many separate interactive jobs. At regular intervals or at the end of the day, records in the data queue can be persisted to a file by a single automated batch process.

See Also

Data Queue ActiveX Control Programmer's Guide

Object Support Using Data Queues

The Microsoft® Data Queue ActiveX® control supports a number of standard COM interfaces as well some custom objects and interfaces.

This section contains:

- COM Interface Support Using Data Queues
- IEIGDataQueueCtl Object
- IEIGDataQueue Object
- IEIGDataQueueItem Object
- IEIGDataQueueCtlEvents Notifications
- IEIGDataQueueEvents Notifications

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COM Interface Support Using Data Queues

The Microsoft Data Queue ActiveX control supports a number of standard COM interfaces as well as several custom interfaces, **IEIGDataQueueCtl**, **IEIGDataQueue**, and **IEIGDataQueueItem**. The ActiveX control object has the ability to register and de-register itself via standard control mechanisms. Support for a number of standard COM interfaces makes it easy to develop applications using the Data Queue ActiveX control with Microsoft® Visual Basic® and Microsoft Visual C++® as well as from Microsoft Internet Explorer and Microsoft Access. Supporting a variety of standard COM interfaces also provides different ways for a client to save information.

The following table summarizes the standard COM interfaces supported by the Data Queue ActiveX control.

COM interface	Comments
ICategorizeProperties	This interface divides up the properties into an intelligent presentation to the client.
IConnectionPointContainer	
IDispatch	A dual interface deriving from **IDispatch** is exposed to provide support and flexibility to clients. Clients that provide support for automation interfaces will utilize the **IDispatch** interface, while more robust clients may use the custom interface. Using the custom interface provides for the greatest execution speed.
IPerPropertyBrowsing	This interface provides support for client browsing of properties in an intelligent manner. This interface exposes to the client property lists used in the population of a drop-down list. This interface is required for the control to be hosted by Microsoft Access.
IPropertyNotifySink	The interface is implemented by a sink object to receive notifications about property changes from an object that supports **IPropertyNotifySink** as an outgoing interface. The client that needs to receive the notifications in this interface (from a supporting connectable object) creates a sink with this interface and connects it to the connectable object through the connection point mechanism.
IPersist	
IPersistPropertyBag	This interface is the preferred method of property persisting for Internet Explorer and Visual Basic. Using this interface persisted properties are stored as a set of name/VARIANT value pairs.
IPersistStorage	This interface stores persistent properties into a structured storage object.
IPersistStreamInit	This interface is responsible for saving the persisted properties in binary form using a stream interface. This is the method used by the Microsoft Visual C/C++ compiler to persist properties.
ISupportErrorInfo	This interface is the preferred method to return error indications to scripting clients. Using this interface, error codes and explanation text are returned to the client. This information may be used in order to provide diagnostic information to the user and in cases of failure.

See Also

Object Support Using Data Queues

IEIGDataQueueCtl Object

The **IEIGDataQueueCtl** object supports a number of properties and methods that provide the ability to connect with a host and communicate with OS/400 Data Queues. The **IEIGDataQueueCtl** also supports a set of events notifying a client application of connection status and error reporting. These events are handled by the client supporting several callback functions and setting these callbacks using the **IConnectionPointContainer**.

The following **IEIGDataQueueCtl** object methods are supported by the Microsoft Data Queue ActiveX control.

Method name	Comment
Connect	Establishes a connection to the configured host and reports to the user an indication of the success or failure of the action.
CreateQueueContainer	Creates an instance of an IEIGDataQueue container object and optionally initializes the QueueName property. The created queue object is assumed to be associated with the connection object that created it for the life of the connection or the life of the queue object.
Disconnect	Terminates an existing connection to a host machine.

The following **IEIGDataQueueCtl** object properties are supported by the Microsoft Data Queue ActiveX control.

Property name	Comment
CCSID	Sets or returns the character code set identifier (CCSID) that must match the data in the AS/400 data queue as represented on the remote host computer. This property defaults to U.S./Canada (37).
ConnectionState	Returns the current state of the connection. The state of a connection can be unspecified, idle, connecting, connected, or disconnecting.
ConnectionType	Sets or returns the network transport used for this connection. The default value for this parameter is SNA. Note that TCP/IP is not supported. If APPC is selected, then values for the **LocalLU**, **ModeName**, and **RemoteLU** properties are required.
LocalLU	Sets or returns the Local LU Alias. When APPC (SNA LU 6.2) is selected for the ConnectionType property, this property must match the name of the local LU alias configured using SNA Manager. This property defaults to the string value of "LOCAL" represented as a BSTR.
ModeName	Sets or returns the APPC mode. When APPC (LU 6.2 SNA) is selected for the **ConnectionType** property, this field must be set to the APPC mode that matches the host configuration and Host Integration Server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bi-directional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This property defaults to the string value of "QPCSUPP" represented as a BSTR.
Password	Sets or returns the password used for authentication. A valid user name and password are normally required to access data on a host computer. The password is case sensitive and is normally displayed as asterisks in a dialog box for security purposes. This property is a string (BSTR) and has no default value.
PCCodePage	Sets or returns the PC code page The PC Code Page property indicates the code page to be used on the PC for character code conversion. This property defaults to Latin 1 (1252).
RemoteLU	Sets or returns the Remote LU Alias. When APPC (LU 6.2 SNA) is selected for the **ConnectionType** property, this property is the name of the remote LU alias configured using SNA Manager. This property is a string (BSTR) and has no default value.

UserID	Sets or returns the user name used for authentication. A valid user name and password are normally required to access data on a host computer. This value is case sensitive. This property is a string (BSTR) and has no default value.

See Also

Object Support Using Data Queues

IEIGDataQueue Object

The **IEIGDataQueue** object represents a logical queue and supports a number of properties and methods that provide the ability to communicate with a specific data queue. The QueueName property is the name of the physical queue. All methods and events are related to the queue that is represented by the individual instance of the object. The Data Queue ActiveX control also supports a set of events notifying a client application of connection status, data transfer status, and error reporting. These events are handled by the client supporting several callback functions and setting these callbacks using the **IConnectionPointContainer**.

The following **IEIGDataQueue** object methods are supported by the Microsoft Data Queue ActiveX control.

Method name	**Comment**
AddQueueItem	Adds a record to the current queue.
Cancel	Terminates a request to receive information from the queue that is already in progress.
CancelQueue	Indicates that an application no longer wants to be notified of an incoming queue data item. This can be used to stop pending notifications that were queued as a result of calling **GetQueueItem**.
ClearAll	Removes all items from the queue.
CreateQueue	Creates a data queue.
DeleteQueue	Clears all messages from the queue and then deletes the queue.
GetQueueItem	Retrieves an item from the queue.
QueryAttribute	Requests information on one of the queue's attributes
SetAttribute	Changes the attributes associated with a data queue.
StopQueue	Stops the queue from responding to client requests.

The following **IEIGDataQueue** object property is supported by the Microsoft Data Queue ActiveX control.

Property name	**Comment**
QueueName	This is the name of the data queue this object is associated with.

See Also

Object Support Using Data Queues

IEIGDataQueueItem Object

The **IEIGDataQueueItem** object represents a specific queue item and supports a number of properties and methods.

The following **IEIGDataQueueItem** object method is supported by the Microsoft Data Queue ActiveX control.

Method name	**Comment**
Reset	Resets the queue item properties to default values.

The following **IEIGDataQueueItem** object properties are supported by the Microsoft Data Queue ActiveX control.

Property name	**Comment**
ExtUser	The external job user name.
ExtJobName	The external job name.
ExtJobNumber	The external job number.
InactiveRec	Indicates an Inactive record.
Keyval	The key value.
Message	The queue message.
QItemType	The type of queue item this represents.
Record	The entire queue data.
RecordAttribute	The list of record attributes.
RecCount	The record count.
RecNumber	The record number.
ReplyRequest	Indicates if the reply message should be returned.
UsrProf	The user profile.

See Also

Object Support Using Data Queues

IEIGDataQueueCtlEvents Notifications

The **IEIGDataQueueCtl** object of the Microsoft Data Queue ActiveX control also supports a set of events notifying a client application of connection status and error reporting. These events are handled by the client supporting several callback interfaces and setting these callbacks derived from the standard **IConnectionPointContainer** COM object.

The following **IEIGDataQueueCtlEvents** notification interface methods are supported by the Data Queue ActiveX control:

Event notifications	Comment
ConnectionStateChange	This event is fired when the state of a connection has changed. A ConnectionState parameter is passed to the client callback function that receives this event method call. This parameter is an **eigConnectionStateEnum** value representing the new state of the ConnectionState property.
ReportError	This event is fired when an error condition needs to be reported during non-blocking (asynchronous) functions. This event passes two parameters to the client callback function that receives this event method call. The first parameter is a long value representing an error code. The second parameter is a BSTR string containing a brief text description of the error.

See Also

Object Support Using Data Queues

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IEIGDataQueueEvents Notifications

The **IEIGDataQueue** object of the Microsoft Data Queue ActiveX control also supports a set of events notifying a client application of when transfers are completed, requests are received, and error reporting. These events are handled by the client supporting several callback interfaces and setting these callbacks derived from the standard **IConnectionPointContainer** COM object.

The following **IEIGDataQueueEvents** notification interface methods are supported by the Data Queue ActiveX control:

Event notifications	Comment
ReportError2	This event is fired when an error condition needs to be reported during non-blocking (asynchronous) functions. This event passes two parameters to the client callback function that receives this event method call. The first parameter is a long value representing an error code. The second parameter is a BSTR string containing a brief text description of the error.
RequestReceived	This event is fired when a request is received.
SendComplete	This event is fired as an indication to the client that the requested transfer operation has completed.

See Also

Object Support Using Data Queues

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Programming Considerations Using the Data Queue ActiveX Control

The Microsoft® Data Queue ActiveX® control exposes a dual interface deriving from **IDispatch**. This provides support and flexibility to clients wishing to use the object. Clients that provide support for automation interfaces can use the **IDispatch** interface while more robust clients may use the custom interface. Using the custom interface offers the greatest execution speed.

The single-threading model is supported, allowing only single threads to access the objects safely.

Asynchronous read operations are not currently supported. The *BlockComplete* parameter of the GetQueueItem method must be set to a value of 0 (eigAnswerYes), indicating that the **GetQueueItem** operation should block until the completion status is known.

This section contains:

- Code Page Support Using Data Queues
- User Names and Passwords Using Data Queues
- Troubleshooting the Data Queue ActiveX Control

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Code Page Support Using Data Queues

When using the Data Queue ActiveX control, the Host CCSID (character code set identifier) property should be configured to match the data as represented on the remote host computer. The Host CCSID parameter defaults to EBCDIC U.S./Canada (37) when using the Data Queue ActiveX control.

This section contains:

- DBCS Code Page Support Using Data Queues

DBCS Code Page Support Using Data Queues

Support for Double-Byte Character String (DBCS) data is limited using the Data Queue ActiveX control. Conversions between DBCS and ANSI code pages are not supported. Conversions between DBCS and ISO code pages are not supported.

The DB2 GRAPHIC data types (GRAPHIC, VARGRAPHIC, and LONG VARGRAPHIC) are not supported. These DB2 data types support DBCS (not mixed) data. Mixed data types are supported using CHAR FOR MIXED DATA, VARCHAR FOR MIXED DATA, and LONGVARCHAR FOR MIXED DATA.

See Also

Code Page Support Using Data Queues

User Names and Passwords Using Data Queues

When connecting to host systems, most users must be authenticated by the remote system by passing a valid User ID and Password.

The AS/400 computer is case-sensitive with regard to user ID and password. The AS/400 only accepts a user ID and password in uppercase. The Microsoft Data Queue ActiveX control forces the user ID and password into uppercase when it knows that it is connecting to an AS/400 system.

See Also

Programming Considerations Using the Data Queue ActiveX Control

Troubleshooting the Data Queue ActiveX Control

The Microsoft Data Queue ActiveX control supplied with Microsoft Host Integration Server 2004 has the ability to trace DRDA data flows.

This tracing capability is accessible from the DB2 Network Library tracing inside the Trace tool. This facility shows the same data as an APPC trace but without the control indicators (for example, What_Received). Socket errors are traced and the error codes can be looked up in Winsock2.h supplied with the Platform SDK.

The Data Queue ActiveX control can return the following types of errors:

- Errors from the remote hosts
- Microsoft Data Queue-specific errors
- Errors from the underlying DDM application requester network client

See Also

Programming Considerations Using the Data Queue ActiveX Control

Using Data Design Tools

The Data Design Tools are a set of technologies exposed in Microsoft® Visual Studio® .NET 2003 that enable you to visually create database connections and queries, browse tables, view data, execute stored procedures, and access other database features. The following table describes the level of support the Server Explorer for Visual Studio .NET 2003 provides for Microsoft® Host Integration Server 2004.

Provider	Visual Studio 2003 data design support
ODBC Driver for DB2	None
OLE DB Provider for DB2	High
Managed Provider for DB2	Low
OLE DB Provider for AS/400 and VSAM	Low
Data Queues	None
File Transfer ActiveX® controls	None

This section contains:

- Using Data Design Tools for the OLE DB Provider for DB2
- Using Data Design Tools for the Managed Provider for DB2
- Using Data Design Tools for the Microsoft OLE DB Provider for AS/400 and VSAM

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Using Data Design Tools for the OLE DB Provider for DB2

The OLE DB Provider for DB2 is the provider that the Microsoft® Visual Studio® .NET 2003 Data Design Tools most heavily support. The following list describes the different Data Design Tools available in Visual Studio .NET 2003, and how they interact with the OLE DB Provider for DB2.

- Database Designer

  With this visual tool, you can design and visualize a DB2 database to which you are connected. When designing a database, you can use the Database Designer to create, edit, or delete tables, columns, keys, indexes, relationships, and constraints. To visualize a database, you can create one or more diagrams illustrating some or all of the tables, columns, keys, and relationships.

- Table Designer

  With this visual tool, you can design and visualize a single table in a DB2 database to which you are connected.

- Query and View Designer

  With this visual tool, you can design a query, view, in-line function, or single-statement stored procedure.

- SQL Editor

  This integrated tool provides a variety of SQL text-editing features.

- Server Explorer

  With this Visual Explorer window, you can view and manipulate data links, database connections, and system resources on any server to which you have network access. Features include the ability to open data connections, log onto servers and display system resources, make database connections, and create data components that describe remote resources for your Visual Studio .NET projects.

- Solution Explorer

  Provides an organized view of your projects and their files as well as ready access to the commands that pertain to them.

See Also

Using Data Design Tools

Using Data Design Tools for the Managed Provider for DB2

The Data Design Tools included in Microsoft® Visual Studio® .NET 2003 do not currently support the Managed Provider for DB2. However, you can partially prototype and design your data connections with System.Data and ADO.NET using the available tools.

To use the Data Design Tools for the Managed Provider for DB2

1. Use the Data Design Tools for the OLE DB Provider for DB2 to outline your data connection.

   The OLE DB Provider for DB2 and the Managed Provider for DB2 are similar enough that the generated scripts and objects can provide a starting point for your Managed Provider for DB2 connection.

2. Manually alter the autogenerated files for use with the Managed Provider for DB2.

See Also

- Using Data Design Tools for the OLE DB Provider for DB2
- Managed Provider for DB2 Programmer's Guide

Using Data Design Tools for the Microsoft OLE DB Provider for AS/400 and VSAM

The Microsoft OLE DB Provider for AS/400 and VASM is a non-SQL command provider. As such, this provider does not integrate well with the Microsoft® Visual Studio® .NET 2003 Data Design Tools. While you can create a data connection from the supplied menus in Visual Studio, very few of the generated scripts and objects are useful for a Microsoft® Host Integration Server 2004 application. Instead, it is recommended that you manually create the connections using the standard programming technologies.

See Also

- OLE DB Provider for AS/400 and VSAM Programmer's Guide

Data Integration Security Guide

This topic covers security issues that programmers working with the data integration features of Microsoft® Host Integration Server 2004 should understand.

This section contains:

- Managed Provider Security
- OLE DB Provider for DB 2, AS/400, and VSAM Security
- Host File Transfer Object Security

Managed Provider Security

The following topics discuss security as it applies to the Managed Provider for DB2 section of the Microsoft® Host Integration Server 2004 SDK.

About Managed Provider security for developers

A Managed Provider is a .NET data provider used for connecting Microsoft® Host Integration Server 2004 applications to a database, executing commands, and retrieving results. Those results are either processed directly, or placed in an ADO.NET **DataSet**.

The Managed Provider for DB2 is built on .NET, and because of this it can take advantage of many of the security features that a managed environment provides. This section discusses security features and issues that you should be aware of when using the Managed Provider.

Threats and mitigations for the Managed Provider

Programmers who use the Managed Provider for DB2 should be aware of the following security practices and issues.

Protect components store connection information in plain text

Generic data access components, such as the Data Tools and Data Bound controls in Microsoft Visual Studio® .NET store sensitive DB2 connection data in plain text. This is done to grant third parties easy access to host data when using the control.

Storing connection data in plain text is a security concern because there is the potential for another application or user to read the active memory belonging to the control, and retrieve sensitive information from the plain text stored in the control. You can improve the security of your Host Integration Server application using one or more of the following techniques:

- Store any file known to contain connection information, such as a .UDL file, in a secure location.
- Design your applications so that you release and destroy any components known to store data in plain text as soon as the user is finished with the component.

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OLE DB Provider for DB 2, AS/400, and VSAM Security

The following topics discuss security as it applies to the following sections of Microsoft® Host Integration Server 2004 SDK.

- OLE DB Provider for DB2
- OLE DB Provider for AS/400 and VASM

About OLE DB Provider Security for Developers

These Microsoft® OLE DB providers enable users to access IBM Data Base 2 (DB2) from within an OLE-aware application. The object linking and embedding database (OLE DB) is a standard set of interfaces that provides heterogeneous access to disparate sources of information located anywhere—file systems, e-mail folders, and databases. The OLE DB Provider for DB2 combines the universal data access of OLE DB with the IBM Distributed Relational Database Architecture (DRDA).

This section discusses security features and issues that you should be aware of before programming the OLE DB Provider for DB2.

Single Sign-On

Enterprise Single Sign-On provides services that request and verify your credentials after you log on to the network, and use your credentials to determine the actions that you can perform based on your user rights. Single Sign-On is supported for the OLE DB provider for DB2.

For information on how you can configure Single Sign-On for the OLE DB Providers, see Connection.

Threats and mitigations for the OLE DB Provider

Programmers who use these features should be aware of the following security practices and issues.

Do not use the RowsetViewer sample as a diagnostic tool

The OLE DB RowsetViewer Sample is a sample that is included in the Host Integration SDK sample. In the past it was often used as a diagnostic tool to test data connections. It is rarely used today, and has several security issues. Most developers use the Microsoft® Visual Studio® .NET data design tool Server Explorer. For more information, see Using Data Design Tools.

The Data Access Tool also allows developers and administrators to test connections and sample data without the security risks of the RowsetViewer sample.

The RowsetViewer sample is still included in the SDK for reference purposes, not as a usable tool.

The OLE DB Provider for DB2 stores host configuration data in OLE DB properties collection

The OLE DB Provider for DB2 stores host and PC configuration data in an OLE DB property collection, and then returns this data to the calling program. Your program should not pass this sensitive information on to the end user.

The OLE DB Provider for DB2 DTS and DQP consumers persist configuration data

Generic consumers such as DTS, DQP, Replication, and OLAP persist sensitive host configuration information in the following insecure ways:

- Most SQL Server consumers utilize the SQL Server Repository to store data source information.
- DTS can persist DTS packages (which include data source configuration info) as files (what format?) and VB programs (plain text).

To minimize the risks mentioned above, generic consumers should encrypt sensitive OLE DB connection information using the crypto API (DP, data protection API).

The OLE DB Provider for AS/400 and VSAM stores host configuration data in an OLE DB properties collection

The OLE DB Provider for AS/400 and VSAM stores host and computer configuration data in an OLE DB property collection, and then returns this data to the calling program. Your program should not pass this sensitive information on to the end user.

Use provider-specific connection pooling

It is a best practice to use the provider-specific connection pooling in Host Integration Server 2004 rather than the system provided resource pooling provided by the OLE DB Provider for DB2. This avoids possible security risks in the OLE DB Provider for DB2.

The OLE DB Provider for DB2 DTS and DQP consumers persist configuration data

Generic consumers such as DTS, DQP, Replication and OLAP stores sensitive host configuration information in the following insecure ways:

- Most SQL Server consumers utilize the SQL Server Repository to store data source information.
- DTS can store DTS packages (which include data-source configuration info) as files and VB programs (plain text).

To minimize the risks mentioned above, Generic consumers should encrypt sensitive OLE DB connection information using the crypto API (DP, data protection API).

Host File Transfer Object Security

The Microsoft® Host File Transfer ActiveX® control provides the ability to transfer files between a local computer and an MVS, OS/390, AS/400, or AS/36 host system. Microsoft Host Integration Server 2004 provides this service through a single ActiveX control that depends on other core Host Integration Server DLLs.

This section discusses security features and issues that you should be aware of before you use with the Host File Transfer object in your programs.

Threats and mitigations for the Host File Transfer object

Programmers who use these features should be aware of the following security practices and issues.

Validate input parameters for the Host File Transfer control

You should validate all input parameters before passing them on to the Host File Transfer control.

You should verify all values received from end users before passing values (such as filenames) to the ActiveX control.

The SAM and VSAM data sets, as well as PDS/PDSE members, must be referenced in the host column description (HCD) file the same way as they are referenced in the command text of the OLE DB command object, using the following command text syntax:

```
EXEC OPEN FileName
```

where FileName represents one of the following host file naming conventions:

- Host file type File naming convention
- VSAM Data Sets:

  ```
  DATASETNAME.FILENAME
  ```

- Partitioned Data Sets:

  ```
  DATASETNAME.FILENAME(MEMBER)
  ```

- OS/400 Files:

  ```
  LIBRARY/FILE
  ```

- OS/400 Files:

  ```
  LIBRARY/FILENAME
  ```

- OS/400 File Members:

  ```
  LIBRARY/FILE(MEMBER)
  ```

- OS/400 File Members:

  ```
  LIBRARY.FILENAME(MEMBER)
  ```

Note that if a member of a library contains a dot in the member name, the member name must be surrounded by double quotes. For example, if the member name is NAMES.DAT, the proper syntax used to open a rowset using command text is as follows:

```
EXEC OPEN LIBRARY/FILE("NAMES.DAT")
```

Please note that you must utilize the full path to the mainframe data set. In the example below, there are two path elements and one name element to describe the target data set:

```
XXXXX.XXX.XXX
```

Whenever you allocate a data set, it is given a unique name composed of one or more segments. Each segment of a data set name is joined by periods and represents a level of qualification. For example, the following data set has four segments that comprise the fully qualified data set name.

```
WNW999.DEMO.KSDS.TITLES
```

The high-level qualifier is WNW999. The low-level qualifier is TITLES. Each segment can be from 1-8 characters in length (first character must be alphabetic; remainder can be alphanumeric or hyphens). The data set name must be no more than 44 characters in length and contain no more than 22 segments.

Store the HCD files for the Host File Transfer control in a secure location

File Transfer reads host column description (HCD) files at run time as a means to support data conversion from host data types to OLE DB data types. You should store HCD files in a secure location that only the application can access at run time. This ensures that a malicious user may not modify the file to submit embedded commands.

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Network Integration Programmer's Guide

This section describes how to create applications in a Systems Network Architecture (SNA) environment.

For API references and other technical information about network integration, see the Network Integration Programmer's Reference section of the SDK.

For sample code that illustrates network integration, see the Network Integration Samples section of the SDK.

This section contains:

- IP-DLC Link Service Programmer's Guide
- APPC Programmer's Guide
- CPI-C Programmer's Guide
- LUA Programmer's Guide
- 3270 Emulator Programmer's Guide
- SNA Internationalization Programmer's Guide
- SNA Print Server Data Filter Programmer's Guide
- SNADIS Programmer's Guide
- Network Integration Security Guides

IP-DLC Link Service Programmer's Guide

This section describes how the Internet Protocol–Data Link Control (IP-DLC) link service of Microsoft® Host Integration Server 2004 makes it possible to integrate vital mainframe data and business rules with new e-commerce solutions developed with Microsoft Windows®-based programs. The IP-DLC link service of Host Integration Server 2004 enables you to connect directly to IBM mainframe computers through a pure Transmission Control Protocol/Internet Protocol (TCP/IP) wide area network or local area network.

This section also offers three scenarios for deployment. Two of these scenarios describe migration from Host Integration Server 2000 to Host Integration Server 2004; the third scenario describes a new implementation based on Host Integration Server 2004.

This section contains:

- Transaction Environments Integration
- Fault Tolerance Features
- Security Features
- Common Scenarios
- Define and Set Up the IP-DLC Link Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Transaction Environments Integration

IBM CICS and IMS, as well as OS/400, are popular transaction environments on which enterprise-class organizations rely for supporting daily mission-critical operations. For the most part, line-of-business applications are not written in C Programming Language, Microsoft Visual C++®, Visual Basic®, or Visual C#®, rather they are written in COBOL, PLI, and RPG. These applications do not run on the Windows operating system, rather they run on specific-purpose transaction and batch processing environments on IBM VM, VSE, MVS, OS/390, z/OS, and OS/400 mainframe and midrange computing platforms. Host Integration Server 2004 offers a cost-effective and manageable means to integrate vital mainframe data and business rules with new e-commerce Application-to-Application (A2A), Business-to-Business (B2B), and Business-to-Customer(B2C) solutions developed with Microsoft Visual Studio®.

A growing number of enterprises have standardized on TCP/IP across their wide area networks (WANs) and in their branch offices. Host Integration Server 2004 offers an efficient means to reduce dependency on SNA network protocols, while enabling continued value from using Host Integration Server 2004 core SNA services—which require direct SNA or an SNA over IP network connection.

SNA over IP network integration support in Host Integration Server 2004 offers the following advantages:

- Ability to extend mission-critical SNA networks without complex or expensive non-Microsoft software gateways or hardware routers
- Ability to effectively use the Microsoft Windows Server™ 2003 operating system, such as the Microsoft .NET Framework platform and BizTalk® Server, as a viable architecture for developing new enterprise application integration (EAI) solutions

The approach of Host Integration Server 2004 is to provide easy-to-use tools, high-speed connectivity, choice of programming models, flexibility of environments, and cost-effective Windows-based data conversion. The IP-DLC link service of Host Integration Server 2004 enables you to connect directly to IBM mainframe computers through a pure TCP/IP wide area network or local area network (LAN). This approach not only eliminates the disadvantages of parallel, but offers additional scalability and longevity.

Microsoft Host Integration Server 2004 includes a number of technologies that offer various levels of integration from the network layer up to the application layer.

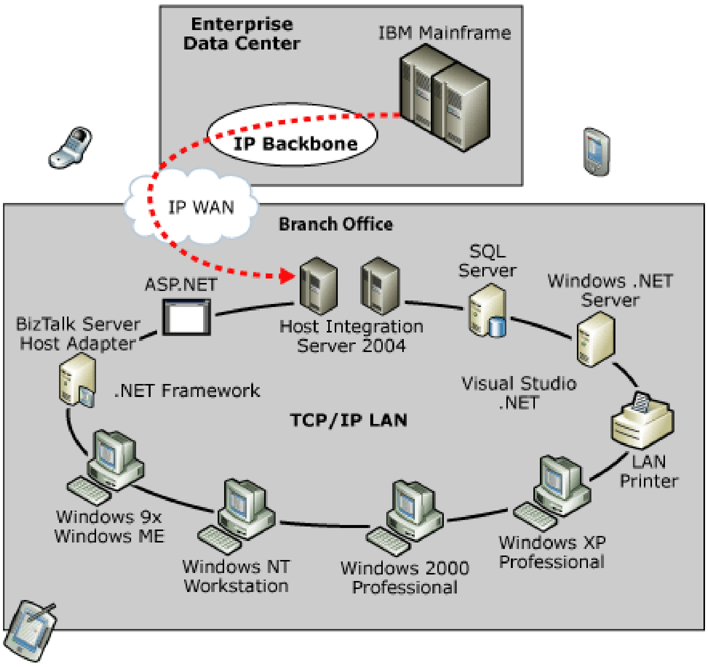
Networking with IP-DLC Link Service

Host Integration Server 2004 offers an efficient means to integrate SNA within data centers, across WANs and in branch offices through a new link service, IP-DLC. IP-DLC link service provides SNA connectivity for applications using dependent and independent sessions over a native IP network.

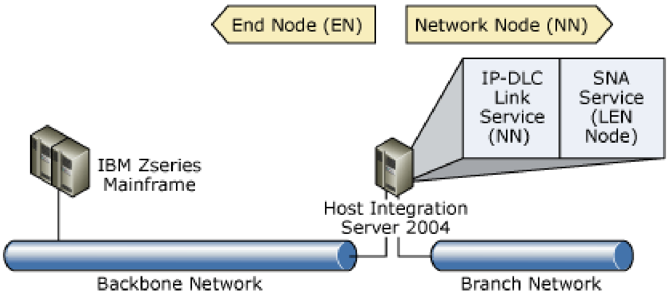
The IP-DLC link service implements the IP-DLC protocols defined in RFC 2353 and the SNA/APPN HPR Architecture Reference (SNA APPN option set 2009). High Performance Routing (HPR) is an extension of the Advanced Peer-to-Peer Network (APPN) architecture; it provides the following functions:

- Rapid Transport Protocol (RTP) minimizes processing cycles and storage requirements for routing network layer packets through intermediate nodes on a session route.
- Automatic Network Routing (ANR) enables APPN networks to automatically reroute sessions if a portion of the originally computed route fails.

The following figure illustrates deploying these new integration solutions across a single LAN-WAN-data center network protocol.


Enterprise Data Center
IBM Mainframe
IP Backbone
IP WAN
Branch Office
ASP.NET
BizTalk Server Host Adapter
Host Integration Server 2004
SQL Server
Windows .NET Server
.NET Framework
TCP/IP LAN
Visual Studio .NET
LAN Printer
Windows 9x Windows ME
Windows NT Workstation
Windows 2000 Professional
Windows XP Professional

The IP-DLC link service acts as a Branch Network Node (BrNN), which combines the functions of a network node and an end node.


End Node (EN)
Network Node (NN)
IP-DLC Link Service (NN)
SNA Service (LEN Node)
IBM Zseries Mainframe
Host Integration Server 2004
Backbone Network
Branch Network

Because the BrNN appears as an end node, it does not receive topology information from the backbone network. Topology information transmits only between network nodes. Thus, the amount of network overhead traffic flowing into the branch network is reduced.

The BrNN registers all resources in the branch with its network node server (NNS) as though they were located on the BrNN itself. This means that the nodes in the backbone network can locate resources in the branch without having to be aware of the separate nodes in the branch.

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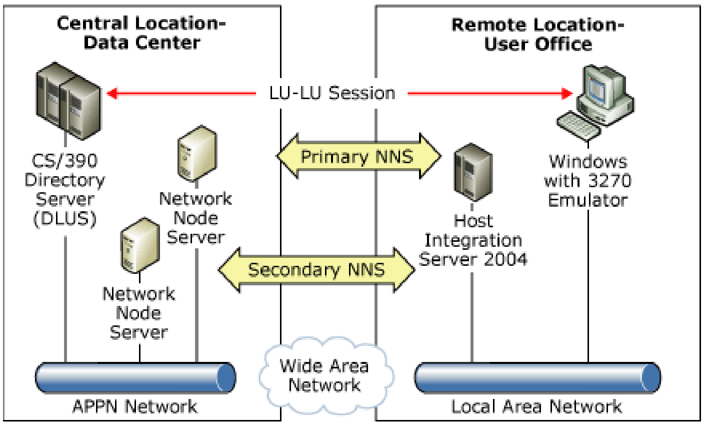
Fault Tolerance Features

Because the new IP-DLC link service uses the APPN and HPR/IP protocols, it is automatically able to take advantage of a number of fault tolerance features.

A function of HPR is the ability to reroute sessions around a failure in the network, as long as an alternative route exists. To achieve this rerouting, you provide primary and backup NNS to each IP-DLC link service.


Central Location-
Data Center
Remote Location-
User Office
LU-LU Session
CS/390 Directory Server (DLUS)
Network Node Server
Primary NNS
Host Integration Server 2004
Windows with 3270 Emulator
Secondary NNS
Network Node Server
Wide Area Network
APPN Network
Local Area Network

The IBM Parallel Sysplex technology and Multi-Node Persistent Sessions (MNPS) feature together allow mainframe applications to be moved to a different processor with little or no impact to users when system or application failures occur on the mainframe. Parallel Sysplex is a clustering technology that provides high availability, load balancing and scalable growth to the large mainframe environment. MNPS allows sessions to be restarted on another system in a Parallel Sysplex, after a hardware or software failure. (See Networking Implications of S/390 Parallel Sysplex, http://go.microsoft.com/fwlink/?LinkId=38994, for further information.). IP-DLC works with this solution with no specific configuration.

Note The IP-DLC link service cannot provide fault tolerance capabilities to seamlessly handle local adapter failures.

Security Features

The IP-DLC link service takes advantage of the entire Host Integration Server 2004 secure deployment feature set, especially the following:

- A typical IP-DLC link service deployment scenario can use IPSec, a firewall, or a Virtual Private Network (VPN) as a security barrier between the Host Integration Server computer and the remote node. (A VPN is advisable if the HPR/IP link spans an insecure IP network.)
- Incoming frames from IP addresses that are not already defined in Host Integration Server are rejected. This practice isolates the main SNA node service from such attack.
- The IP-DLC link service checks the length of incoming datagrams before it copies the data into internal data areas, and it discards any datagrams that are too long.
- All configuration data—whether from registry entries, COM.cfg, or the SNA node service—is validated for correct value when it is first accessed. Particular consideration is given to validating length to avoid buffer overruns. If errors are found, the IP-DLC link service logs an event and terminates.
- Usage of IPSec/ESP is advisable because it protects all network SNA protocols (LU 6.2, 3270, etc.) within the APPN IP-DLC flow.
- Logical and physical access to Host Integration Server 2004 should be carefully guarded against unauthorized access to IP-DLC internal traces for example.

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Common Scenarios

IP-DLC is basically another UDP/IP application (using UDP port 12000 to 12004). IP-DLC networking appears from the application level just like another SNA network protocol.

The following existing Host Integration Server 2004 SNA features are supported over the IP-DLC link service:

- LU types 0, 1, 2, 3, and 6.2 (dependent and independent)
- LUA, FMI, APPC, and CPI-C APIs
- Dynamically defined dependent LUs
- Dynamic local LU, remote LU, and connection configuration
- Incoming and outgoing calls
- Connection activation at server startup, on demand or by administrator
- SNA data compression
- PU concentration with the upstream link over IP-DLC
- NetView RUNCMD/Alerts (The IP-DLC link service does not generate alerts.)

Because the SNA features in the preceding list are supported, the following applications are also supported over the IP-DLC link service:

- Host Integration Server 2004-compatible 3270 emulators
- Host Integration Server 2004-compatible 5250 emulators
- APPC - 3270 Session Viewer (including the Diagnostics tool)
- Print Service
- Data Integration Services
- TN3270 Service
- TN5250 Service
- MSMQ-MQSeries Bridge
- Transaction Integrator

> **Note** If IP-DLC does not limit any of the sockets functionality, some native TCP/IP direct communications can still be used (for example, Transaction Integrator/IMS with IMS Connect) if no SNA-specific function is needed.

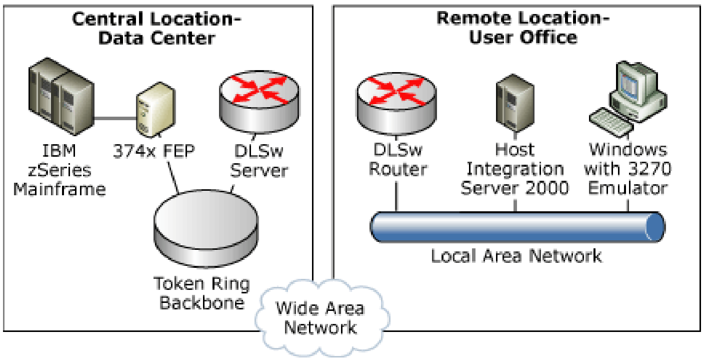
This section contains:

- Scenario 1 Migration: Branch Service Display Session over TN3270
- Scenario 2 Migration: Distributed Architecture Using DLS
- Scenario 3 New Solution: Accessing CICS with Transaction Integrator

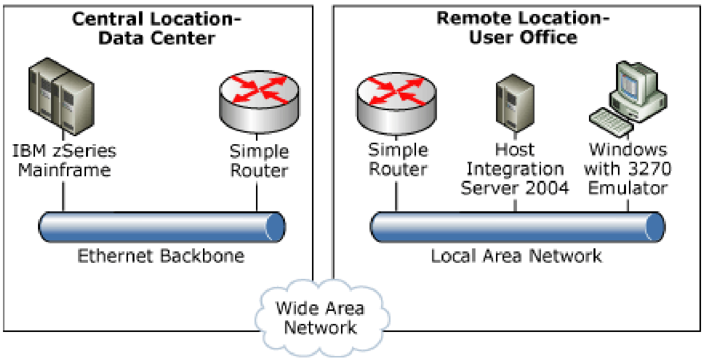
To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Scenario 1 Migration: Branch Service Display Session over TN3270

With Host Integration Server 2000, DLC traffic is encapsulated by Data Link Switching (DLSw) routers; DLC is still used on the network between the central DLSw router and the mainframe or a communication controller 374x, as shown in the following figure.


Central Location-
Data Center
IBM zSeries Mainframe
374x FEP
DLSw Server
Token Ring Backbone
Wide Area Network
Remote Location-
User Office
DLSw Router
Host Integration Server 2000
Windows with 3270 Emulator
Local Area Network

With Host Integration Server 2004 and IP-DLC, IP is used from end to end. The DLSw routers are no longer involved in SNA. In addition, the DLC protocol can be uninstalled from the computer running Host Integration Server.


Central Location-
Data Center
IBM zSeries Mainframe
Simple Router
Ethernet Backbone
Wide Area Network
Remote Location-
User Office
Simple Router
Host Integration Server 2004
Windows with 3270 Emulator
Local Area Network

The host still uses SNA resources, They are still available on the Windows system. Connections (for example, PU) and display LUs remain the same. Host Integration Server authentication and authorization also are unchanged.

The main steps required to reconfigure Host Integration Server 2004 are:

1. Replace DLC link service with an IP-DLC link service. A new APPN node will be created on the host side identifying the IP-DLC Link service as an end node (EN).
2. Re-create dependent connections in Host Integration Server 2004 and linked with the IP-DLC link service; the local node ID remains the same. Configure new parameters for the DLUS (APPN network ID and SSCPNAME). This PU is dedicated to dependent sessions only; the Remote End parameter should be set as "Host System".
3. Re-create dependents LUs.

   Note A mainframe connection over OSA Express in QDIO mode is now possible.

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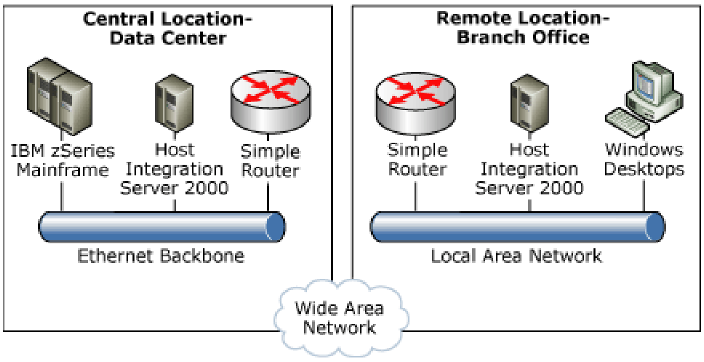
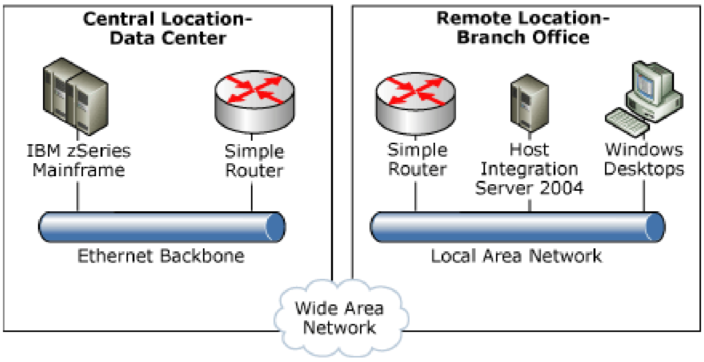
Scenario 2 Migration: Distributed Architecture Using DLS

Central office servers equipped with Host Integration Server 2000 connect to the mainframe through DLC over Ethernet or Token ring. Branch office servers equipped with Host Integration Server 2000 are connected to the central server using DLSw link service (also known as SOGA). In our scenario, APPC sessions are in use at the branch.

A good design of a distributed Host Integration Server architecture should be fault tolerant of one central or branch Host Integration Server failure, but the first reason to choose a distributed scenario over a centralized or branch scenario is to manage WAN efficiency and use only TCP/IP on the WAN, as shown in the following figure.


Central Location-
Data Center
IBM zSeries Mainframe
Host Integration Server 2000
Simple Router
Ethernet Backbone
Remote Location-
Branch Office
Simple Router
Host Integration Server 2000
Windows Desktops
Local Area Network
Wide Area Network

With IP-DLC, branch offices equipped with Host Integration Server 2004 can be directly connected to the mainframe using User Datagram Protocol/Internet Protocol (UDP/IP) over the WAN, as shown in the following figure.


Central Location-
Data Center
IBM zSeries Mainframe
Simple Router
Ethernet Backbone
Remote Location-
Branch Office
Simple Router
Host Integration Server 2004
Windows Desktops
Local Area Network
Wide Area Network

The main steps required to reconfigure the Branch Host Integration Server 2004 are:

- Replace the DLC link service with an IP-DLC link service. A new APPN node will be created on the host side identifying the IP-DLC service as an end node (EN).
- Create a new peer connection in Host Integration Server and associate it with the IP-DLC link service; no parameters are needed. This physical unit (PU) is dedicated to independent sessions only. Set the Remote End parameter to "Peer System".
- Local independent sessions logical units (LUs) remain unchanged.
- Associate the remote LUs with the new peer connection.

Optionally, you can deploy the central office Host Integration Server 2004 server to cover a branch office Host Integration Server failure. The Host Integration Server client in the branch can switch over the WAN to use the APPC services provided by the central office Host Integration Server.

> **Note** If DLS traffic has been "firewalled," set new firewall rules to handle HPR-IP protocol and ports: UDP ports 12000 to 12004.

> **Note** If IPSec has been used or should be used to encapsulate (use of AH protocol) or encrypt (use of ESP protocol) traffic between Host Integration Servers, IPSec had to be configured between Host Integration Servers and mainframes. For more information, see the IBM documentation, Communications Server for z/OS V1R2 TCP/IP, Implementation Guide, Volume 7: Security, Chapter 8.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Scenario 3 New Solution: Accessing CICS with Transaction Integrator

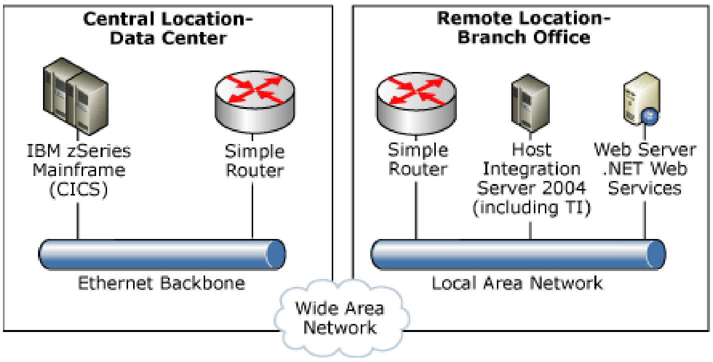
Host Integration Server 2004 Transaction Integrator (TI) integrates the IBM Customer Information Control System (CICS), Information Management System (IMS) transaction programs (TPs), and OS/400 applications with the Component Object Model (COM) and the .NET Framework by:

- Creating interfaces to the CICS, IMS, and OS/400 transaction programs.
- Invoking those transactions on the mainframe or midrange computer (also called the host computer) from a Microsoft Windows–based application.

Because all TI processing is done on the Windows 2000 Server or Windows Server 2003 platform, no TI-related executable code (or "footprint") is required on the mainframe or midrange computer. TI uses SNA (APPC/LU 6.2) and TCP/IP standard communication protocols for all communication between Windows and the host computer.

With IP-DLC link service, you can select the CICS LU 6.2 Link programming model for implementing TI functionality. This choice offers some functions that native TCP/IP does not have:

- Reliable transactions - two phase commit (2PC) over SNA LU 6.2 is supported
- Available mirror TP CSMI for listening on LU 6.2



At the networking level, configure Host Integration Server 2004 with:

- An IP-DLC link service. A new APPN node will be created on the host side identifying the IP-DLC service as an EN.
- Create a peer connection in Host Integration Server 2004 and associated with the IP-DLC link service; no parameters are needed. Set the Remote End parameter to "Peer System".
- A local independent session LU which allows Host Integration Server 2004 for APPC LU-LU conversation with CICS,
- A remote LU identifying the CICS environment (APPLID),
- An APPC mode (or dialog mode).
- The Remote LU and APPC mode may have been defined already; they are not dedicated to Host integration Server 2004.

  Note If IP-DLC is acting as an APPN node, Host Integration Server 2004 can also use an independent session LU that has already been defined.

  Note To provide access to CICS TP, this LU should be known by CICS (value of NETNAME entry in CEDA definition).

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Define and Set Up the IP-DLC Link Service

This section presents suggestions for defining the IP-DLC service and setting up the IP-DLC connection.

This section contains:

- Defining IP-DLC Link Service
- Setting Up IP-DLC Connections

Defining IP-DLC Link Service

One end node should be declared for each IP-DLC link service.

Each IP-DLC link service node definition must use its own CP Name unique on the APPN network. It must use a different CP name from the SNA node service. (This limitation is a consequence of the fact that each IP-DLC link service appears in the APPN network as a separate node and therefore must have a unique node name.)

When host connections or connections to network node servers are established, many remote nodes will accept any network name/CP name pair, provided it is unique. (This is the default case on CS/390 systems.) However, some hosts or network node servers require certain naming conventions or require that the network name/CP name pair be explicitly defined in their configurations. In such cases the user will need to agree with the remote system administrator what network name/CP name to use on the IP-DLC link service. If the link service needs to be defined on the remote system it should be an APPN-style definition.

The following is an example CS/390 APPN-style PU definition for an IP-DLC link service with CP name HIS001.

```
HISPUN20 PU
PUTYPE=2,MAXDATA=1461,ADDR=01,CPNAME=HIS001,CONNTYPE=APPN,
CPCP=YES,MODETAB=DYNAMIC,USSTAB=USSTAB1,HPR=YES"
```

Just as does the LEN, an IP-DLC link requires a connection to an APPN network node server (NNS) in order to participate fully in an APPN network. A network node server is an entry point to an APPN network. NNS provides the distributed directory and routing service for all resources, for example LUs, defined to LEN nodes and end nodes known to the network node server.

The network node server is identified by its IP address, host name, or FQDN DNS name.

> **Note** Multiple IP-DLC link services can be supported—up to one link service for each local IP address on the local Host Integration Server 2004 system. Each IP-DLC link service is tied to a LEN node (for example, SNA Server service) defined to the Host Integration Server computer. Multiple IP-DLC link services can be associated with the same LEN node.

Setting Up IP-DLC Connections

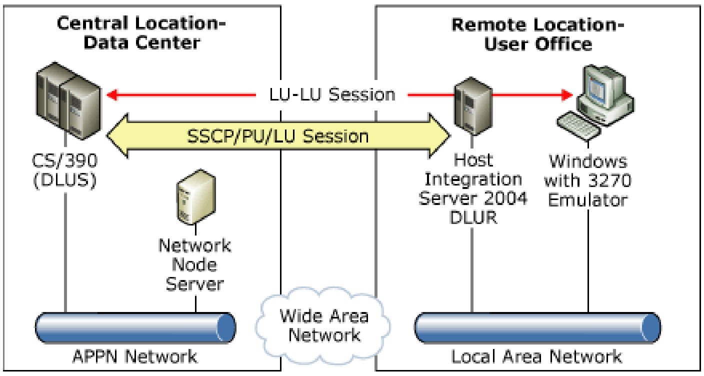
This section describes how to set up IP-DLC connections for dependent and independent LU sessions.

Dependent Sessions

Dependent LU Requester (DLUR) function and dependent LUs, for example 3270 display LUs, are the provider and consumer of dependent LU traffic on an APPN network. Due to the advanced features of HPR this traffic can be routed through intermediate APPN nodes in the APPN network.

DLUR works in conjunction with a dependent LU server (DLUS) at the host. Together, they route sessions across the network from dependent LUs in the APPN network to the DLUS host. The route to the host can span multiple nodes and can take advantage of the APPN network management, dynamic resource location, and route calculation facilities.

IP-DLC works as a DLUR for all or part of dependent connections of one SNA node in Host Integration Server 2004; each dependent connection can have its own primary and backup DLUS defined.



For dependent sessions, each existing PU must be defined as an IP-DLC host connection in Host Integration Server 2004; they are identified by their local node IDs. Each should indicate at least one DLUS server that is identified by the APPN network Name and the SSCPNAME. IP-DLC host connections are dedicated to managing dependent sessions.

> **Note** The NNS and CS/390 must be part of the same reachable APPN network, so that SNA sessions can be activated between them.

Independent Sessions

Remote independent LUs are associated with an IP-DLC peer connection, an internal connection between the SNA node and the IP-DLC link service. All independent LU traffic is routed by the APPN network and can traverse any active IBM Enterprise Extender link. However, all independent session traffic between the IP-DLC link service and the SNA node service flows over the peer IP-DLC connection.

Only one peer connection can be associated with an IP-DLC link service. No parameter is needed to configure this peer connection. IP-DLC peer connections are dedicated to managing independent sessions.

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APPC Programmer's Guide

This section of the Microsoft® Host Integration Server 2004 Developer's Guide provides information about using the Advanced Program-to-Program Communications (APPC) in a distributed processing environment.

For API references and other technical information about APPC, see APPC Programmer's Reference.

For sample code using APPC, see APPC Samples.

This section contains:

- About the APPC Guide
- Introduction to APPC
- About Transaction Programs
- Windows CSV Overview
- Support for APPC Automatic Logon

About the APPC Guide

This section provides information required to develop C-language applications that use Advanced Program-to-Program Communications (APPC) to exchange data in a Systems Network Architecture (SNA) environment.

This section is intended for the developer writing applications that use Common Programming Interface for Communications (CPI-C) to exchange data. It provides conceptual information and detailed reference information.

To use this section effectively, you should be familiar with:

- Microsoft® Host Integration Server 2004
- Microsoft Microsoft Windows Server™ 2003 or Windows® 2000
- SNA concepts

This section contains:

- Operating Systems Support for APPC Development
- Finding Further Information about APPC

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Operating Systems Support for APPC Development

Microsoft® Host Integration Server 2004 supports the development of Advanced Program-to-Program Communications (APPC) applications for Microsoft Windows Server™ 2003 and Microsoft Windows® 2000.

Finding Further Information about APPC

This section does not describe the products, architectures, or standards developed by other companies or organizations.

For more information about SNA and about 3270 information display systems, see the following manuals:

- *IBM 3270 Information Display System: 3274 Control Unit Description and Programmer's Guide*
- *IBM 3270 Information Display System: Color and Programmed Symbols*
- *IBM 3270 Information Display System: 3274 Control Unit Display Station: Operator's Guide*
- *IBM Systems Network Architecture: Technical Overview*
- *IBM Systems Network Architecture: Concepts and Products*
- *IBM Advanced Communications Function Products Installation Guide*
- *IBM Installation and Resource Definition*
- *IBM 9370 LAN Token Ring Support*
- *IBM SNA Format and Protocol Reference Manual: Architectural Logic*

For background information about logical unit (LU) 6.2, APPC, or the Common Programming Interface for Communications (CPI-C), see the following manuals:

- *IBM Systems Network Architecture: Introduction to APPC*
- *IBM Systems Network Architecture: Transaction Programmer's Reference Manual for LU Type 6.2*
- *IBM SNA: Format and Protocol Reference Manual: Architecture Logic for LU Type 6.2*
- *IBM SNA: Formats*
- *IBM SNA: Technical Overview*
- *IBM SNA: ACF/VTAM Programming for LU Type 6.2*

Introduction to APPC

This section introduces the fundamental concepts of Advanced Program-to-Program Communications (APPC) in a distributed processing environment. These concepts include the following:

- APPC verbs
- Microsoft® Windows® APPC extensions
- Using APPC verbs in C programs
- Operating system considerations

Detailed descriptions of APPC verbs are provided in:

- APPC Management Verbs
- APPC TP Verbs
- APPC Conversation Verbs

APPC is an application programming interface (API) that enables peer-to-peer communications in a Systems Network Architecture (SNA) environment. Through APPC, programs distributed across a network can work together, communicating with each other and exchanging data, to accomplish a single processing task such as querying a remote database, copying a remote file, or sending and receiving electronic mail.

This section contains:

- APPC Verb Overview
- APPC Verb Summary
- Windows APPC Overview
- Using APPC Verbs in C Programs
- Windows Server 2003, Windows XP, and Windows 2000 Considerations

APPC Verb Overview

APPC verbs fall into three categories: management, transaction program (TP), and conversation.

Management Verbs

Management verbs provide management functions. They are:

ACTIVATE_SESSION

CNOS

DEACTIVATE_SESSION

DISPLAY

TP Verbs

TP verbs start and end TPs, and get and set TP properties. They are:

GET_TP_PROPERTIES

SET_TP_PROPERTIES

TP_ENDED

TP_STARTED

Conversation Verbs

Conversation verbs enable TPs to allocate and deallocate conversations, send and receive data, and change conversation states. The conversation verbs are listed in the following table.

Conversation verbs fall into two groups: mapped conversation verbs and basic conversation verbs. The mapped conversation is intended for programs that use the conversation directly. The basic conversation is intended for more complex programs that provide services to other users. In typical situations, end-user TPs use mapped conversations and service TPs use basic conversations.

Mapped conversation verbs can only be issued by a TP in mapped conversations, while basic conversation verbs are reserved for basic conversations. There is one exception to this rule: ALLOCATE can be used to start either a basic or a mapped conversation.

Mapped conversation verbs	Basic conversation verbs
MC_ALLOCATE	ALLOCATE
MC_CONFIRM	CONFIRM
MC_CONFIRMED	CONFIRMED
MC_DEALLOCATE	DEALLOCATE
MC_FLUSH	FLUSH
MC_GET_ATTRIBUTES	GET_ATTRIBUTES
GET_LU_STATUS	GET_LU_STATUS
GET_STATE	GET_STATE
GET_TYPE	GET_TYPE
MC_POST_ON_RECEIPT	POST_ON_RECEIPT
MC_PREPARE_TO_RECEIVE	PREPARE_TO_RECEIVE
RECEIVE_ALLOCATE	RECEIVE_ALLOCATE
MC_RECEIVE_AND_POST	RECEIVE_AND_POST
MC_RECEIVE_AND_WAIT	RECEIVE_AND_WAIT
MC_RECEIVE_IMMEDIATE	RECEIVE_IMMEDIATE
MC_RECEIVE_LOG_DATA	RECEIVE_LOG_DATA
MC_REQUEST_TO_SEND	REQUEST_TO_SEND
MC_SEND_CONVERSATION	SEND_CONVERSATION
MC_SEND_DATA	SEND_DATA
MC_SEND_ERROR	SEND_ERROR
MC_TEST_RTS	TEST_RTS

Mapped and basic verbs have the same functions in their respective types of conversation. For example, **MC_CONFIRM** performs the same function in a mapped conversation that **CONFIRM** performs in a basic conversation.

APPC Verb Summary

This section briefly describes each APPC verb, grouped by function.

Verbs for Starting Conversations

ALLOCATE or MC_ALLOCATE

Issued by the local transaction program (TP). This verb allocates a session between the local logical unit (LU) and a partner LU, and establishes a conversation between the local TP and the partner TP.

ALLOCATE can establish either a basic or a mapped conversation. **MC_ALLOCATE** can start only a mapped conversation. After the conversation is allocated, APPC uses this verb to return a conversation identifier (**conv_id**).

RECEIVE_ALLOCATE

Issued by the partner TP. This verb confirms that the partner TP is ready to begin a conversation with the local TP that issued **ALLOCATE** or **MC_ALLOCATE**. Upon successful execution, this verb returns a TP identifier (**tp_id**) for the partner TP and the **conv_id**.

TP_STARTED

Issued by the local TP. This verb notifies APPC that the local TP is starting. Upon successful execution, this verb returns a **tp_id** for the local TP.

Verbs for Sending Data

CONFIRM or MC_CONFIRM

Sends the contents of the local LU's send buffer and a confirmation request to the partner TP.

FLUSH or MC_FLUSH

Flushes the local LU's send buffer, sending the contents of the buffer to the partner LU and TP. If the send buffer is empty, no action takes place.

PREPARE_TO_RECEIVE or MC_PREPARE_TO_RECEIVE

Changes the state of the conversation from SEND to RECEIVE. Before changing the conversation state, this verb performs the equivalent of **FLUSH**, **MC_FLUSH**, **CONFIRM**, or **MC_CONFIRM**. After this verb has successfully executed, the local TP can receive data.

REQUEST_TO_SEND or MC_REQUEST_TO_SEND

Informs the partner TP that the local TP wants to send data. The local TP must wait until the partner TP issues **PREPARE_TO_RECEIVE**, **MC_PREPARE_TO_RECEIVE**, **RECEIVE_AND_WAIT**, or **MC_RECEIVE_AND_WAIT**, and the conversation state changes to RECEIVE for the partner TP, before the local TP begins sending data.

SEND_DATA or MC_SEND_DATA

Puts data in the local LU's send buffer for transmission to the partner TP.

The data collected in the local LU's send buffer is transmitted to the partner LU and partner TP when one of the following occurs:

- The send buffer fills up.
- The local TP issues **FLUSH**, **MC_FLUSH**, **CONFIRM**, **MC_CONFIRM**, **DEALLOCATE**, **MC_DEALLOCATE**, or another verb that flushes the local LU's send buffer.

Verbs for Receiving Data

POST_ON_RECEIPT or MC_POST_ON_RECEIPT

Issuing this verb allows the application to register to receive a notification when data or status arrives at the local LU without actually receiving it at the same time. This verb can only be issued while in RECEIVE state and it never causes a change in conversation state.

When the TP issues this verb, APPC returns control to the TP immediately. When the specified conditions are satisfied, the Win32® event specified as a parameter is signalled and the verb completes. Then the TP looks at the return code in the verb control block to determine whether or not any data or status notification has arrived at the local LU and issues a **RECEIVE_IMMEDIATE** or **RECEIVE_AND_WAIT** verb to actually receive the data or status notification.

RECEIVE_AND_POST or MC_RECEIVE_AND_POST

Issuing this verb while the conversation is in RECEIVE state changes the conversation state to PENDING_POST and causes the local TP to receive data asynchronously. This allows the local TP to proceed with processing while data is still arriving at the local LU.

Issuing this verb while the conversation is in SEND state flushes the LU's send buffer and changes the conversation state to

PENDING_POST. The local TP then begins to receive data asynchronously.

RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT

Issuing this verb while the conversation is in RECEIVE state causes the local TP to receive any data that is currently available from the partner TP. If no data is available, the local TP waits for data to arrive.

Issuing this verb while the conversation is in SEND state flushes the LU's send buffer and changes the conversation state to RECEIVE. The local TP then begins to receive data.

RECEIVE_IMMEDIATE or MC_RECEIVE_IMMEDIATE

Receives any data that is currently available from the partner TP. If no data is available, the local TP does not wait.

TEST_RTS or MC_TEST_RTS

Determines whether a **REQUEST_TO_SEND** or **MC_REQUEST_TO_SEND** or notification has been received.

Verbs for Confirming Data or Reporting Errors

CONFIRMED or MC_CONFIRMED

Replies to a confirmation request from the partner TP. It informs the partner TP that the local TP has received and processed the data without error.

RECEIVE_LOG_DATA or MC_RECEIVE_LOG_DATA

Issuing this verb allows the user to register to receive the log data associated with an inbound Function Management Header 7 (FMH7) error report. The verb passes a buffer to APPC, and any log data received is placed in that buffer. APPC continues to use this buffer as successive FMH7s arrive until it is provided with another buffer (that is, until the TP issues another **RECEIVE_LOG_DATA** or **MC_RECEIVE_LOG_DATA** specifying a different buffer or no buffer at all).

SEND_CONVERSATION or MC_SEND_CONVERSATION

Issued by the invoking TP, this verb allocates a session between the local LU and partner LU, sends data on the session, and then deallocates the session.

SEND_ERROR or MC_SEND_ERROR

Notifies the partner TP that the local TP has encountered an application-level error.

Verbs for Getting and Setting Information

GET_ATTRIBUTES or MC_GET_ATTRIBUTES

Used by a TP to get the attributes of the conversation.

GET_LU_STATUS

Used to report the status of a particular remote LU.

GET_STATE

Used by a TP to interrogate the state of a particular conversation.

GET_TP_PROPERTIES

Returns attributes of the TP and the current transaction.

GET_TYPE

Used by a TP to determine the conversation type (basic or mapped) of a particular conversation. With this information, the TP can decide whether to issue basic or mapped conversation verbs.

SET_TP_PROPERTIES

Used to set the attributes of the TP and the current transaction.

Verbs that Provide Management Functions

ACTIVATE_SESSION

Activates a session between the local LU and a specified partner LU, using a specified mode.

CNOS (Change Number of Sessions)

Establishes APPC LU 6.2 session limits.

DEACTIVATE_SESSION

Deactivates a particular session, or all sessions on a particular mode.

DISPLAY

Returns configuration information and current operating values for the SNA node.

Verbs for Ending Conversations

DEALLOCATE or MC_DEALLOCATE

Deallocates a conversation between two TPs. Before deallocating the conversation, this verb performs the equivalent of **FLUSH**, **MC_FLUSH**, **CONFIRM**, or **MC_CONFIRM**.

TP_ENDED

Issued by both the local and partner TPs. It notifies APPC that the TP is ending. Issuing this verb also terminates any active conversations.

Windows APPC Overview

The information provided in this guide is source code and executable code compatible with the following implementations of APPC:

- APPC applications based on Microsoft® Host Integration Server 2004 residing on the server or on a client. These applications run on Microsoft® Windows Server™, Windows® XP, and Windows 2000.

Programs written to use this implementation of APPC can exchange data with programs written to use other implementations of APPC that adhere to the SNA LU 6.2 architecture.

The use of the Windows APPC interface on Windows Server 2003 and Windows 2000 causes additional threads to be created within the calling process. These other threads perform interprocess communication with the Host Integration Server 2004 or SNA service over the LAN interface that the client is configured to use (TCP/IP, IPX/SPX, or named pipes, for example).

If an application using Windows APPC is running on Windows Server 2003 and Windows 2000, stopping the SNABASE service causes the application to be unloaded from memory.

This section contains:

- Windows APPC Asynchronous Support
- APPC Verbs and Windows Extensions

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Windows APPC Asynchronous Support

A program that issues a call and does not regain control until the call completes cannot perform any other operations. This type of operation, referred to as blocking, is not suited to a server application designed to handle multiple requests from many clients. Asynchronous call completion returns the initial call immediately so the application can continue with other processes.

Microsoft Host Integration Server 2004 uses the **RegisterWindowsMessage** function for asynchronous support for APPC applications. With "WinAsyncAPPC" as the input string, an application passes a window handle by which it can be notified of verb completion. The application then issues the verb. When the verb completes, a message is posted to the window handle that was passed, notifying the application that the verb is complete.

With the exception of asynchronous RECEIVE_AND_WAIT, MC_RECEIVE_AND_WAIT, RECEIVE_AND_POST, and MC_RECEIVE_AND_POST, which can issue certain other verbs while pending, a conversation can have only one incomplete operation at any time.

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APPC Verbs and Windows Extensions

This topic describes the APPC verbs and Windows extensions that are supported by Host Integration Server 2004:

APPC Verbs

The following APPC verb descriptions contain important features and should be read before using this version of Windows APPC.

ALLOCATE or MC_ALLOCATE

Issued by the invoking transaction program (TP), this verb allocates a session between the local logical unit (LU) and partner LU and (in conjunction with RECEIVE_ALLOCATE) establishes a conversation between the invoking TP and the invokable TP. After this verb executes successfully, APPC generates a conversation identifier (**conv_id**). The **conv_id** is a required parameter for all other APPC conversation verbs.

For a user or group using TPs, 5250 emulators, or APPC applications, you can assign default local and remote LUs. In this case, the field for LU alias is left blank or null and the default LUs are accessed when the user or group member starts an APPC program. For more information about using default LUs, see the Network Integration section of the Microsoft Host Integration Server 2004 Help.

RECEIVE_ALLOCATE

Issued by the invokable TP to confirm that it is ready to begin a conversation with the invoking TP that issued ALLOCATE or MC_ALLOCATE. This must be the first APPC verb issued by the invokable TP. The initial state is RESET. If the verb executes successfully (**primary_rc** is AP_OK), the state changes to RECEIVE.

RECEIVE_AND_POST or MC_RECEIVE_AND_POST

Receives application data and status information asynchronously. This enables the local TP to proceed with processing while data is still arriving at the local LU. RECEIVE_AND_POST and MC_RECEIVE_AND_POST are only supported by the Windows 2000 operating system.

While an asynchronous RECEIVE_AND_POST or MC_RECEIVE_AND_POST is outstanding, the following verbs can be issued:

REQUEST_TO_SEND or MC_REQUEST_TO_SEND

GET_TYPE

GET_ATTRIBUTES or MC_GET_ATTRIBUTES

TEST_RTS or MC_TEST_RTS

DEALLOCATE

SEND_ERROR or MC_SEND_ERROR

TP_ENDED

RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT

Receives any data that is currently available from the partner TP. If no data is currently available, the local TP waits for data to arrive.

RECEIVE_AND_WAIT and MC_RECEIVE_AND_WAIT have been altered to act like RECEIVE_AND_POST and MC_RECEIVE_AND_POST. While an asynchronous RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT is outstanding, the following verbs can be issued:

REQUEST_TO_SEND or MC_REQUEST_TO_SEND

GET_TYPE

GET_ATTRIBUTES or MC_GET_ATTRIBUTES

TEST_RTS or MC_TEST_RTS

DEALLOCATE

SEND_ERROR or MC_SEND_ERROR

TP_ENDED

TP_STARTED

Issued by the invoking TP, this verb notifies APPC that the TP is starting. For a user or group using TPs, 5250 emulators, or APPC applications, you can assign default local and remote APPC LUs. These default LUs are accessed when the user or group member starts an APPC program (a TP, 5250 emulator, or APPC application) and the program does not specify LU aliases. For more information about using default LUs, see the Network Integration section of the Microsoft Host Integration Server 2004 Help.

Limits

Host Integration Server 2004 permits one outstanding Windows APPC asynchronous call per connection and one blocking verb per thread. For example:

```
void ProcessVerbCompletion (WPARAM wParam, LPARAM lParam)
{
    int i;
    for (i = 0; i < nPendingVerbs; i++)
        if (pPendingVerbs[i].hAsync == wParam)
            ProcessVCB( (LPVCB) lParam);
}    . . .
LRESULT CALLBACK SampleWndProc ( ... )
{
    if (msg == uAsyncAPPC) {
        ProcessVerbCompletion(wParam; lParam);
    }
        else switch (msg) {
        case WM_USER:
            if (hAsync = WinAsyncAPPC(hwnd, &vcb))
               pPendingVerbs [nPendingVerbs++].hAsync = hAsync;
            break;
    }
}
WinMain ( ... )
{
    if ( ( WinAPPCStartup ( ...) = = FALSE ) {
    return FALSE ;
    }
    uAsyncAPPC = RegisterWindowsMessage ("WinAsyncAPPC") ;
    while (GetMessage ( ...)  )  {
    ...
    WinAPPCCleanup ( ... )
}
```

> **Note** The exceptions to the rule of one outstanding asynchronous call are RECEIVE_AND_POST, MC_RECEIVE_AND_POST, RECEIVE_AND_WAIT, and MC_RECEIVE_AND_WAIT. While these verbs are outstanding, certain other verbs can also be called.

Using APPC Verbs in C Programs

This implementation of APPC is available for programs written in Microsoft® C version 5.1 or later. A C program calls APPC through the external function **APPC**. For compatibility with previous versions of Microsoft C, the external function **APPC_C** is also supported.

> **Note** Compilers other than the Microsoft C compiler can also be used to build applications using this implementation of APPC.

This section contains:

- Verb Control Block
- APPC Definition
- Issuing an APPC Verb

Verb Control Block

The only parameter passed to the **APPC** function is the address of a verb control block (VCB). The VCB is a structure made up of variables that:

- Identify the APPC verb to be executed.
- Supply information to be used by the verb.
- Contain information returned by the verb when execution is complete.

Each APPC verb has its own VCB structure, which is declared in the WINAPPC.H header file. For compatibility with earlier versions, the APPC_C.H header file is also supported.

The WINAPPC.H file is supplied as part of the Host Integration Server 2004 Software Development Kit (SDK).

APPC Definition

The prototype definitions of the **APPC** function are as follows:

```
void WINAPI APPC(long);
HANDLE WINAPI WinAsyncAPPC (hWnd, LPAPPC);
```

The verb control block (VCB) address parameter, a 32-bit pointer, is declared as a long integer and thus requires casting from a pointer to a long integer.

Issuing an APPC Verb

The following procedure is required to issue a blocking APPC verb. In the sample code, the verb issued is **MC_SEND_DATA**.

To issue a blocking APPC verb

1. Create a structure variable from the verb control block (VCB) structure that applies to the APPC verb to be issued.

```
#include <winappc.h>
    .
    .
struct mc_send_data  mcsend;
The VCB structures are declared in WINAPPC.H; one of these structures is:
mc_send_data
```

2. Clear (set to zero) the variables within the VCB structure.

```
memset( mcsend, '\0', sizeof( mcsend ) );
```

3. Assign values to the VCB variables that supply information to APPC.

```
mcsend.opcode = AP_M_SEND_DATA;
mcsend.opext = AP_MAPPED_CONVERSATION;
memcpy( mcsend.tp_id, tp_id, sizeof( tp_id ) );
mcsend.conv_id = conv_id;
mcsend.dlen = datalen;
mcsend.dptr = sharebufptr;
```

   The values AP_MAPPED_CONVERSATION and AP_M_SEND_DATA are symbolic constants representing integers. These constants are defined in WINAPPC.H.

4. Invoke the **APPC** function. The only parameter is a pointer to the address of the structure containing the VCB for the desired verb.

```
APPC ( ( long ) (void FAR * ) &mcsend );
```

   Use WinAsyncAPPC if you are running the application under Windows version 3.*x*.

   To call **WinAsyncAPPC**:

```
HANDLE WINAPI WinAsyncAPPC (hWnd, 1pVCB)
```

   When the asynchronous operation is complete, the application's window *hWnd* receives the message returned by **RegisterWindowMessage** with "WinAsyncAPPC" as the input string.

5. Use the variables that were returned by APPC.

```
if( mcsend.primary_rc != AP_OK )
/* Do error routine */
    .
    .
    .
```

Windows Server 2003, Windows XP, and Windows 2000 Considerations

This topic summarizes information about developing transaction programs (TPs) using APPC on the following operating systems:

- Microsoft Windows Server™ 2003
- Microsoft Windows XP Professional
- Microsoft® Windows® 2000

Byte ordering

The values of constants defined in WINAPPC.H and WINCSV.H are dependent on the byte ordering of the hardware used. Macros are used to set the constants to the correct value.

By default, Intel little-endian byte ordering is used, with the low byte of a 16-bit value followed by the high byte. However, when defining inline macros, the NON_INTEL_BYTE_ORDER macro used in WINAPPC.H and WINCSV.H will not reverse (flip) the byte order for constants. Non-constant input parameters in verb control blocks (VCBs) (such as lengths, pointers, and so on) are always in the native format.

For example, the primary return code of AP_PARAMETER_CHECK is defined to have a value of 0x0001. Depending on the environment (byte ordering), the constant AP_PARAMETER_CHECK may or may not be 0x0001. Some formats define the value as it appears in memory; others define it as a 2-byte variable. Because you cannot assume that the application always uses provided constants rather than hardwired values, you can define a macro to swap the bytes. The following is an example of using the macro:

```
/* when NON_INTEL_BYTE_ORDER is specified, the APPC_FLIPI macro defined in WINAPPC.H macro b
ecomes */
#define APPC_FLIPI(x)    (x)

/* otherwise this macro flips bytes by defining */
#define APPC_FLIPI(X) APPC_MAKUS(APPC_HI_UC(X),APPC_LO_UC(X))

/* the AP_PARAMETER_CHECK macro is now defined using the APPC_FLIPI macro */
#define AP_PARAMETER_CHECK APPC_FLIPI (0X0001)      /* X '0001' */
```

Events

To receive data asynchronously, an event handle is passed in the semaphore field of the VCB. This event must be in the nonsignaled state when passed to APPC, and the handle must have EVENT_MODIFY_STATE access to the event.

Library names

In order to support the coexistence of Win16 and Win32 API libraries on the same computer, the Win32 DLL names have been changed.

Old DLL names	New DLL names
WINAPPC.DLL	WAPPC32.DLL
WINCSV.DLL	WINCSV32.DLL

The new DLL names should be used for Win32-based applications that are intended to run only on Host Integration Server 2004.

Limits

For Windows Server 2003 and Windows 2000, the number of simultaneous common service verbs (CSVs) allowed per process is 64. Only one of these verbs per thread can be synchronous (blocking).

Using APPC, the maximum number of simultaneous conversations per process is 15,000. Each process supports up to 15,000 simultaneous TPs.

Multiple threads

A TP can have multiple threads that issue verbs. Windows APPC makes provisions for multithreaded Windows-based processes. A process contains one or more threads of execution. All references to threads refer to actual threads in the multithreaded Windows Server 2003 and Windows 2000 environments.

With the exception of RECEIVE_AND_POST, MC_RECEIVE_AND_POST, RECEIVE_AND_WAIT, and MC_RECEIVE_AND_WAIT, only one conversation verb can be outstanding at a time on any conversation; however, other verbs can be issued for other conversations. This guideline also applies to TP verbs and TPs. Although multiple TP verbs can be issued, only one TP verb can be outstanding at a time on a TP. This applies to both multithreaded applications and single-threaded applications that use asynchronous calls.

Packing

For performance considerations, the VCBs are not packed. VCB structure member elements after the first element are aligned on either the size of the member type or DWORD (4-byte) boundaries, whichever is smaller. As a result, DWORDs are aligned on DWORD boundaries, WORDs are aligned on WORD boundaries, and BYTEs are aligned on BYTE boundaries. This means, for example, that there is a 2-byte gap between the primary and secondary return codes. Therefore, the elements in a VCB should only be accessed using the structures provided.

This option for structure and union member alignment is the default behavior for Microsoft C/C++ compilers. For compatibility with the supplied logical unit application (LUA) libraries, make sure to use an equivalent structure and union member packing option when using other C/C++ compilers or when explicitly specifying a structure alignment option when using Microsoft compilers.

Registering and deregistering applications

All Windows APPC applications must call WinAPPCStartup at the beginning of the session to register the application and WinAPPCCleanup at the end of the session to deregister the application.

All Windows CSV applications must call the Windows SNA extension WinCSVStartup at the beginning of the session to register the application and WinCSVCleanup to deregister the application when the session is finished.

Run-time linking

For a TP to be dynamically linked to APPC at run time, the TP must issue the following calls:

- **LoadLibrary** to load the dynamic-link libraries WINAPPC.DLL or WAPPC32.DLL.
- **GetProcAddress** to specify APPC on all the desired entry points to the DLL such as **APPC**, **WinAsyncAPPC**, **WinAPPCStartup**, and **WinAPPCCleanup**.

For a TP to be dynamically linked to CSV at run time, the TP must issue the following calls:

- **LoadLibrary** to load WINCSV.DLL or WINCSV32.DLL, the dynamic-link libraries for Windows CSV.
- **GetProcAddress** to specify CSV on all the desired entry points to the DLL such as **ACSSVC**, **WinAsyncCSV**, **WinCSVStartup**, and **WinCSVCleanup**.

The TP must issue the **FreeLibrary** call when the APPC or CSV library is no longer required.

Yielding to other components

Because the Windows Server 2003 and Windows 2000 environments are multithreaded, there is no need to yield to other components.

About Transaction Programs

A processing task accomplished by programs using Advanced Program-to-Program Communications (APPC) is called a transaction. Consequently, programs that use APPC are called transaction programs (TP)s. These programs communicate as peers, on an equal (rather than hierarchical) basis. The TPs use APPC verbs to exchange status information and application data. Each TP uses APPC verbs to supply parameters to APPC, which performs the desired function and returns parameters to the TP.

TPs distributed across a local or wide area network perform distributed transaction processing.

This section describes how to write TPs and how to configure the systems on which TPs run. The topics in this section cover the following general areas:

- Understanding fundamental concepts related to TPs
- Designing and coding TPs
- Configuring registry and environment variables for invokable TPs
- Configuring Microsoft® Host Integration Server 2004 to work with your TPs
- Sync Point Level 2 support

This section contains:

- Communication between TPs
- Designing and Coding TPs
- Configuring Invokable TPs
- Configuring TPs on Host Integration Server
- Arranging TPs Within an SNA Network
- Sync Point Level 2 Support in Host Integration Server

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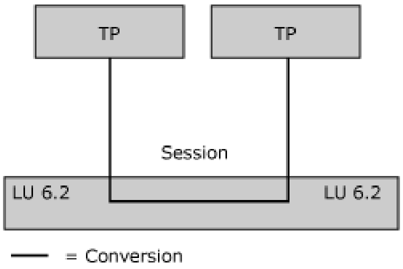
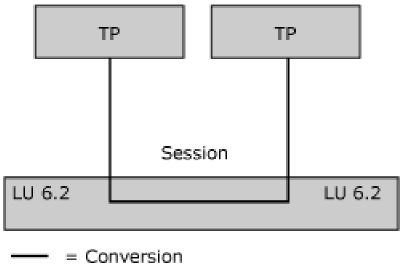
Communication between TPs

Various hardware and software elements in the SNA environment are required for two transaction programs (TPs) to communicate with each other. The following figure shows several fundamental elements.



Each TP is associated with a logical unit (LU) of type 6.2. The LU allows the TP to access the network. Several TPs can be associated with the same LU.

A partner TP can invoke another TP, which, in turn, invokes another TP, and so on. In the following figure, TP A invokes TP B and TP B invokes TP C.



This section contains:

- Fundamental Terms for TPs and LUs
- Sample TPs Illustrating Fundamental Concepts
- Configuring and Controlling TPs
- Creating TPs and Their Supporting Configuration

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Fundamental Terms for TPs and LUs

The following terms describe some fundamental characteristics of transaction programs (TPs) communicating through logical units (LUs):

asynchronous verb

An APPC verb for which the initial function call returns immediately, so that the normal operation of the program is not blocked while processing of the verb completes. For more information, see Receiving Data Asynchronously.

basic conversation

A type of conversation more complex than a mapped conversation and generally used by service TPs (SNA-based programs that provide services to other programs). For more information, see Basic and Mapped Conversations Compared.

conversation

The interaction between TPs carrying out a specific task. Each conversation requires an LU-LU session. A TP can be involved in several conversations simultaneously, as shown with TP B in Communication between TPs.

invokable TP

A TP that can be invoked by another TP. Invokable TPs are usually server-type applications; that is, they work in the same general way that an application such as CICS works. Parameters for an invokable TP are configured through registry or environment variables.

There are several types of invokable TPs:

operator-started invokable TP

A TP that is started manually in preparation for being invoked.

autostarted invokable TP

A TP that is automatically started by APPC when invoked.

queued TP

A TP that, when invoked multiple times, loads once and then queues up subsequent requests to be dealt with one at a time. All operator-started TPs and some autostarted TPs are queued.

nonqueued TP

A TP loaded multiple times, once for every time it is invoked. Some autostarted TPs are nonqueued but no operator-started TPs are nonqueued.

For more information, see Invokable TPs.

invoking TP

A TP that can invoke (that is, initiate a conversation with) other TPs. Invoking TPs are usually client-type applications; that is, they work in the same general way that an emulator works. For more information, see Invoking TPs.

local LU and **local TP**

An LU and TP working together, when viewed as the "home base" for a particular conversation. From this viewpoint, some other LU and TP are seen as the "partner" or "remote" LU and TP.

LU alias

The string that identifies an LU to a TP. The alias can be up to eight characters long.

LU-LU session

The communication between two LUs over a specific connection for a specific amount of time. An LU-LU session is needed for two TPs to interact. One session can be used serially by many pairs of TPs.

An LU 6.2 can have multiple sessions (two or more concurrent sessions with different partner LUs) and parallel sessions (two or more concurrent sessions with the same partner LU).

LUs as well as LU-LU pairs and modes are configured using the SNA Manager on Host Integration Server.

mapped conversation

A type of conversation simpler than a basic conversation and generally used by application TPs (programs that accomplish tasks for end users). The characters **MC_** at the beginning of a verb stand for mapped conversation. For more information, see Basic and Mapped Conversations Compared.

partner LU and **partner TP**, or **remote LU** and **remote TP**

An LU and TP working together, when viewed as being at the far end of a particular conversation.

synchronous verb

An APPC verb that blocks further program operations until the processing of the verb is complete.

http://go.microsoft.com/fwlink/?linkid=29507.

Sample TPs Illustrating Fundamental Concepts

A set of sample transaction programs (TPs) is provided on the Host Integration Server CD-ROM in the \SDK\SAMPLES directory. Included with the sample code in the \SDK\SAMPLES\SNA\TPSETUP directory on the Host Integration Server CD-ROM is TPSETUP, a program that simplifies the setting of registry or environment variables needed by autostarted invokable TPs. Without an interface like that provided by TPSETUP, configuring such variables can be complicated and error-prone. Therefore, it is recommended that you use code like TPSETUP in installation programs for autostarted invokable TPs.

The source code for TPSETUP (INSTALL.C) can be compiled to work in the Microsoft Windows Server™ 2003 and Windows® 2000 environment.

For information about TPSETUP and about the sample TPs, see APPC Samples.

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Configuring and Controlling TPs

The following table shows how the characteristics of the transaction programs (TPs) and selection of the logical units (LUs) for a conversation are controlled.

Characteristic	**How controlled**
Type of verb: synchronous or asynchronous	Written into the code. Synchronous verbs use blocking calls; asynchronous verbs avoid blocking calls. See Receiving Data Asynchronously and WinAsyncAPPC.
Type of conversation: basic or mapped	Written into the code. The **MC_** prefix is used on verbs in mapped conversations and omitted on verbs in basic conversations. For two TPs to communicate successfully, both must use the same type of conversation, basic or mapped. See Basic and Mapped Conversations Compared.
Type of TP: invoking or invokable	Written into the code. Invoking TPs start with TP_STARTED, which identifies the invoking TP, and ALLOCATE or MC_ALLOCATE, which identifies the requested invokable TP. Invokable TPs start with RECEIVE_ALLOCATE, which identifies the invokable TP. See Invoking TPs and Invokable TPs.
The local LU alias to be used by an invoking TP	Three options: • Written into the code in TP_STARTED. • Configured (in Host Integration Server Manager as the default local APPC LU for the user who starts the invoking TP. • Configured as a member of the default outgoing local APPC LU pool using the SNA Manager on Host Integration Server 2004. See Configuring Invoking TPs on Host Integration Server.
The invokable TP requested by an invoking TP	Written into the ALLOCATE or MC_ALLOCATE request in the invoking TP.
The LU alias to be used by an invokable TP	Two options: • Written into the invoking TP (not the invokable TP), in ALLOCATE or MC_ALLOCATE. • Configured as the default remote APPC LU for the user who starts the invoking TP. See Configuring Invoking TPs on Host Integration Server and Matching Invoking and Invokable TPs.
Type of autostarted invokable TP: queued or nonqueued	Configured with registry or environment variables. See Configuring Invokable TPs.
Local LU and remote LU aliases	Configured using SNA Manager on Host Integration Server 2004.
The pairing of local and remote LUs, and the mode used for each LU-LU pair	Configured using SNA Manager on Host Integration Server 2004.

Creating TPs and Their Supporting Configuration

The following procedure describes how to create transaction programs (TPs) and set up a supporting configuration.

To create TPs and set up a supporting configuration

1. Write, compile, and link each TP.
2. Place each TP on an appropriate computer.

   For TPs that you start many times or that are started by a user, arrange for the TP to be started easily. That is, for graphical interfaces, create a program icon for starting the TP; for non-graphical interfaces, make sure the TP is in the path.

3. On one or more servers running Host Integration Server, configure logical units (LUs), modes, and LU-LU pairs for use by the TPs.

   For information about how to set up LU-LU pairs to support TPs, see Using Invoking and Invokable TPs.

4. Set any registry or environment variables needed for the invokable TP.

   For autostarted invokable TPs, it is recommended that you use the sample TP configuration program, TPSETUP, for this step. When you write an installation program for autostarted invokable TPs, it is recommended that you include code similar to TPSETUP.

   For information about registry or environment variables, see Configuring Invokable TPs. For information about TPSETUP, see APPC Samples.

5. If the invokable TP is operator-started, start it, or arrange for it to be started when the computer is restarted and then restart the computer.

   If the invokable TP is autostarted, Host Integration Server 2004 will start it when needed.

6. Start the invoking TP.

Designing and Coding TPs

The following topics provide background information about designing and coding transaction programs (TPs).

This section contains:

- Conversation States
- Confirmation Processing
- Receiving Data Asynchronously
- Conversation Security
- Basic and Mapped Conversations Compared
- Using Invoking and Invokable TPs

Conversation States

The state of the conversation (as viewed by a particular TP) governs which APPC verbs the TP can issue at a particular time. For example, a TP cannot issue MC_SEND_DATA if the conversation is not in SEND state for that TP.

The state of a conversation depends on the TP from which it is viewed. A local TP can view a conversation as being in SEND state while the partner TP views the conversation as being in RECEIVE state. A particular TP can be in several conversations, each of which is in a different state.

The possible conversation states are summarized here.

CONFIRM

The TP has received a request for confirmation of receipt of data; it must respond positively or send error information to the partner TP.

CONFIRM_DEALLOCATE

The TP has received a request for confirmation; it must respond positively or send error information. If the TP responds positively, the conversation is automatically deallocated.

CONFIRM_SEND

The TP has received a request for confirmation; it must respond positively or send error information. After responding, the TP can begin to send data.

PENDING_POST

The TP is receiving data asynchronously. The TP can perform other processing not related to this conversation.

RECEIVE

The TP can receive application data and status information from the partner TP. When the conversation is in RECEIVE state, the TP can also send error information and request permission to send data.

RESET

The conversation has not started or has been terminated.

SEND

The TP can send data to the partner TP and request confirmation. When the conversation is in SEND state, the TP can also begin to receive data, which changes the state to RECEIVE.

SEND_PENDING

The TP issued a receive verb and the **what_rcvd** parameter returned by that verb indicated both data received and a status indication of SEND. This only affects the use of the **err_dir** parameter for SEND_ERROR and MC_SEND_ERROR. Otherwise, the state is the same as the SEND state.

This section contains:

- State Checks
- Changing Conversation States

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State Checks

A state check occurs when a TP issues an APPC verb and the conversation is not in the appropriate state. For example, a state check occurs if a TP issues MC_SEND_DATA while the conversation is in RECEIVE state. When a state check occurs, APPC does not execute the verb; it returns state check information through primary and secondary return codes.

Changing Conversation States

A change in the conversation state can result from:

- A verb issued by the local TP.
- A verb issued by the partner TP.
- An error condition.

The following example shows how APPC verbs can change the state of the conversation from SEND to RECEIVE and from RECEIVE to SEND.

> **Note** Any TP can send or receive data, regardless of whether it is the invoking TP (the TP that started the conversation) or the invokable TP (the TP that responded to a request to start a conversation).

This example shows how APPC verbs can change the conversation state. In this table, each conversation state appears in bold and precedes the APPC verbs that are used while in that state.

Issued by the invoking TP	Issued by the invokable TP
TP_STARTED	
Conversation state: RESET	
MC_ALLOCATE	
(synclevel=AP_CONFIRM_SYNC_LEVL)	
Conversation state: SEND	
MC_SEND_DATA	
MC_PREPARE_TO_RECEIVE	
(ptr_type=AP_SYNC_LEVEL)	
	Conversation state: RESET
	RECEIVE_ALLOCATE
	Conversation state: RECEIVE
	MC_RECEIVE_AND_WAIT
	(primary_rc=AP_OK)
	(what_rcvd=AP_DATA_COMPLETE)
	MC_RECEIVE_AND_WAIT
	(primary_rc=AP_OK)
	(what_rcvd=AP_CONFIRM_SEND)
	Conversation state: CONFIRM_SEND
	MC_CONFIRMED
	Conversation state: SEND
	MC_SEND_DATA
	MC_CONFIRM
Conversation state: RECEIVE	
MC_RECEIVE_AND_WAIT	
(primary_rc=AP_OK)	
(what_rcvd=AP_DATA_COMPLETE)	
MC_RECEIVE_AND_WAIT	
(primary_rc=AP_OK)	
(what_rcvd=AP_CONFIRM_WHAT_RECEIVED)	
Conversation state: CONFIRM	
MC_REQUEST_TO_SEND	
MC_CONFIRMED	
	(rts_rcvd=AP_YES)
	MC_PREPARE_TO_RECEIVE
	(ptr_type=AP_SYNC_LEVEL)
Conversation state: RECEIVE	
MC_RECEIVE_AND_WAIT	
(primary_rc=AP_OK)	

(what_rcvd=AP_CONFIRM_SEND)	
Conversation state: CONFIRM_SEND	
MC_CONFIRMED	
Conversation state: SEND	
MC_SEND_DATA	
MC_DEALLOCATE	
(dealloc_type=AP_SYNC_LEVEL)	
	Conversation state: RECEIVE
	MC_RECEIVE_AND_WAIT
	(primary_rc=AP_OK)
	(what_rcvd=AP_DATA_COMPLETE)
	MC_RECEIVE_AND_WAIT
	(primary_rc=AP_OK)
	(what_rcvd=AP_CONFIRM_DEALLOCATE)
	Conversation state: CONFIRM_DEALLOCATE
	MC_CONFIRMED
Conversation state: RESET	**Conversation state: RESET**
TP_ENDED	TP_ENDED

Initial States

Before the conversation is allocated, the state is RESET for both TPs.

In the example, after the conversation is allocated, the initial state is SEND for the invoking TP and RECEIVE for the invokable TP.

Changing to RECEIVE State

MC_PREPARE_TO_RECEIVE allows a TP to change the conversation from SEND to RECEIVE state. This verb:

- Flushes the local LU's send buffer.
- Sends the AP_CONFIRM_SEND indicator to the partner TP through the **what_rcvd** parameter of a receive verb. This indicator tells the partner TP that an MC_CONFIRMED response is expected before the partner TP can begin to send data.

Confirmation processing is performed when the following conditions are true:

- The **ptr_type** parameter is set to AP_SYNC_LEVEL.
- The synchronization level of the conversation is set to AP_CONFIRM_SYNC_LEVEL.

For more information about confirmation processing, see Confirmation Processing.

> **Note** Issuing MC_RECEIVE_AND_WAIT while the conversation is in SEND state flushes the LU's send buffer and changes the conversation state to RECEIVE. Changing the conversation state in this manner does not support confirmation processing.

Changing to SEND State

MC_REQUEST_TO_SEND informs the partner TP (for which the conversation is in SEND state) that the local TP (for which the conversation is in RECEIVE state) wants to send data. This request is communicated to the partner TP through the **rts_rcvd** parameter of MC_CONFIRM. (The **rts_rcvd** parameter is also returned to MC_SEND_DATA and other verbs.)

When the partner TP issues MC_PREPARE_TO_RECEIVE, the conversation state changes to RECEIVE for the partner TP, making it possible for the local TP to send data.

> **Note** Issuing MC_REQUEST_TO_SEND does not change the state of the conversation. Upon receiving a request to send, the partner TP is not required to change the conversation state; it can ignore the request.

Confirmation Processing

The sequence of events for confirmation processing is as follows:

1. Establish the synchronization level.
2. Send a confirmation request.
3. Receive data and confirmation request.
4. Respond to the confirmation request.
5. Deallocate the conversation.

Using confirmation processing, a TP sends a confirmation request with the data; the partner TP confirms receipt of the data or indicates that an error occurred. Each time the two TPs exchange a confirmation request and response, they are synchronized.

> **Note** Although the example in this section does not show this, any TP can send or receive data, regardless of whether the TP is the invoking TP or the invokable TP.

The following example illustrates confirmation processing.

Issued by the invoking TP	**Issued by the invokable TP**
TP_STARTED	
MC_ALLOCATE	
(synclevel=AP_CONFIRM_SYNC_LEVEL)	
MC_SEND_DATA	
(type=AP_SEND_DATA_CONFIRM)	
	RECEIVE_ALLOCATE
	MC_RECEIVE_AND_WAIT
MC_SEND_DATA	
(type=AP_SEND_DATA_DEALLOC_SYNC_LEVEL)	
	MC_RECEIVE_AND_WAIT
	(primary_rc=AP_OK)
	(rtn_status=AP_YES)
	(what_rcvd= AP_DATA_COMPLETE_CONFIRM_DEALLOCATE)
	MC_CONFIRMED
TP_ENDED	TP_ENDED

Establishing the Synchronization Level

The **synclevel** parameter of MC_ALLOCATE determines the synchronization level of the conversation. There are three possible synchronization levels:

- AP_NONE, under which confirmation processing does not occur.
- AP_CONFIRM_SYNC_LEVEL, under which the TPs can request confirmation of receipt of data and respond to requests for confirmation of data.
- AP_SYNCPT, under which the TPs operate under Sync Point Level 2 support for confirmation of receipt of data.

Sending a Confirmation Request

MC_SEND_DATA with type AP_SEND_DATA_CONFIRM has two effects:

- It flushes the local LU's send buffer and sends any data contained in the buffer to the partner TP.
- It sends a confirmation request that the partner TP receives through the **what_rcvd** parameter of a receive verb.

After issuing **MC_SEND_DATA**, the local TP waits for confirmation from the partner TP.

Receiving Data and Confirmation Request

The **what_rcvd** parameter of MC_RECEIVE_AND_WAIT indicates:

- Status of the data received: complete or incomplete.
- Future processing expected of the local TP.

In the example, **what_rcvd** is AP_DATA_COMPLETE_CONFIRM, indicating that the status is complete and a confirmation is requested.

Responding to a Confirmation Request

The partner TP issues MC_CONFIRMED to confirm receipt of data. This frees the local TP to resume processing.

Deallocating the Conversation

MC_SEND_DATA sends a confirmation request with the data when all of the following conditions are true:

- The conversation's synchronization level (established by the **synclevel** parameter of MC_ALLOCATE) is AP_CONFIRM_SYNC_LEVEL.
- The type parameter of **MC_SEND_DATA** is set to AP_SEND_DATA_DEALLOC_SYNC_LEVEL.
- The **what_rcvd** parameter of the final MC_RECEIVE_AND_WAIT is AP_DATA_COMPLETE_CONFIRM_DEALLOCATE, indicating that a confirmation of receipt of data is required before APPC will deallocate the conversation. The local TP waits for this confirmation until the partner TP issues MC_CONFIRMED.

Receiving Data Asynchronously

When using Windows 2000, a TP can receive data asynchronously, without regard to other events occurring within the TP. The following table shows the methods by which a TP can receive data asynchronously. The table also indicates how asynchronous methods can be applied to actions other than receiving data.

Operating system	**Method**
Windows 2000	**Through a Windows message:** Issue **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** with **WinAsyncAPPC**; the application is notified of completion through a **PostMessage** to the defined window handle. This method is not restricted to **RECEIVE_AND_WAIT** and **MC_RECEIVE_AND_WAIT**, but can be applied to any APPC verb.
Windows 2000	**Through a Win32® event:** Issue **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** with **WinAsyncAPPCEx**; the application is notified of completion through a Win32 event. This method is not restricted to **RECEIVE_AND_WAIT** and **MC_RECEIVE_AND_WAIT**, but can be applied to any APPC verb.
Windows 2000	With **RECEIVE_AND_POST** or **MC_RECEIVE_AND_POST:** Issue the **RECEIVE_AND_POST** or **MC_RECEIVE_AND_POST** verb.

The following list gives details about these methods of receiving data asynchronously. For complete information, see the verb descriptions.

RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT with WinAsyncAPPC
: This method enables an application to issue a verb and be notified through a **PostMessage** when the action is complete. To retrieve the message number that will be posted to the window, call **RegisterWindowMessage** with "WinAsyncAPPC" as the input string. Then issue **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** using the **WinAsyncAPPC** entry point.

RECEIVE_AND_WAIT or **MC_RECEIVE_AND_WAIT** with WinAsyncAPPCEx
: This method enables an application to be notified through a Win32 event. This is particularly useful when writing applications that need to service multiple conversations simultaneously. The event must be in the nonsignaled state when passed to APPC, and the handle must have EVENT_MODIFY_STATE access to the event.

RECEIVE_AND_POST or MC_RECEIVE_AND_POST
: When using **RECEIVE_AND_POST** or **MC_RECEIVE_AND_POST** with Windows 2000, the application is notified through a Win32 event. The event must be in the nonsignaled state when passed to APPC, and the handle must have EVENT_MODIFY_STATE access to the event.

While receiving data asynchronously, the TP performs tasks not related to this conversation; the TP cannot issue most APPC verbs until notification is received. For information about the verbs that can be issued, see the descriptions of WinAsyncAPPC or WinAsyncAPPCEx.

After a verb has completed asynchronously, check the primary_rc to find out whether the data was received without error.

> **Note** If the initial call to issue the verb returns successfully, the application is guaranteed to be notified (by the applicable method) when the verb completes, regardless of whether the verb is ultimately successful.

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Conversation Security

You can use conversation security to require that the invoking TP provide a user identifier and password before APPC will allocate a conversation with the invokable TP. If security is activated, the invoking TP must supply a combination of the user identifier and password as parameters of ALLOCATE or MC_ALLOCATE. Conversation security is activated and configured through registry or environment variables on the computer where the invokable TP is located.

With communication involving more than two TPs, the verification of a user identifier and password can be passed from one TP to another. Suppose that TP A invokes TP B, which requires security information, and TP B in turn invokes TP C, which also requires security information. Through **ALLOCATE** or **MC_ALLOCATE**, TP B can inform TP C that conversation security has already been verified.

For information about the registry or environment variables affecting conversation security, see Configuring Invokable TPs.

Basic and Mapped Conversations Compared

The following table offers some guidelines for choosing between basic and mapped conversations for your TPs. For definitions of basic and mapped conversations, see Fundamental Terms for TPs and LUs.

Characteristic	**Basic conversations**	**Mapped conversations**
Common use	Generally used for service TPs.	Generally used for application TPs.
Partnering	Must be used to communicate with an existing TP that uses basic verbs.	Must be used to communicate with an existing TP that uses mapped verbs.
Sending and receiving method	Before a TP can begin a send operation, it must convert data records into logical records. The TP does this by adding a 2-byte prefix that indicates the length of the record. A TP can send several logical records at one time. When a partner TP receives logical records, it must reconstruct them into usable data records. For more information, see Logical Records Used in Basic Conversations.	A TP sends data one record at a time. Neither the sending TP nor the receiving TP needs to convert data records between different forms.
Abnormal termination	In the DEALLOCATE verb, a TP can indicate whether an error or ABEND (abnormal program termination) was caused by a TP or by a program using the TP.	A TP can indicate an error or ABEND, but cannot tell whether a problem was caused by a TP or by a program using a TP.
	A TP can indicate whether an ABEND was caused by a timeout or by a critical error.	A TP cannot indicate the cause of an ABEND.
Error logging	For an error or ABEND, a TP can send an error message, in the form of a general data stream (GDS) error log variable, to the local log and to the partner LU.	For an error or ABEND, a TP cannot send an error message to the local log or to the partner LU.

This section contains:

- Logical Records Used in Basic Conversations
- An Example of a Mapped Conversation

Logical Records Used in Basic Conversations

Logical records are sent and received in basic conversations only.

A TP can send or receive multiple logical records with a single SEND_DATA or receive verb. The receive verbs are RECEIVE_AND_POST (Windows 2000), RECEIVE_IMMEDIATE, and RECEIVE_AND_WAIT. A TP can also send or receive a logical record in successive portions: beginning, middle, and end.

A logical record is made up of:

- A 2-byte record-length (LL) field.
- A data field that can range in length from 0 bytes through 32765 bytes.

The LL field contains a hexadecimal value that is the length of the data field plus two bytes (for the LL field). For example, if a record contains 228 bytes of application data, the logical record length is 230. The LL field is 0x00E6, the hexadecimal equivalent of 230. If the length of the data field is 0, the value contained in the LL field is 0x0002.

Logical records are sent from or received in a data buffer established by the TP. In the data buffer, the LL field must not be in Intel byte-swapped format. For example, a length of 230 must be 0x00E6, not 0xE600.

The LL field cannot be 0x0000 or 0x0001, which allow less than the two bytes required for the LL field itself. The LL field also cannot be greater than or equal to 0x8000, which is equivalent to decimal 32768 and therefore allows for a data field greater than 32765 or an LL field greater than 2.

Setting the most significant bit of the LL field to 1 indicates that the information contained in the current logical record is continued in the next logical record.

An Example of a Mapped Conversation

For background information about mapped conversations, see Basic and Mapped Conversations Compared.

The following example of a mapped conversation shows the APPC verbs used to start a conversation, exchange data, and end the conversation. APPC verb parameters are in parentheses.

Issued by the invoking TP	Issued by the invokable TP
TP_STARTED	
MC_ALLOCATE	
MC_SEND_DATA	
MC_DEALLOCATE	
TP_ENDED	RECEIVE_ALLOCATE
	MC_RECEIVE_AND_WAIT
	(primary_rc=AP_OK)
	(rtn_status=AP_NO)
	(what_rcvd=AP_DATA_COMPLETE)
	MC_RECEIVE_AND_WAIT
	(primary_rc=AP_DEALLOC_NORM)
	TP_ENDED

The following paragraphs describe the verbs that are used in a mapped conversation.

Verbs for Starting a Mapped Conversation

To start a mapped conversation, the invoking TP issues the following verbs:

- TP_STARTED, which notifies APPC that the local TP is beginning a conversation.
- MC_ALLOCATE, which requests that APPC establish a conversation between the local TP and the partner TP.

The invokable TP issues RECEIVE_ALLOCATE, which informs APPC that it is ready to begin a conversation with the invoking TP.

Verbs for Sending Data in a Mapped Conversation

MC_SEND_DATA puts one data record (a record containing application data to be transmitted) in the send buffer of the local LU. Data transmission to the partner TP does not happen until one of the following events occurs:

- The send buffer fills up.
- The sending TP issues a verb that forces APPC to flush the buffer and send data to the partner TP.

In the preceding example, the send buffer contains both the data record and the MC_ALLOCATE request (which precedes the data record). Therefore, in the example, MC_DEALLOCATE flushes the buffer, sending the **MC_ALLOCATE** request and data record to the partner TP. Other verbs that flush the buffer are MC_CONFIRM and MC_FLUSH.

Verbs for Receiving Data in a Mapped Conversation

The MC_RECEIVE_AND_WAIT verb allows a TP to receive a data record or status information. If no data is currently available, the TP waits for data to arrive. For Windows 2000 systems, issue **MC_RECEIVE_AND_WAIT** in conjunction with WinAsyncAPPC rather than the blocking version of this call.

In the example, the receiving TP issues **MC_RECEIVE_AND_WAIT** twice. The first time, it issues the verb to receive data. When it finishes receiving the complete data record (**what_rcvd** is AP_DATA_COMPLETE), it issues **MC_RECEIVE_AND_WAIT** again to receive a return code. The return code AP_DEALLOC_NORMAL indicates that the conversation has been deallocated.

> **Note** MC_RECEIVE_IMMEDIATE performs the same function as **MC_RECEIVE_AND_WAIT**, except that it does not wait if data is not currently available from the partner TP. Instead, it returns a no-data-available response to the calling TP.

Verbs for Ending a Mapped Conversation

To end a mapped conversation, one of the TPs issues MC_DEALLOCATE, which causes APPC to deallocate the conversation between the two TPs.

After the conversation has been deallocated, both TPs issue TP_ENDED.

> **Note** A TP can participate in multiple conversations simultaneously. In this case, the TP issues **TP_ENDED** after all conversations have been deallocated.

Using Invoking and Invokable TPs

There are two kinds of TPs: TPs that can invoke (that is, initiate a conversation with) other TPs, and TPs that can be invoked. A TP that can invoke another TP is called an invoking TP, and a TP that can be invoked is called an invokable TP.

The following topics describe how:

- Invoking TPs request invokable TPs.
- Invokable TPs identify themselves to Host Integration Server in preparation for being invoked.
- An invokable TP is matched to an invoking TP's request.

For information about how to configure LUs to support TPs, see Configuring TPs on Host Integration Server and Microsoft Host Integration Server 2004 Help.

This section contains:

- Invoking TPs
- Invoking TPs and Contention
- Invokable TPs
- Subcategories for Invokable TPs
- Matching Invoking and Invokable TPs

Invoking TPs

An invoking TP can be located on any system on the SNA network. An invoking TP identifies itself by issuing TP_STARTED, which specifies the name of the invoking TP and can specify the LU alias that the TP uses. If the LU alias is not specified in **TP_STARTED**, Host Integration Server must be configured to supply it through one of two types of default local LU; otherwise, **TP_STARTED** will fail. For more information, see Configuring Invoking TPs on Host Integration Server.

Next, the invoking TP initiates the invoking process by issuing ALLOCATE or MC_ALLOCATE, in which it specifies the name of the invokable TP, and can also specify the partner LU alias (the LU alias to be used by the invokable TP). If the partner LU is not specified in **ALLOCATE** or **MC_ALLOCATE**, Host Integration Server 2004 must be configured to supply one through the default remote APPC LU assigned to the user who started the invoking TP; otherwise, **ALLOCATE** or **MC_ALLOCATE** will fail. For more information, see Configuring Invoking TPs on Host Integration Server.

After a TP successfully issues an **ALLOCATE** or **MC_ALLOCATE** verb, an allocation request flows. For more information about what happens after an invoking TP requests an invokable TP, see Matching Invoking and Invokable TPs.

Invoking TPs and Contention

The following information applies only to cases where LUs are communicating in complex ways (such as chains of LUs) over multiple sessions. In such cases, two LUs may attempt to allocate a conversation on the same session at the same time. If this happens, one LU must win (the contention winner) and one must lose (the contention loser). The contention-winner LU and the contention-loser LU are determined for each session when the session is established. During that particular session, the contention-loser LU must receive permission from the contention-winner LU before allocating a conversation. In contrast, the contention-winner LU on that session allocates a conversation as needed.

Note that when two LUs are communicating over multiple sessions, one LU can be the contention winner for some of the sessions, and the other LU the contention winner for others.

An invoking TP will operate most efficiently if the number of concurrent **ALLOCATE** or **MC_ALLOCATE** requests that the TP issues is matched by the number of sessions on which the local LU is the contention winner. The choice of contention winner is controlled through the modes configured at the two ends of the communication. The mode is configured using SNA Manager on Host Integration Server 2004. A mode must be configured to work with the mode on the remote system for communication to begin between two LUs. For more information about modes, see Microsoft Host Integration Server 2004 Help.

Invokable TPs

An invokable TP is a TP that can be invoked by another TP. Invokable TPs are written or configured through registry or environment variables to supply their names to Host Integration Server 2004 as a notification that they are available for incoming requests. Invokable TPs can be run on any Host Integration Server 2004 client or server running Windows 2000.

There are two types of invokable TPs:

Operator-started invokable TPs

An operator-started invokable TP must be started by an operator before the TP can be invoked. When the operator-started invokable TP is started, it notifies Host Integration Server 2004 of its availability by issuing a RECEIVE_ALLOCATE verb. The **RECEIVE_ALLOCATE** causes the name of the invokable TP, along with the alias of an associated LU if one has been configured through a registry or environment variable, to be communicated to all the servers running Host Integration Server 2004 in the SNA domain.

Autostarted invokable TPs

An autostarted invokable TP can be started by Host Integration Server 2004 when needed. The TP must be registered through registry entries or environment variables on its local system, so that it can be identified to the SnaBase component of the Host Integration Server 2004 client software. The registered information defines the TP as autostarted and must specify the TP name. The registered information can also specify the local LU alias that the invokable TP will use.

The recommended method for setting registry or environment variables for autostarted invokable TPs is to use the sample TP configuration program, TPSETUP, or similar code written into your own installation program. For more information about registry or environment variables for invokable TPs, see Configuring Invokable TPs. For information about TPSETUP, see APPC Samples.

If no local LU alias is registered with autostarted TPs, the resulting Host Integration Server 2004 configuration can be more flexible in responding to invoking requests. For more information about such flexible configurations, see TP Name Not Unique; Local LU Alias Unspecified.

After an autostarted invokable TP is started by Host Integration Server 2004, the TP issues RECEIVE_ALLOCATE just as an operator-started TP does. **RECEIVE_ALLOCATE** must provide the TP name that was registered for the TP.

Autostarted TPs must be configured through registry or environment variables to be either queued or nonqueued. All operator-started TPs act as queued TPs.

Queued TPs

If an autostarted TP is configured as queued, or if the TP is operator-started, incoming allocation requests are queued and then sent only when the invokable TP issues **RECEIVE_ALLOCATE**. For autostarted invokable TPs, if a copy of the TP is not yet running, one is started when an incoming allocation request specifies that TP.

> **Note** For Windows 2000, only one copy of a service can be running at any given time; this means that all autostarted TPs that run as services under Windows 2000 must be queued. To write an autostarted TP so it will run under Windows 2000 as a service and also run in a nonqueued way, write a multithreaded program with a **RECEIVE_ALLOCATE** always outstanding.

Nonqueued TPs

If an autostarted TP is configured as nonqueued, a new copy will be started every time an ALLOCATE or MC_ALLOCATE is received for the TP. Nonqueued TPs should process the conversation they have been allocated and then exit, since they will not receive any additional **ALLOCATE** or **MC_ALLOCATE** requests.

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Subcategories for Invokable TPs

The following figure shows subcategories for invokable TPs.

Queued or nonqueued	**Application or service**	**Starting method**
Queued	Running as an application or a service	Autostarted or operator-started
Nonqueued	Running as an application	Autostarted

The concept of a TP "running as a service" or "running as an application" is distinct from a service TP or an application TP. Service TP and application TP are SNA terms that describe how a TP is used: either as a supportive service program for other APPC programs, or directly by a user, as an application. For detailed information about services and applications on Windows, see the Microsoft Developer Network (MSDN®) Platform Software Development Kit.

To write an autostarted TP so it will run under Windows as a service and also run in a nonqueued way, write a multithreaded program with a RECEIVE_ALLOCATE always outstanding. See Invokable TPs.

Matching Invoking and Invokable TPs

Each computer running Host Integration Server 2004 maintains a list of available invokable TP names and any LU aliases to be associated with the TP names. This information is obtained as follows:

- For autostarted invokable TPs, registry or environment variables identify a TP name containing a maximum of eight characters, and can specify an associated LU. This information is sent from the client to the server that sponsors the client. A client learns about the domain through a sponsor connection to a server; clients must establish the sponsor connection before proceeding with any other tasks.
- For operator-started invokable TPs, a TP name (with a maximum of 64 characters) is specified with the RECEIVE_ALLOCATE verb. The TP name is truncated to eight characters and sent from the client to the server that sponsors the client, along with the alias of an associated LU if one has been configured through a registry or environment variable.

  > **Note** If you want a TP name to be unique, it is recommended that you limit the name to eight characters or fewer, or make the name unique within the first eight characters. This is because the preliminary routing of allocation requests is carried out using the first eight characters. Although further matching is later carried out between the full TP names specified in ALLOCATE or MC_ALLOCATE and **RECEIVE_ALLOCATE**, it is inefficient to allow the preliminary routing to succeed when in some cases the later matching will fail.

The next step in the matching of invoking and invokable TPs is that the invoking TP issues the **ALLOCATE** or **MC_ALLOCATE** verb. After an invoking TP in a Host Integration Server domain successfully issues this verb, an allocation request flows to the partner LU specified in the **ALLOCATE** or **MC_ALLOCATE** verb, stating the name of the invokable TP that has been requested.

When an allocation request arrives, Host Integration Server compares the requested invokable TP name and LU alias to the list of available invokable TPs (which can include associated LU aliases). The comparison can be modified by registry variables, but by default is carried out as follows:

- Although the TP name requested in the **ALLOCATE** or **MC_ALLOCATE** verb can be as long as 64 characters, any name received through a registry or environment variable is limited to eight characters or less. Therefore, only the first eight characters of TP names are used in comparisons.
- The comparison is carried out first on both the TP name and the LU alias. An invokable TP for which there is a match on both TP name and LU alias will be chosen ahead of a TP for which no LU alias has been configured through a registry or environment variable. A TP for which no LU alias has been configured can be matched with any request that specifies that TP name, since there cannot be a mismatch based on LU alias.
- The comparison of requested and available TP names is carried out in a specific order:
  1. Host Integration Server first checks for operator-started invokable TPs on the local system (the local computer running Host Integration Server 2004).
  2. If no match is found, Host Integration Server checks for autostarted invokable TPs on the local system (the local computer running Host Integration Server 2004).
  3. If no match is found, Host Integration Server checks for operator-started invokable TPs on other Host Integration Server 2004 clients or servers.
  4. If no match is found, Host Integration Server checks for autostarted invokable TPs on other Host Integration Server clients or servers.

This comparison can be modified somewhat by registry entries for the SnaServer service. The entries are called **DloadMatchTPOnly** and **DloadMatchLocalFirst**, and are described in the *Microsoft Host Integration Server 2004 Reference online book*.

If a match is found, Host Integration Server signals the system containing the requested TP to connect to that server running Host Integration Server 2004. If no match is found, Host Integration Server rejects the incoming request.

For suggestions about specific ways to handle TP names and LU aliases, see Arranging TPs Within an SNA Network.

> **Note** Because of the way APPC works, an allocation request will not flow until local data buffers are full, or a confirm or flush verb is issued. This can mean that the allocation request does not flow until some time after the ALLOCATE or MC_ALLOCATE verb is issued. Therefore, any allocation failure caused by the rejection of the allocation request at the partner LU will be observed as the failure of a later verb with one of the allocation failure return codes.

Configuring Invokable TPs

The following topics discuss how to configure invokable transaction programs (TPs) for Microsoft® Host Integration Server 2004 clients.

This section contains:

- Clients Running Windows

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Clients Running Windows

On clients running Microsoft® Windows® 2000, Windows XP, and Windows Server 2003, invokable TPs are configured through the Windows registry.

> **Note** The recommended method for setting registry variables for autostarted invokable TPs is to use the sample TP configuration program, TPSETUP. Compile INSTALL.C, the source code for TPSETUP, for the Windows environment. When you write an installation program for autostarted invokable TPs, it is recommended that you add code similar to TPSETUP to the installation program. For information about TPSETUP, see APPC Samples.

It is recommended that autostarted invokable TPs be written as Windows services. Be sure to include code like that in TPSETUP in the program that installs your TPs. Among other things, TPSETUP shows how to use the **CreateService** function when installing a TP. For important information about how services work under Windows, see the Microsoft Developer Network (MSDN®) Platform Software Development Kit.

The following table lists the registry entries used for the types of invokable TPs that can be run on Windows clients:

Type of TP	**Location in registry**	**Possible registry entries**
Autostarted invokable TP running as a service	**HKEY_LOCAL_MACHINE** **SYSTEM** **CurrentControlSet** **Services** ***TPName*** (and subkeys)	Registry entries created by the **CreateService** call, including entries that specify the path, display name, and other characteristics of the service. —plus— **Linkage** **OtherDependencies:**REG_MULTI_SZ:SnaBase **Parameters** **SNAServiceType:**REG_DWORD:0x5 **LocalLU:**REG_SZ:*LUalias* **Parameters:**REG_SZ:*ParameterList* **Timeout:**REG_DWORD:*number* **ConversationSecurity:**REG_SZ:{ YES | NO } **AlreadyVerified:**REG_SZ:{ YES | NO }[2] ***Username1:***REG_SZ:*Password1*[2] ... ***UsernameX:***REG_SZ:*PasswordX*[2]
Autostarted invokable TP running as an application	**HKEY_LOCAL_MACHINE** **SYSTEM** **CurrentControlSet** **Services** **SnaBase** **Parameters** **TPs** ***TPName*** Parameters	**SNAServiceType:**REG_DWORD:{ 0x5 | 0x6 } **PathName:**REG_EXPAND_SZ:*path* **LocalLU:**REG_SZ:*LUalias* **Parameters:**REG_SZ:*ParameterList* **TimeOut:**REG_DWORD:*number* **ConversationSecurity:**REG_SZ:{ YES | NO } **AlreadyVerified:**REG_SZ:{ YES | NO }2 ***Username1:***REG_SZ:*Password1*[2] ... ***UsernameX:***REG_SZ:*PasswordX*[2]

Operator-started invokable TP running as a service	**HKEY_LOCAL_MACHINE** **SYSTEM** **CurrentControlSet** **Services** ***TPName*** (and subkeys)	Registry entries created by the **CreateService** call, including entries that specify the path, display name, and other characteristics of the service. —plus— **Linkage** **OtherDependencies:**REG_MULTI_SZ:SnaBase **Parameters** **SNAServiceType:**REG_DWORD:0x1A **LocalLU:**REG_SZ:*LUalias* **Timeout:**REG_DWORD:*number* **ConversationSecurity:**REG_SZ:{ YES | NO } **AlreadyVerified:**REG_SZ:{ YES | NO }[2] ***Username1:***REG_SZ:*Password1*[2] ... ***UsernameX:***REG_SZ:*PasswordX*[2]
Operator-started invokable TP	**HKEY_LOCAL_MACHINE** **SYSTEM** **CurrentControlSet** **Services** **SnaBase** **Parameters** **TPs** ***TPName*** Parameters	**SNAServiceType:**REG_DWORD:0x1A **LocalLU:**REG_SZ:*LUalias* **TimeOut:**REG_DWORD:*number* **ConversationSecurity:**REG_SZ:{ YES | NO } **AlreadyVerified:**REG_SZ:{ YES | NO }2 ***Username1:***REG_SZ:*Password1*[2] ... ***UsernameX:***REG_SZ:*PasswordX*[2]

Notes

APPC Samples

2) **AlreadyVerified** and **Username/Password** entries are used only if **ConversationSecurity** is set to YES.

This section contains:

- Registry Entries for Clients Running Windows 2000
- Example of Windows 2000 Registry Entries for an Invokable TP

Registry Entries for Clients Running Windows 2000

The following list gives details about registry entries for clients running Windows 2000. For each TP type, the applicable variables and their locations are shown in Clients Running Windows.

Registry Entries for TPName on Clients Running Windows 2000

TPName:REG_MULTI_SZ

The name of the transaction program (TP) that is executed. A TP name is up to 64 ASCII characters in length and cannot contain spaces or nulls.

SNA service TPs are a special set of TPs defined by the SNA protocols. Each service TP is a specially-defined function with a special name. An SNA service TP name is represented by up to four EBCDIC bytes; the first byte is a hexadecimal number in the range 0x00 to 0x3F, and the remaining bytes are EBCDIC characters. The first byte defines the function class of the TP. Therefore, to convert a service TP name to an ASCII TP name form, convert the first byte as shown in the following table, and convert the EBCDIC values to ASCII letter equivalents.

First byte of TP name (hexadecimal number)	ASCII character equivalent for WIN.INI
0x07	DDM
0x20	DIA
0x21	SNAD
0x24	FS
0x30	PO
All others	UN

For example, an EBCDIC service TP name of 0x21 0xD7 0xD7 is equivalent to a TP name of SNADPP (0x21 converts to SNAD and each 0xD7 converts to P).

Registry Entries for the TPName Subtree on Clients Running Windows 2000

OtherDependencies:REG_MULTI_SZ:SnaBase

For a TP running as a service, ensures that the SnaBase service will be started before the TP is started. This entry belongs under the **Linkage** subkey.

SNAServiceType:REG_DWORD:{ 0x5 | 0x6 | 0x1A }

Indicates the type of TP. Use a value of 0x5 for an autostarted queued TP, 0x6 for an autostarted nonqueued TP, and 0x1A for an operator-started TP.

Note that the value for an autostarted TP running as a service must be 0x5, because these TPs are always queued, as described in Invokable TPs.

PathName:REG_SZ:*path*

For an autostarted TP running as an application, specifies the path and file name of the TP. The data type of REG_EXPAND_SZ means that the path can contain an expandable data string; for example, %SystemRoot% represents the directory containing the Windows 2000 system files. Note that for a TP running as a service, an equivalent entry is inserted by the **CreateService** call; no additional path entry is needed.

LocalLU:REG_SZ:*LUalias*

Specifies the alias of the local LU to be used when this TP is started on this computer.

Parameters:REG_SZ:*ParameterList*

Lists parameters to be used by the TP. Separate parameters with spaces.

Timeout:REG_DWORD:*number*

Specifies the time, in milliseconds, that a RECEIVE_ALLOCATE will wait before timing out. Specify *number* in decimal; the registry editor converts this to hexadecimal before displaying it. The default is infinity (no limit).

ConversationSecurity:REG_SZ:{ YES | NO }

Indicates whether this TP supports conversation security. The default is NO.

AlreadyVerified:REG_SZ:{ YES | NO }

Indicates whether this TP can be invoked with a user identifier and password that have already been verified. **AlreadyVerified** is ignored if **ConversationSecurity** is set to NO. The default value is NO.

For a diagram of three TPs in a conversation, where the third TP can be invoked with a password that is already verified by the second TP, see Communication between TPs. The following table shows the requirements for using password verification in a chain of TPs.

First TP (invoking TP)	Second TP (invokable TP that confirms password and then invokes another TP)	Third and subsequent TPs (invokable TPs that invoke other TPs)
Does not need registry or environment variables.	**ConversationSecurity** setting must be YES.	**ConversationSecurity** setting must be YES.
Does not need registry or environment variables.	**AlreadyVerified** setting can be YES or NO.	**AlreadyVerified** setting must be YES.
ALLOCATE or MC_ALLOCATE in this TP has a **security** parameter of AP_PGM; as a result, the TP passes along the **user_id** and **pwd** values supplied in **ALLOCATE** or **MC_ALLOCATE**.	**ALLOCATE** or **MC_ALLOCATE** in this TP has a **security** parameter of AP_SAME; as a result, after confirming the user identifier and password, the TP passes along the user identifier and an already-verified flag.	**ALLOCATE** or **MC_ALLOCATE** in this TP has a **security** parameter of AP_SAME; as a result, the TP passes along the user identifier as received, along with the already-verified flag.

If you set **AlreadyVerified** to NO, this TP cannot join in a chain of conversations where password verification is already done. The exception to this is when **ConversationSecurity** is set to NO, in which case the TP could be the final TP in such a chain, since it performs no checking.

If you are configuring a TP that sometimes needs to confirm a password and sometimes accepts an already-verified flag, set **AlreadyVerified** to YES and configure the *UsernameX* variable appropriately. In this case, whenever the TP is invoked without the already-verified flag set, **AlreadyVerified** is ignored; verification is attempted with the user identifier and password configured for the TP.

If you want to have a chain of conversations where the user identifier and password are reverified at every step, carry out the following. For all the TPs, set **ConversationSecurity** to YES, and in each **ALLOCATE** or **MC_ALLOCATE** issued, set the security parameter to AP_PGM and the **pwd** and **user_id** parameters to valid combinations.

If you set **AlreadyVerified** to YES, make sure that **ConversationSecurity** is also set to YES.

Username1:REG_SZ:Password1
...
UsernameX:REG_SZ:PasswordX

Sets one or more user names and passwords to be compared with those sent by the invoking TP. The user name and password can each be as many as 10 characters. Both parameters are case-sensitive.

This variable is ignored if conversation security is not activated or if the password has already been verified, as described for the **AlreadyVerified** entry.

Example of Windows 2000 Registry Entries for an Invokable TP

For an autostarted invokable TP called **BounceTP** and running as a service, the following registry entries might be added to a Windows 2000-based client. The entries would be added to **HKEY_LOCAL_MACHINE\ SYSTEM\ CurrentControlSet\ Services\ SnaBase**, under the subkeys shown in bold type.

> **Note** In the following list, the parameters listed directly under the **BounceTP** key (such as **DisplayName** and **ErrorControl**) are service parameters created when TPSETUP or similar code is run to install the TP. These parameters should be created by TPSETUP or similar code; they should not be set manually. For more information about TPSETUP, see APPC Samples.

BounceTP
DisplayName:REG_SZ:BounceTP
ErrorControl:REG_DWORD:0x1
ImagePath:REG_EXPAND_SZ:c:\sna\system\bouncetp.exe
ObjectName:REG_SZ:LocalSystem
Start:REG_DWORD:0x3
Type:REG_DWORD:0x10

Linkage

OtherDependencies:REG_MULTI_SZ:SnaBase

Parameters

SNAServiceType:REG_DWORD:0x5
LocalLU:REG_SZ:JohnDoe
Parameters:REG_SZ:Arg1 Arg2 Arg3
Timeout:REG_DWORD:0x100
ConversationSecurity:REG_SZ:yes
AlreadyVerified:REG_SZ:no
JohnDoe:REG_SZ:SecretPassword

Security

Security:REG_BINARY:

For an autostarted invokable TP called **BounceTP** running as an application, the following registry entries might be added to a Windows 2000-based client. The entries would be added to **HKEY_LOCAL_MACHINE\SYSTEM\ CurrentControlSet\Services\SnaBase\Parameters\Tps**, under the subkeys shown in bold type.

> **Note** In the following list, the parameters listed under the **BounceTP** key (such as **PathName** and **ConversationSecurity**) are parameters created when TPSETUP or similar code is run to install the TP. These parameters should be created by TPSETUP or similar code; they should not be set manually. For more information about TPSETUP, see APPC Samples.

BounceTP
Parameters

SNAServiceType:REG_DWORD:0x5
PathName:REG_SZ:C:\sna\system\bouncetp.exe
LocalLU:REG_SZ:JohnDoe
Parameters:REG_SZ:Arg1 Arg2 Arg3
Timeout:REG_DWORD:0x100
ConversationSecurity:REG_SZ:yes
AlreadyVerified:REG_SZ:no
JohnDoe:REG_SZ:SecretPassword

Configuring TPs on Host Integration Server

The following topics describe how configuration of invoking and invokable transaction programs (TPs) works on Microsoft® Host Integration Server 2004.

This section contains:

- Configuring Invoking TPs on Host Integration Server
- Configuring Invokable TPs on Host Integration Server

Configuring Invoking TPs on Host Integration Server

For a server running Host Integration Server 2004 to support the beginning of the invoking process (that is, to accept the TP_STARTED and ALLOCATE or MC_ALLOCATE verbs issued by an invoking TP), the following parameters must be configured correctly:

- If the invoking TP specifies in **TP_STARTED** the LU alias that it uses, that LU alias must match a local APPC LU alias on the supporting server running Host Integration Server 2004. If the invoking TP leaves the LU alias blank in **TP_STARTED**, one of two methods for designating a default LU must be carried out on the supporting server running Host Integration Server 2004:
    - Assign a default local APPC LU to the user or group that starts the invoking TP (that is, the user or group logged on at the system from which **TP_STARTED** is issued).
    - Designate one or more LUs as members of the default outgoing local APPC LU pool. The Host Integration Server first attempts to determine the default local APPC LU of the user who started the TP, and then attempts to assign an available LU from the default outgoing local APPC LU pool; if these attempts fail, the Host Integration Server rejects the request.
- In most situations, the supporting Host Integration Server must contain an appropriate connection to another system (host or peer). Sometimes, for testing purposes, the server running Host Integration Server 2004 contains two local LUs paired together (for invoking and invokable TPs that are in the same domain); in this situation, a connection to a host or peer is not necessary.
- If the invoking TP specifies in ALLOCATE or MC_ALLOCATE the partner LU alias, that LU alias must match an LU alias that is paired with the local LU alias specified in TP_STARTED. If the partner LU alias is left unspecified in **ALLOCATE** or **MC_ALLOCATE**, a default remote APPC LU must be assigned to the user who started the invoking TP. The default remote APPC LU is configuring using SNA Manager on Host Integration Server 2004. If the default remote APPC LU is used, it must be paired with the local LU that will be used. Otherwise, **ALLOCATE** or **MC_ALLOCATE** fails.

The preceding parameters support the beginning of the invoking process. For the invoking process to successfully complete, additional parameters must be configured as described in Configuring Invokable TPs on Host Integration Server.

Configuring Invokable TPs on Host Integration Server

For a computer running Host Integration Server 2004 to receive allocation requests from an invoking TP on another system and route those requests to an invokable TP, certain parameters must be configured correctly:

- The Host Integration Server must have a connection to the system from which the invoking TP's request is sent.
- The Host Integration Server must have a remote LU capable of receiving the incoming request. This remote LU can be configured either explicitly or implicitly.

  When configured explicitly, there is an explicit match between a remote LU alias on the Host Integration Server and the alias of the LU that conveys the invoking TP's request.

  When configured implicitly, an implicit incoming remote LU (with its implicit incoming mode) is used. This means that several items must work together. First, the LU alias specified in the incoming request (the LU alias requested for the invokable TP) must match a local LU alias on the Host Integration Server receiving the request. Second, the local LU on the Host Integration Server 2004 server must have an implicit incoming remote LU assigned to it. The properties of the implicit incoming remote LU will be used for that LU-LU session. For more details about how an implicit incoming remote LU works, see Microsoft Host Integration Server 2004 Help.
- Appropriate local LUs must be defined in the Host Integration Server configuration. For descriptions of several ways to set up these local LUs, see Arranging TPs Within an SNA Network.

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Arranging TPs Within an SNA Network

If your installation of Microsoft® Host Integration Server contains multiple systems (multiple clients and/or multiple computers running Host Integration Server), you can place a given invokable transaction program (TP) on more than one system. When an invoking request is received in such an installation, there can be a choice of systems on which to run the invokable TP.

You can maintain specific control over this choice or you can allow Host Integration Server to make the choice randomly to distribute the load. To do this, follow the instructions in TP Name Not Unique; Local LU Alias Unspecified.

You can maintain specific control over the choice of system by setting up invokable TPs with unique names, or by setting up each invokable TP to run only with a specific, unique LU alias. With this arrangement, the information provided by the invoking TP (in the **ALLOCATE** or **MC_ALLOCATE** verb) specifies the system on which the invokable TP should run.

You can allow Host Integration Server to make the system choice randomly by setting the **DloadMatchLocalFirst** registry entry to NO and using invokable TPs that leave the local logical unit (LU) alias unspecified. Then, when an incoming request is received, it is routed randomly, rather than preferentially to the local Host Integration Server; in addition, no matter what LU alias is requested for the invokable TP, there cannot be a mismatch. Host Integration Server starts one instance of the requested TP, choosing randomly among the available systems.

This section contains:

- TP Name Unique for Each TP
- TP Name Not Unique; Local LU Alias Unique
- TP Name Not Unique; Local LU Alias Unspecified

TP Name Unique for Each TP

One way to specify the intended system where the invokable TP will run is to use a unique TP name for each invokable TP. In this arrangement, the invoking TP identifies the intended invokable TP (and system) simply by naming the TP. This makes it unnecessary for an invokable TP to specify any LU alias in registry or environment variables.

TP Name Not Unique; Local LU Alias Unique

Another way to specify the intended system where the invokable TP will run is to give the same name to multiple invokable TPs, but associate each TP with a unique local LU alias. To do this, configure each invokable TP (through registry or environment variables) to use a unique local LU alias. Then set up the invoking TPs so that each one is routed not only to the correct TP name but also to the correct partner LU alias for the intended invokable TP.

TP Name Not Unique; Local LU Alias Unspecified

If it does not matter on which system an invokable TP runs, use the same name for multiple invokable TPs and do not specify an LU alias in the registry or environment variables for the TPs. In this situation, there are no associated LU aliases in the list of available invokable TP names on a Host Integration Server. Thus, a request received from an invoking TP cannot cause a mismatch on the LU alias, and will match according to the TP name.

In this situation, if you set the **DloadMatchLocalFirst** registry entry to NO, Host Integration Server randomly routes the request to one of the available TPs. This spreads the processing load among multiple systems and provides hot backup (the ability to take systems online and offline without disrupting service).

Troubleshooting for Invokable TPs

If there are difficulties with starting an invokable TP, there may be a mismatch between the information for the invokable TP, the invoking TP, and/or LUs in the Microsoft® Host Integration Server configuration. That is, there may be a mismatch between the parameters for RECEIVE_ALLOCATE, TP_STARTED, ALLOCATE, or MC_ALLOCATE and/or LU aliases specified in server configuration. LU aliases are configured using SNA Manager on Host Integration Server 2004.

Simplifying APPC Configuration

There are several features in Microsoft® Host Integration Server 2004 that can simplify configuration for APPC:

- The implicit incoming remote LU and the implicit incoming mode, which allow Host Integration Server to accept requests that arrive by unrecognized remote LUs and modes.
- The default local APPC LU and the default remote APPC LU, which allow LU aliases to be associated with user or group names, simplifying the routing of incoming requests and the configuration of client systems.
- The default outgoing local APPC LU pool, which allows LUs to be allocated dynamically to any invoking TP that does not specify a local LU.
- Automatic partnering, which automatically creates LU-LU pairs and assigns modes to the pairs.

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Sync Point Level 2 Support in Host Integration Server

The following topics describe additions to Microsoft® Host Integration Server 2004 that enable Sync Point Level 2 support to the LU 6.2 protocol stack.

This section assumes familiarity with the existing Host Integration Server APPC basic and mapped conversation interfaces. It does not attempt to explain the SNA formats and protocols for implementing Sync Point protocols, which are described in *SNA LU6.2 Reference: Peer Protocols* published by IBM (Document SC31-6808-1).

This section contains:

- Sync Point Functional Overview
- Sync Point Support Architecture
- Sync Point Session Support
- Starting Local Sync Point TPs
- Sync Point Conversation Activation
- Sync Point Level 2 Confirm Support
- Sync Point Backout Support
- LUWID, Conversation Correlators, and Session Identifiers
- Configuration Changes for Sync Point Support
- Accepting Incoming Attaches
- Sync Point Examples

Sync Point Functional Overview

The Sync Point support additions to Host Integration Server 2004 allow vendors to provide Sync Point services over LU 6.2 conversations provided by the LU 6.2 protocol stack in Host Integration Server 2004. These additions do not implement the architected Sync Point components and TPs necessary for a complete Sync Point implementation. In particular, the following Sync Point components are not implemented, and must be provided by the vendor.

- Sync Point Services (SPS)
- Conversation-Protected Resource Manager (C-PRM)
- Resynchronization TP

These vendor-supplied components and applications are expected to implement the **SYNCPT** and **BACKOUT** verbs used for Sync Point services. The **SYNCPT** verb is used to synchronize transactions. The **BACKOUT** verb is used to back out of a transaction.

SPS, C-PRM, and the Resynchronization TP are specific components of the SNA Sync Point architecture described in *SNA LU6.2 Reference: Peer Protocols* published by IBM.

Host Integration Server 2004 has been modified to add the features necessary to support these components, namely:

- Additions to the existing APPC API to support implementation of Sync Point verbs.
- Accounting support for Sync Point protocols.
- Modifications to invokable transaction program (TP) initiation.

Changes to the APPC basic and mapped conversation APPC APIs are made so as to ensure backward compatibility with existing APPC applications that adhere strictly to the API.

> **Note** Applications must zero all reserved verb control block (VCB) members before issuing an APPC verb. If this is not done, the application may inadvertently invoke one of the new APPC features.

Sync Point Support Architecture

The Sync Point support provided by Host Integration Server 2004 assumes a particular implementation architecture by the vendor, as follows:

- The vendor provides a communication interface to its own clients requiring Sync Point Services (SPS).
- The vendor API maps its communication and Sync Point requests to the Host Integration Server APPC API.
- The vendor provides a single Microsoft Windows 2000 process, the Transaction Monitor, that is responsible for:
    - Issuing all APPC verbs.
    - Implementing the architected Resynchronization TP.
    - Implementing the architected Conversation-Protected Resource Manager (C-PRM) component of the logical unit (LU).
    - Implementing the architected SPS component of the LU.

  The Transaction Monitor must reside on the same computer as the Host Integration Server containing the LUs for which it is providing Sync Point services. Both incoming and outgoing Sync Point conversations for this Transaction Monitor will be routed through this Host Integration Server 2004 server only.

Detailed descriptions of the three architected Sync Point components can be found in *SNA LU6.2 Reference: Peer Protocols* published by IBM.

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Sync Point Session Support

This section discusses support for Sync Point session activation and deactivation in Host Integration Server 2004.

This section contains:

- Sync Point Session Activation
- Sync Point Session Deactivation

Sync Point Session Activation

If Host Integration Server 2004 is to support Sync Point conversations, this must be specified at session activation time. The configuration of Host Integration Server 2004 is modified to allow the system administrator to specify which (if any) local LUs will be used for Sync Point conversations.

The **Local LU Configuration** property page in Host Integration Server contains a new check box. When checked, it indicates that the local LU can participate in Sync Point sessions. Host Integration Server uses this option to determine the parameters it sends on BIND requests and responses.

When Host Integration Server initiates an LU 6.2 session on an LU designated as supporting Sync Point, it sets the synchronization level on BIND requests to indicate that the session can support Sync Point and Backout. If the partner LU also supports Sync Point and Backout, the session is available for conversations requiring Sync Point support. If the partner LU does not support Sync Point, the session will not be used for Sync Point conversations.

Similarly, if the local LU is configured for Sync Point and the partner LU's BIND request indicates that it supports Sync Point, Host Integration Server sends BIND responses specifying that Sync Point is supported. In this case, the session can be used for Sync Point conversations.

Sync Point Session Deactivation

A Sync Point implementation needs to determine whether it has lost connectivity to a partner when establishing Sync Point conversations so that it can know whether or not to resynchronize. To obtain this information, Host Integration Server provides a new APPC verb, GET_LU_STATUS that reports the status of a particular remote LU. The information returned by this verb is as follows:

- Current number of active LU 6.2 sessions between the remote LU and the TP's local LU.
- Whether or not the number of active sessions dropped to zero at any time since this verb was last issued for the remote LU.

Note that the zero sessions indicator is reset to AP_NO each time the verb is issued by any process. It is therefore imperative that only one process issues this verb; otherwise information may be lost.

Starting Local Sync Point TPs

Local TPs are created by issuing the TP_STARTED verb to Host Integration Server. The **TP_STARTED** verb has been modified by adding the new verb control block (VCB) member **syncpoint_rqd** to allow a TP to specify that it requires Sync Point services.

By setting **syncpoint_rqd** to AP_YES, a TP indicates that it requires Sync Point services from Host Integration Server. A value of AP_NO (the default) indicates that Sync Point services are not required.

Since this member cannot be incorporated within the existing **TP_STARTED** VCB, the TP must use a larger VCB structure. To indicate that the VCB is longer than usual, the **opext** member of the VCB must be combined using OR with the value AP_EXTD_VCB before calling APPC.

Conversations started by TPs requiring Sync Point support will be routed only by the Host Integration Server software running on the same computer. They will not be routed to other LAN-attached servers.

Sync Point Conversation Activation

This section discusses support for Sync Point conversation activation in Host Integration Server.

This section contains:

- Locally Initiated Conversations
- Remotely Initiated Conversations
- Already Verified Support
- Presentation Header Support in Data Transfers
- User Control Data
- Implied Forget

Locally Initiated Conversations

Conversations are initiated locally by issuing an ALLOCATE or MC_ALLOCATE verb. The **ALLOCATE** and **MC_ALLOCATE** verbs are modified to support additional parameters required by Sync Point support. The supplied **synclevel** parameter of the **ALLOCATE** and **MC_ALLOCATE** verbs can take on a value of AP_SYNCPT, which specifies that the conversation requested is a Sync Point conversation.

Remotely Initiated Conversations

Applications wishing to receive remotely initiated conversations (incoming Attaches) issue a RECEIVE_ALLOCATE verb. To accommodate Sync Point support, the **RECEIVE_ALLOCATE** verb is modified in a number of ways as follows:

- The returned **sync_level** parameter of the **RECEIVE_ALLOCATE** verb can take on a value of AP_SYNCPT, specifying that the conversation is a Sync Point conversation. The value of the **sync_level** parameter can also be determined by issuing a GET_ATTRIBUTES verb on the new conversation.
- Support is added for the receipt of program initiation parameters (PIP) data by a new parameter to the **RECEIVE_ALLOCATE** verb:

  The **pip_incoming** parameter is set by the application to indicate whether it is willing to accept incoming PIP data, and is returned by Host Integration Server to indicate whether PIP data is available to be received. If the application does not wish to receive PIP data, this member should be set to AP_NO, the default, before issuing the **RECEIVE_ALLOCATE** verb. If it is willing to accept PIP data, this member should be set to AP_YES. On completion of the **RECEIVE_ALLOCATE** verb, this member will be set to AP_YES if PIP data is available to be received by the application and to AP_NO otherwise.

- If PIP data is available, the application can receive it by issuing one of the verbs for receiving data on completion of the RECEIVE_ALLOCATE verb. For basic conversations, these receive verbs include RECEIVE_AND_POST, RECEIVE_AND_WAIT, and RECEIVE_IMMEDIATE. On basic conversations the PIP data will be returned inclusive of the general data stream (GDS) header for PIP data (GDS identifier 0x12F5). For mapped conversations, these receive verbs include MC_RECEIVE_AND_POST, MC_RECEIVE_AND_WAIT, and MC_RECEIVE_IMMEDIATE. On mapped conversations, Host Integration Server 2004 removes the 4-byte GDS header, and returns the PIP data only.
- For basic conversations, if the application issues a SEND_ERROR, DEALLOCATE, or TP_ENDED verb before the PIP data is received, the PIP data will be discarded. For mapped conversations, if the application issues an MC_SEND_ERROR, MC_DEALLOCATE, or **TP_ENDED** verb before the PIP data is received, the PIP data will be discarded.
- If PIP data is received for a TP that cannot or does not want to receive it, the conversation is rejected with a primary return code of AP_ALLOCATION_ERROR, and a secondary return code of AP_PIP_NOT_ALLOWED.

Already Verified Support

In an implementation where a Host Integration Server application acts as a gateway between an SNA network and a non-SNA network, it is possible that non-Host Integration Server clients of the gateway may require Sync Point Level 2 conversation security. Since the originating client will have validated the relevant user identifier and password, the gateway application should specify conversation security of AP_SAME when starting a conversation on behalf of the client. In this case, however, Host Integration Server assumes that the user identifier to be used has previously been received on an Attach targeted at the TP. In the case of a non-Host Integration Server client this is not the case.

To allow such a gateway to support Sync Point Level 2 conversation security, Host Integration Server provides a new verb, SET_TP_PROPERTIES, which allows the gateway application to set the user identifier for the TP before allocating a conversation with security of AP_SAME. This verb will normally be issued once, immediately after TP_STARTED, to set the user identifier for all the TP's conversations.

Presentation Header Support in Data Transfers

For basic conversations, Sync Point commands are sent by means of presentation headers (PS) across LU 6.2 conversations using the SEND_DATA or MC_SEND_DATA verb. All presentation headers contain length fields that specify a length of 1, which is usually illegal. To support Sync Point conversations, the following modifications are made to the Host Integration Server presentation services component:

- On basic conversations with a **synclevel** of AP_SYNCPT, data transferred specifying a general data stream (GDS) variable length of 1 will not be rejected. If the **synclevel** is not AP_SYNCPT, they will be rejected as before.
- On mapped conversations, PS headers will not be wrapped as mapped conversation application data logical records (with GDS identifier 0x12FF) when they are sent, or have the GDS header stripped off when they are received.
- On mapped conversations, it is the responsibility of the application to provide the complete PS header including the length field. Similarly, the length field will be included in PS header data returned by receive verbs.

To achieve the latter the MC_SEND_DATA verb and the receive verbs (MC_RECEIVE_AND_POST, MC_RECEIVE_AND_WAIT, and MC_RECEIVE_IMMEDIATE) require modifications as follows:

- A new parameter, **data_type**, is added to the **MC_SEND_DATA** verb. When this is set to AP_APPLICATION (the default, 0x00), the data is sent as application data (GDS identifier 0x12FF) as usual. When it is set to AP_PS_HEADER, the data is sent as described above.
- The following two new values are added for the **what_rcvd** member of the receive verbs to specify that the received data is a PS header:

  AP_PS_HEADER_COMPLETE

  AP_PS_HEADER_INCOMPLETE
- If an application issues a receive verb with **rtn_status** set to AP_YES, Host Integration Server will return status in combination with AP_PS_HEADER_COMPLETE, with the exception of AP_DEALLOCATE_NORMAL and AP_CONFIRM_DEALLOCATE. This is to prevent the conversation being prematurely disconnected from the LU 6.2 session when a COMMIT PS header arrives with the end of conversation indication.

It is the responsibility of the vendor-supplied Sync Point support component to convert these PS headers into the appropriate Sync Point return codes (for example, TAKE_SYNCPT).

User Control Data

For mapped conversations, the MC_SEND_DATA verb and the receive verbs (MC_RECEIVE_AND_POST, MC_RECEIVE_AND_WAIT, and MC_RECEIVE_IMMEDIATE) are modified to allow applications to send and receive data in user control data general data stream (GDS) variables instead of the regular application data GDS variables. The **MC_SEND_DATA** verb is modified as follows:

- A new parameter, **data_type**, is added. When **data_type** is set to AP_USER_CONTROL_DATA, the data is sent as user control data (GDS identifier 0x12F2). When it is set to AP_APPLICATION (the default), the data is sent as application data (GDS identifier 0x12FF). Note that the APPC library automatically creates the GDS header on behalf of the application for both AP_APPLICATION and AP_USER_CONTROL_DATA data records.
- The mapped conversation receive verbs are modified to allow applications to receive user control data by adding two new values for the **what_rcvd** parameter, as follows:

  AP_USER_CONTROL_DATA_COMPLETE

  AP_USER_CONTROL_DATA_INCOMPLETE

Implied Forget

LU 6.2 Sync Point sessions can use an optimization of the architected message flows known as implied forget. When the protocol specifies that a FORGET presentation header (PS) is required, the next data flow on the session implies that a FORGET has been received, even though it has not. In the normal situation, the TP is aware of the next data flow when data is received or sent on one of its Sync Point conversations.

However it is possible that the last message that flows is caused by the conversation being deallocated. In this case, the TP is unaware when the next data flow on the session occurs. To provide the TP with this notification, the DEALLOCATE and MC_DEALLOCATE verbs are modified to allow the TP to register a callback function which will be called:

- On the first normal flow transmission (request or response) over the session used by the conversation.
- If the session is unbound before any other data flows.
- If the session is terminated abnormally due to a data link control (DLC) outage.

The callback procedure can take any name because the address of the procedure is passed into the APPC DLL.

Note that the **DEALLOCATE** and **MC_DEALLOCATE** verbs will probably complete before the callback routine is called. The conversation is considered to be in RESET state and no further verbs can be issued using the conversation identifier. If the application issues a TP_ENDED verb before the next data flow on the session, the callback routine will not be invoked.

The DEALLOCATE and MC_DEALLOCATE verbs are modified as follows to support implied forget:

- A new member, **callback**, is added to allow the TP to specify the address of the function to call on the next data flow on the session being used by the conversation being deallocated. If this member is NULL, no notification will be provided. A vendor would normally supply this callback function.
- The **DEALLOCATE** and **MC_DEALLOCATE** verbs also contain a correlator member which is returned as one of the parameters when the callback function is invoked. The application can use this parameter in any way (for example, as a pointer to a control block within the application).

Host Integration Server allows TPs to deallocate conversations immediately after sending data by specifying the **type** member in the SEND_DATA and MC_SEND_DATA verbs as AP_SEND_DATA_DEALLOC_FLUSH, AP_SEND_DATA_DEALLOC_SYNC_LEVEL, AP_SEND_DATA_DEALLOC_ABEND, and AP_SEND_DATA_DEALLOC_CONFIRM. However, the **SEND_DATA** and **MC_SEND_DATA** verbs do not contain the implied forget callback function. TPs wishing to receive implied forget notification must issue a DEALLOCATE or MC_DEALLOCATE verb explicitly.

Sync Point Level 2 Confirm Support

The current APPC implementation in Host Integration Server supports conversations with **synclevel** of AP_NONE, AP_CONFIRM_SYNC_LEVEL, or AP_SYNCPT. The DEALLOCATE, MC_DEALLOCATE, PREPARE_TO_RECEIVE, and MC_PREPARE_TO_RECEIVE verbs specify a **type** member indicating the synchronization level required. This parameter is interpreted as follows:

Allocated synclevel	**Type specified**	**Action performed**
AP_NONE	AP_FLUSH	Action of FLUSH or MC_FLUSH verb before deallocation or change of direction.
AP_NONE	AP_SYNCLEVEL	Action of **FLUSH** or **MC_FLUSH** verb before deallocation or change of direction.
AP_SYNCPT	AP_FLUSH	Action of FLUSH or MC_FLUSH verb before deallocation or change of direction.
AP_SYNCPT or AP_CONFIRM_SYNC_LEVEL	AP_CONFIRM_TYPE	Action of CONFIRM or MC_CONFIRM verb before deallocation or change of direction.
AP_SYNCPT	AP_SYNCLEVEL	It is assumed that a Sync Point implementation built using the APPC API in Host Integration Server implements the defer states appropriately. See the note below.

> **Note** With an allocated **synclevel** of AP_SYNCPT and a specified **type** of AP_SYNCLEVEL, it is assumed that a vendor-supplied Sync Point component implements the defer states appropriately. A vendor-supplied Sync Point system must:

- Intercept DEALLOCATE, MC_DEALLOCATE, PREPARE_TO_RECEIVE, and MC_PREPARE_TO_RECEIVE verbs on Sync Point Level 2 conversations when type AP_SYNCLEVEL is specified for **synclevel**.
- Maintain the defer state until one of the verbs valid in that state completes.
- On completion of the verb, issue the original **DEALLOCATE**, **MC_DEALLOCATE**, **PREPARE_TO_RECEIVE**, or **MC_PREPARE_TO_RECEIVE** verb to Host Integration Server 2004.

Host Integration Server does not implement the defer states directly. In particular, when a **DEALLOCATE**, **MC_DEALLOCATE**, **PREPARE_TO_RECEIVE**, or **MC_PREPARE_TO_RECEIVE** verb is received with a **type** specified as AP_SYNCLEVEL on a Sync Point conversation, this is treated as if the conversation has a **synclevel** of AP_NONE.

So that Sync Point Level 2 conversations can use confirm type synchronization, the **DEALLOCATE**, **MC_DEALLOCATE**, **PREPARE_TO_RECEIVE**, and **MC_PREPARE_TO_RECEIVE** verbs are modified to support a type member of AP_CONFIRM_TYPE.

The DEALLOCATE, MC_DEALLOCATE, PREPARE_TO_RECEIVE, and MC_PREPARE_TO_RECEIVE verbs specify a type member indicating the synchronization level required. This parameter is interpreted as follows:

Allocated synclevel	**Type specified**	**Action performed**
AP_NONE	AP_FLUSH	Action of FLUSH or MC_FLUSH verb before deallocation or change of direction.
AP_NONE	AP_SYNCLEVEL	Action of **FLUSH** or **MC_FLUSH** verb before deallocation or change of direction.
AP_CONFIRM_SYNC_LEVEL	AP_FLUSH	Action of **FLUSH** or **MC_FLUSH** verb before deallocation or change of direction.
AP_CONFIRM_SYNC_LEVEL	AP_SYNCLEVEL	Action of CONFIRM or MC_CONFIRM verb before deallocation or change of direction.

Sync Point Backout Support

This section describes back out support for Sync Point conversations.

This section contains:

- Additional Sync Point Return Codes
- Sending Backout on Sync Point Conversations

Additional Sync Point Return Codes

When a remote transaction program (TP) issues a **BACKOUT** verb, the back out is reported to the local TP as a new primary return code value, AP_BACKED_OUT, on the next (current) verb issued. The local TP is provided access to the sense code information contained in the Backout FMH-7 by setting the **secondary_rc** field as follows:

- AP_BO_NO_RESYNC for sense code 0x08240000
- AP_BO_RESYNC for sense code 0x08240001

This new return code will only be supplied on conversations with **synclevel** AP_SYNCPT, and therefore will not be presented to existing applications.

The verbs on which this new return code can be returned are:

CONFIRM

MC_CONFIRM

MC_PREPARE_TO_RECEIVE

MC_RECEIVE_AND_POST

MC_RECEIVE_AND_WAIT

MC_RECEIVE_IMMEDIATE

MC_SEND_DATA

MC_SEND_ERROR

PREPARE_TO_RECEIVE

RECEIVE_AND_POST

RECEIVE_AND_WAIT

RECEIVE_IMMEDIATE

SEND_DATA

SEND_ERROR

Sending Backout on Sync Point Conversations

To send a Backout, an FMH-7 containing a sense code of 0x08240000 or 0x08240001 is sent on the session. This is done using the SEND_ERROR or MC_SEND_ERROR verb. To allow Host Integration Server 2004 to send the appropriate sense data, the **SEND_ERROR** and **MC_SEND_ERROR** verbs are modified as follows:

- A new field, **err_type**, is added to allow the TP to specify the type of error. The default is AP_PROG (0x00), which means existing TPs will continue to work unmodified.
- The **err_type** field in both verbs can take one of two new values, specifying the sense codes to be generated by Host Integration Server 2004:

  AP_BACKOUT_NO_RESYNC for sense code 0x08240000

  AP_BACKOUT_RESYNC for sense code 0x08240001

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

LUWID, Conversation Correlators, and Session Identifiers

The logical unit-of-work identifier (LUWID), conversation correlators, and session identifiers are important for all Sync Point operations and accounting purposes. The following sections describe how Host Integration Server provides access to these components and, where appropriate, facilities to modify this information.

This section contains:

- Generating and Setting LUWIDs
- Extracting LUWIDs
- Session Identifiers

Generating and Setting LUWIDs

The unit-of-work identifier (LUWID) is used to identify conversations that are part of a single Sync Point transaction. All conversations with the same LUWID are committed (or backed out) at the same time.

Host Integration Server assigns two LUWIDs to a transaction program when the TP is started. For locally started TPs, this is when the TP_STARTED verb is issued. The first LUWID is the TP's protected LUWID. It is used by Host Integration Server 2004 as the LUWID for all **synclevel** AP_SYNCPT conversations allocated by the TP. When the TP issues an ALLOCATE or MC_ALLOCATE verb with a **synclevel** of AP_SYNCPT, Host Integration Server generates an Attach containing the TP's current protected LUWID.

The second LUWID is the TP's unprotected LUWID. It is used on all conversations allocated by the TP with a **synclevel** other than AP_SYNCPT.

For remotely initiated TPs, the incoming Attach may contain an LUWID for the TP—it is mandatory if the conversation has a **synclevel** of AP_SYNCPT. For Sync Point conversations, Host Integration Server saves the LUWID as the TP's protected LUWID and generates a new unprotected LUWID for it. For conversations with a **synclevel** other than Sync Point (AP_SYNCPT), Host Integration Server saves the LUWID as the TP's unprotected LUWID and generates a new protected LUWID.

Host Integration Server generates LUWIDs by concatenating the following:

- The fully qualified name of the local LU, preceded by a single byte indicating its length (exclusive of the length byte).
- A 6-byte LUW instance number, generated from the current date and time (modified to ensure uniqueness if necessary).
- A 2-byte LUW sequence number, initialized to 1.

If the fully qualified LU name component of the LUWID is not 17 bytes long, Host Integration Server does not add any padding between it and the LUW instance number. The application can determine the length of the LUWID, and the offsets within it of the LUW instance number and LUW sequence number, by examining the first byte of the LUWID, which indicates the length of the fully qualified LU name.

When Host Integration Server generates both a protected and an unprotected LUWID for a TP, the unprotected LUWID is created by incrementing the protected LUWID's instance number.

The protected LUWID needs to be changed by a TP for one of four reasons:

- When a transaction is backed out or committed, the LUWID sequence number must be incremented.
- If the transaction tree is split, a new LUWID must be generated for the TP.
- If the application uses multiple logical TPs to implement a transaction, each TP must have the same LUWID (different from that assigned by Host Integration Server).
- If the application is acting as a gateway from a non-SNA environment and LUWIDs are received by a means other than an Attach.

To allow a TP to set or generate new LUWIDs, a new verb, SET_TP_PROPERTIES, is provided by the APPC API. This verb allows the TP to either set its LUWIDs to an existing value, by providing the LUWIDs, or generate new ones and use them from then on. When a new LUWID is generated by Host Integration Server, it is guaranteed to be unique.

Note that it is the responsibility of the application (the Sync Point system component) to transmit the new LUWID PS header to the partner Sync Point system when the protected LUWID is changed. Similarly, when a new LUWID PS header is received, the application must inform the LU by issuing **SET_TP_PROPERTIES**.

Extracting LUWIDs

Both LUWIDs for a particular TP can be determined by issuing the GET_TP_PROPERTIES verb. The **GET_TP_PROPERTIES** verb returns the TP's unprotected LUWID in the **luw_id** field.

If the TP needs to access the protected LUWID, it must combine the **opext** member of the verb control block (VCB) with the value AP_EXTD_VCB using OR before issuing the verb. The protected LUWID will then be returned in the **prot_luw_id** field. If the **opext** field does not contain the AP_EXTD_VCB bit, the verb control block is presumed to end immediately before the **prot_luw_id** field.

The LUWID for a particular conversation can be determined by issuing a GET_ATTRIBUTES or MC_GET_ATTRIBUTES verb on the conversation. These verbs are modified as follows:

- A new field, **luw_id**, is added in which the LUWID is returned. The LUWID returned is the protected one if the conversation was allocated with **synclevel** field of the ALLOCATE or MC_ALLOCATE verb set to Sync Point (AP_SYNCPT); otherwise it is the unprotected one.
- Since the **luw_id** field cannot be incorporated within the existing verb control blocks, the TP must use a larger VCB structure. To indicate that the VCB is longer than usual, the **opext** field of the VCB must be combined with the value AP_EXTD_VCB using OR before calling APPC.
- The **sync_level** field of the **GET_ATTRIBUTES** or **MC_GET_ATTRIBUTES** verb can take an additional value, AP_SYNCPT, when the conversation was allocated with the **synclevel** field of the **ALLOCATE** or **MC_ALLOCATE** verb of Sync Point (AP_SYNCPT).

Session Identifiers

Host Integration Server maintains a unique identification for every LU 6.2 session it has with a remote LU. This 8-byte identifier is generated by Host Integration Server every time it starts a new session (or is received by Host Integration Server when a session is initiated remotely). The Sync Point resynchronization protocols require knowledge of the session identifier.

To provide this, the MC_GET_ATTRIBUTES and the GET_ATTRIBUTES verbs have been modified to return the session identifier of the session over which a particular conversation is allocated. The **MC_GET_ATTRIBUTES** and **GET_ATTRIBUTES** verbs can be used to retrieve this **sess_id** field of the VCB if the **opext** field of the VCB is combined with the value AP_EXTD_VCB using OR before calling APPC.

Configuration Changes for Sync Point Support

A new check box is added to the Local LU Configuration dialog box. When selected, this indicates that the local LU is able to participate in **synclevel** Sync Point sessions. Host Integration Server uses this option to determine the **synclevel** BIND parameters it sends on BIND requests and responses.

This field is added to the Host Integration Server configuration file in a field that is no longer used by Host Integration Server. Existing configurations from earlier versions of Host Integration Server will therefore continue to work unmodified.

Accepting Incoming Attaches

The Sync Point support in Host Integration Server is intended for use only by gateway applications that implement the architected SNA Sync Point components, including Conversation-Protected Resource Manager (C-PRM). In a Sync Point implementation, it is necessary for C-PRM to be aware of all protected conversations, both locally initiated and remotely initiated. This can be achieved in Host Integration Server by C-PRM intercepting the conversation allocation and deallocation verbs and issuing them on behalf of the transaction program (TP). Note that since Host Integration Server does not allow TP or conversation identifiers to be shared across processes, this also means that the process containing C-PRM must also intercept all APPC verbs issued by the client TPs.

For locally initiated TPs, this is straightforward. However for incoming Attaches, the situation is made more complex by the requirement that the RECEIVE_ALLOCATE verb specify the name of the TP to be matched with the Attach.

In some implementations, this will not be an issue, as the gateway will be aware of the names of all the transactions passing through it. To support this situation, the **RECEIVE_ALLOCATE** verb has been enhanced as described in the following topic to permit the gateway to indicate that it can accept Sync Point conversations.

In other implementations, the gateway does not know the names of the transactions passing through it. This is particularly so when the gateway is providing a conversion between SNA and another communications protocol. In this case, Host Integration Server allows the gateway process to register itself as a Sync Point Attach Service, indicating that it is willing to accept incoming Attaches for any Sync Point conversation. In this case, the gateway must be implemented as a Sync Point Attach Manager.

This section contains:

- Sync Point Knows Transaction Names
- Sync Point Attach Manager
- Rejecting Remotely Initiated Conversations

Sync Point Knows Transaction Names

A Sync Point implementation that knows the names of all the transactions that can be supported (for example, through configuration of the gateway) may accept incoming Sync Point conversations by issuing a RECEIVE_ALLOCATE verb specifying the name of the transaction and indicating that it is willing to accept Sync Point conversations.

The **RECEIVE_ALLOCATE** verb was modified to allow a TP to specify that it can accept Sync Point conversations by adding a new **syncpoint_rqd** field to the VCB. When this field is set to AP_YES it indicates that the transaction program can accept Sync Point conversations from Host Integration Server. When this field is set to AP_NO (the default), it indicates that Sync Point conversations are not supported.

Sync Point Attach Manager

Instead of issuing separate RECEIVE_ALLOCATE verbs for each possible transaction name, a Sync Point implementation may instead register as the Sync Point Attach Manager for Host Integration Server. It does so by issuing a **RECEIVE_ALLOCATE** verb specifying a TP name consisting of all 0x00s.

When a Sync Point Attach Manager is registered, the following changes are effected in server's incoming Attach support on Host Integration Server:

- When an Attach message arrives for any TP name on a conversation with the **syncpoint_rqd** field of the VCB set to AP_YES, Host Integration Server 2004 matches it with the application that issued the special **RECEIVE_ALLOCATE** verb registering itself as the Sync Point Attach Manager.
- Any Attach message arriving for the Resynchronization TP (0x06F2) will automatically be routed to the Sync Point Attach Manager.
- If no **RECEIVE_ALLOCATE** has been issued for the Sync Point Attach Manager, or for the specific TP name, Host Integration Server will queue the Attach for a configured period of time. If no **RECEIVE_ALLOCATE** is issued in that time, the Attach will be rejected with a return code of TP_NOT_AVAILABLE_RETRY.
- If a **RECEIVE_ALLOCATE** is matched with the Attach message, the verb is returned to the TP with the **tp_name** field of the VCB set to the TP name contained in the Attach message.

Applications using this feature must adhere to two restrictions:

- All verbs issued on conversations started in this manner must be issued by the same process, as Host Integration Server cannot pass **tp_id**s between processes.
- Only a single process may register as the Sync Point Attach Manager on any server running Host Integration Server 2004. If a second process attempts to register, its **RECEIVE_ALLOCATE** verb will return immediately with the primary return code set to AP_SYNCPOINT_MANAGER_ACTIVE.

Sync Point Attach Manager applications must reside on a Host Integration Server 2004 server. They may not be distributed across Host Integration Server clients. This restriction is imposed to ensure that only a single instance of Sync Point Services (SPS) and Conversation-Protected Resource Manager (C-PRM) exists for each LU on the Host Integration Server (which might not be the case if Sync Point Attach Managers were visible from multiple servers in the Host Integration Server domain).

The structure of the RECEIVE_ALLOCATE verb control block does not require modification to support this function.

Rejecting Remotely Initiated Conversations

In an environment where a Sync Point Attach Manager is receiving all Attach messages as described above, it may be necessary for it to reject an Attach for a particular TP name, either because the TP name is not valid or because there is another problem with the received Attach message. To enable the application to generate the correct return code at the initiating TP, the DEALLOCATE and MC_DEALLOCATE verbs are enhanced with new **deallocate_type** field values in the VCB that allow the application to specify the return code to be sent to the initiating TP. The new values for **deallocate_type** are:

AP_TP_NOT_AVAIL_RETRY

AP_TP_NOT_AVAIL_NO_RETRY

AP_TPN_NOT_RECOGNIZED

AP_PIP_DATA_NOT_ALLOWED

AP_PIP_DATA_INCORRECT

Sync Point Examples

This section contains example verb sequences for implementing the architected Sync Point verbs using the Sync Point facilities provided by Host Integration Server.

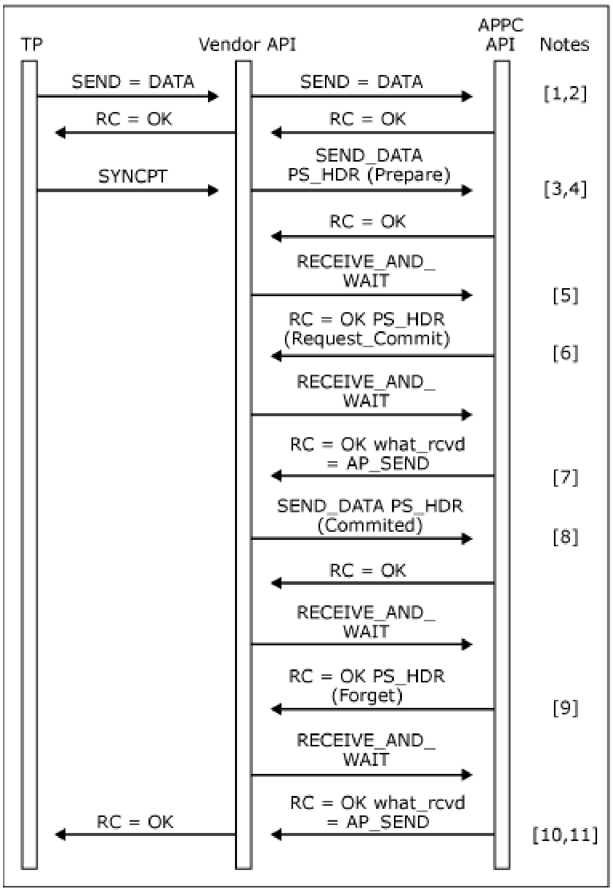
In the following figures, TP is the transaction program that requires Sync Point services. Vendor API is the vendor-supplied APPC API. This component provides the SPS and C-PRM components and a mapping between the vendor's APPC syntax and that of Host Integration Server. APPC API is the Host Integration Server APPC basic and mapped conversation interface.

This section contains:

- SYNCPT Verb Issued Locally
- SYNCPT Verb Issued Remotely
- BACKOUT Verb Issued Locally
- BACKOUT Verb Issued Remotely

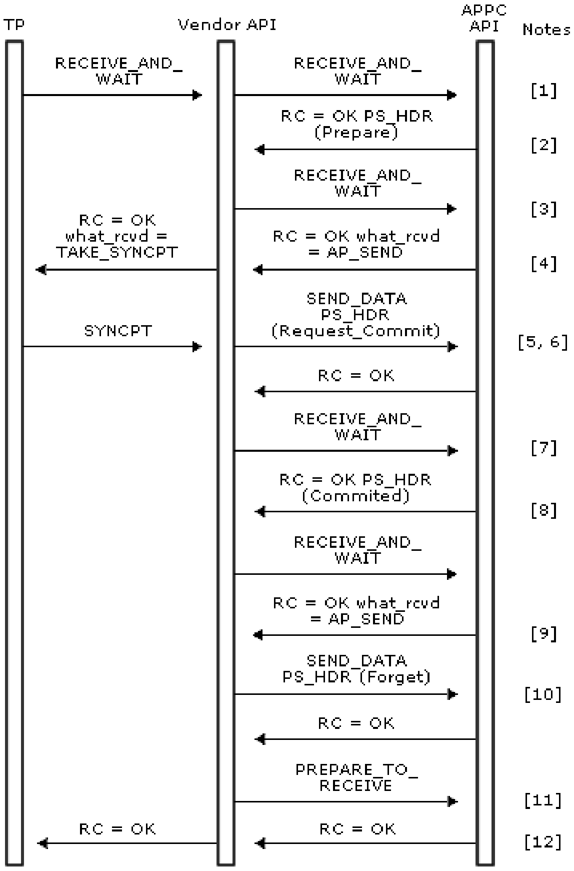
SYNCPT Verb Issued Locally

This section provides an example verb sequence with a verb issued locally.


TP
Vendor API
APPC API
Notes
SEND = DATA
SEND = DATA
[1,2]
RC = OK
RC = OK
SEND_DATA PS_HDR (Prepare)
SYNCPT
[3,4]
RC = OK
RECEIVE_AND_ WAIT
[5]
RC = OK PS_HDR (Request_Commit)
[6]
RECEIVE_AND_ WAIT
RC = OK what_rcvd = AP_SEND
[7]
SEND_DATA PS_HDR (Commited)
[8]
RC = OK
RECEIVE_AND_ WAIT
RC = OK PS_HDR (Forget)
[9]
RECEIVE_AND_ WAIT
RC = OK what_rcvd = AP_SEND
RC = OK
[10,11]

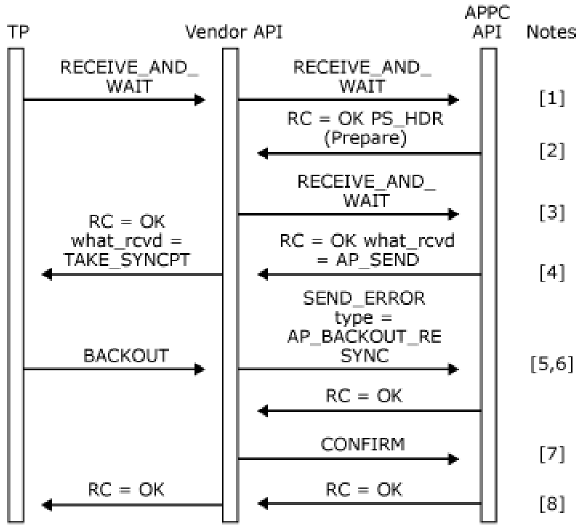
1. The transaction program issues a SEND_DATA or MC_SEND_DATA verb depending on whether a basic or mapped conversation is being used.
2. The **SEND_DATA** or **MC_SEND_DATA** VCB is passed transparently through the vendor API to Host Integration Server 2004. When the verb completes, the return code from Host Integration Server 2004 is returned to the transaction program.
3. The transaction program issues a **SYNCPT** verb to the vendor API.
4. The vendor API creates a PREPARE PS header and transmits it by issuing a **SEND_DATA** or **MC_SEND_DATA** verb. For a mapped conversation, the data_type field of the **MC_SEND_DATA** VCB must be set to AP_PS_HEADER.
5. On completion of the **SEND_DATA** or **MC_SEND_DATA** verb, the vendor API issues a RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT verb.
6. The **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb completes with the **what_rcvd** field of the VCB with a value of AP_PS_HEADER. The data buffer is filled with the received REQUEST_COMMIT PS header.
7. Another **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb is issued to get send direction. Note that the vendor API can combine these two verbs into a single request by setting the **rtn_status** field of the VCB to AP_YES in order to receive status with data on the first RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT.
8. A COMMITTED PS header is then transmitted using a SEND_DATA or MC_SEND_DATA verb.
9. The Vendor API issues a **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb to receive the FORGET PS header from the remote TP.
10. Another **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb is issued with the **what_rcvd** field of the VCB set to AP_SEND to get send direction (again the **rtn_status RECEIVE_AND_WAIT** field of the VCB can be set to AP_YES to combine these two verbs).
11. When send indication is received, the vendor API returns the **SYNCPT** verb to the local transaction program with an OK return code.

SYNCPT Verb Issued Remotely


TP
Vendor API
APPC API
Notes
RECEIVE_AND_WAIT
RECEIVE_AND_WAIT
[1]
RC = OK PS_HDR (Prepare)
[2]
RECEIVE_AND_WAIT
[3]
RC = OK what_rcvd = TAKE_SYNCPT
RC = OK what_rcvd = AP_SEND
[4]
SYNCPT
SEND_DATA PS_HDR (Request_Commit)
[5, 6]
RC = OK
RECEIVE_AND_WAIT
[7]
RC = OK PS_HDR (Commited)
[8]
RECEIVE_AND_WAIT
RC = OK what_rcvd = AP_SEND
[9]
SEND_DATA PS_HDR (Forget)
[10]
RC = OK
PREPARE_TO_RECEIVE
[11]
RC = OK
RC = OK
[12]

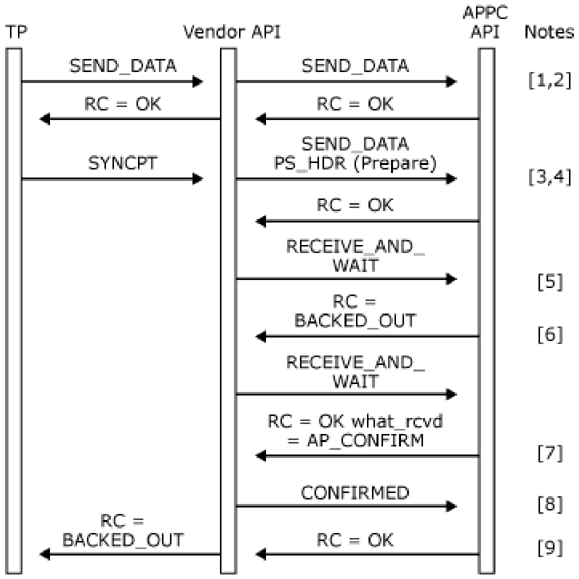
1. The local TP issues a RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT verb (depending on whether a basic or mapped conversation is being used) to receive data from the remote transaction program. The vendor API passes the verb transparently to Host Integration Server.
2. The **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb completes with **what_rcvd** = AP_PS_HEADER. The data buffer contains a PREPARE PS header.
3. Another **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb is issued by the vendor API to receive the send indication from the remote TP.
4. The vendor API returns the transaction program's **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb with the **what_rcvd** field of the VCB set to TAKE_SYNCPT.
5. The transaction program issues a **SYNCPT** verb.
6. The vendor API generates a REQUEST_COMMIT PS header and transmits it using a SEND_DATA or MC_SEND_DATA verb. If the conversation is mapped, the **MC_SEND_DATA** verb is issued with the **data_type** field of the VCB set to AP_PS_HEADER.
7. The vendor API then issues a RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT verb to give the remote TP direction to send.
8. The **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb completes with the **what_rcvd** field of the VCB set to AP_PS_HEADER. The data buffer contains a COMMITTED PS header.
9. Another **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb is issued to get permission to send.
10. A FORGET PS header is prepared and sent to the remote transaction program.
11. The FORGET is flushed and direction given to the remote transaction program by issuing a PREPARE_TO_RECEIVE or MC_PREPARE_TO_RECEIVE with the **ptr_type** field of the VCB set to AP_FLUSH.
12. When the **PREPARE_TO_RECEIVE** or **MC_PREPARE_TO_RECEIVE** verb completes, the vendor API returns the **SYNCPT** verb to the local transaction program.

BACKOUT Verb Issued Locally


TP
Vendor API
APPC API
Notes
RECEIVE_AND_WAIT
RECEIVE_AND_WAIT
[1]
RC = OK PS_HDR (Prepare)
[2]
RECEIVE_AND_WAIT
[3]
RC = OK what_rcvd = TAKE_SYNCPT
RC = OK what_rcvd = AP_SEND
[4]
SEND_ERROR type = AP_BACKOUT_RESYNC
BACKOUT
[5,6]
RC = OK
CONFIRM
[7]
RC = OK
RC = OK
[8]

1. The local transaction program issues a RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT verb (depending on whether a basic or mapped conversation is being used) to receive data from the remote transaction program. The vendor API passes the verb transparently to Host Integration Server.
2. The **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb completes with the **what_rcvd** field of the VCB set to AP_PS_HEADER. The data buffer contains a PREPARE PS header.
3. Another **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb is issued by the vendor API to receive the send indication from the remote TP.
4. The vendor API returns the transaction program's **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb with the **what_rcvd** field of the VCB set to **TAKE_SYNCPT**.
5. The transaction program issues a **BACKOUT** verb to back out the transaction.
6. The vendor API generates a SEND_ERROR or MC_SEND_ERROR verb of type BACKOUT_RESYNC to send the Backout sense code 0x08240001.
7. The vendor API then issues a CONFIRM or MC_CONFIRM verb to flush the **SEND_ERROR** or **MC_SEND_ERROR** verb and request a response from the remote transaction program.
8. The CONFIRM or MC_CONFIRM verb completes when the remote transaction program issues a CONFIRMED or MC_CONFIRMED verb. The vendor API then returns the **BACKOUT** verb to the local transaction program.

BACKOUT Verb Issued Remotely


TP
Vendor API
APPC API
Notes
SEND_DATA
RC = OK
SYNCPT
SEND_DATA
RC = OK
SEND_DATA PS_HDR (Prepare)
RC = OK
RECEIVE_AND_WAIT
RC = BACKED_OUT
RECEIVE_AND_WAIT
RC = OK what_rcvd = AP_CONFIRM
CONFIRMED
RC = OK
RC = BACKED_OUT
[1,2]
[3,4]
[5]
[6]
[7]
[8]
[9]

1. The transaction program issues a SEND_DATA or MC_SEND_DATA verb depending on whether a basic or mapped conversation is being used.
2. The **SEND_DATA** or **MC_SEND_DATA** VCB is passed transparently through the vendor API to Host Integration Server. When the verb completes the return code from Host Integration Server is returned to the transaction program.
3. The transaction program issues a **SYNCPT** verb to the vendor API.
4. The vendor API creates a PREPARE PS header and transmits it by issuing a **SEND_DATA** or **MC_SEND_DATA** verb. For a mapped conversation, the data_type field of the **MC_SEND_DATA** VCB must be set to AP_PS_HEADER.
5. On completion of the **SEND_DATA** or **MC_SEND_DATA** verb, the vendor API issues a RECEIVE_AND_WAIT or MC_RECEIVE_AND_WAIT verb.
6. The **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb returns with a return code of AP_BACKED_OUT, indicating that the remote transaction program issued a **BACKOUT** verb.
7. The vendor API issues another **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** verb to receive the Confirm indication.
8. When the verb completes with the **what_rcvd** field of the VCB set to AP_CONFIRM, the vendor API issues a CONFIRMED or MC_CONFIRMED verb to acknowledge the **BACKOUT** verb.
9. The **SYNCPT** verb is returned to the transaction program with a BACKED_OUT return code when the **CONFIRMED** or **MC_CONFIRMED** verb completes.

Windows CSV Overview

Common service verbs (CSVs) are a set of programming functions provided by Microsoft® Host Integration Server 2004. The CSVs provide convert, log, trace, and transfer services to applications.

The CSVs and information presented in this section represent an evolving CSV API that is composed of IBM Extended Services for OS/2 and a set of Microsoft Windows® extensions that allow for registering and deregistering the application, and that provide an asynchronous entry point for TRANSFER_MS_DATA.

This section describes the verbs available to you and explains how to use them with your applications. A detailed description of each verb is provided in the reference portion of the SDK.

The CSVs are as follows:

CONVERT
Converts a character string from ASCII to EBCDIC or from EBCDIC to ASCII.

COPY_TRACE_TO_FILE
Concatenates the contents of the individual application programming interface (API)/link service trace files to form a single trace file.

DEFINE_TRACE
Enables or disables tracing for specific APIs.

GET_CP_CONVERT_TABLE
Creates and returns a 256-byte conversion table to translate character strings from a source code page to a target code page.

LOG_MESSAGE
For OS/2 only, takes a message from a message file, adds specified data to it, and records the message in the error log file. This verb optionally displays the message on the user's screen.

TRANSFER_MS_DATA
Builds a Systems Network Architecture (SNA) request unit (RU) containing Network Management Vector Transport (NMVT) data. The verb can send the NMVT data to NetView for centralized problem diagnosis and resolution. The data is optionally logged in the event log for Windows 2000.

This section contains:

- Host Integration Server Asynchronous Support
- Before Using Windows CSV
- Creating Specific NetView User Alerts
- Using CSVs in C Programs
- Sample Programs
- CSV Verb Control Block
- Bit Ordering
- WINCSV Definition
- WINCSV.H File
- Issuing a CSV

Host Integration Server Asynchronous Support

Asynchronous call completion returns the initial call immediately so the application can continue with other processes. An application that issues a call and does not regain control until the operation completes is not able to perform any other operations. This type of operation, referred to as blocking, is not suited to a server application designed to handle multiple requests from many clients.

Through **RegisterWindowsMessage** with "WinAsyncCSV" as the string, you pass a window handle by which you will be notified of call completion. You then make your call and when it completes, a message is posted to the window handle that you passed, notifying you that the call is complete.

Before Using Windows CSV

The following Microsoft® Windows® extensions are of particular importance and should be reviewed before using Windows CSV:

WinAsyncCSV

Provides an asynchronous entry point for TRANSFER_MS_DATA only. If used for any other verb, the behavior will be synchronous. Use this extension instead of the blocking version of the verb if you run your application under Microsoft® Windows® version 3.*x*.

When the asynchronous operation is complete, the application's window *hWnd* receives the message returned by **RegisterWindowMessage** with "WinAsyncCSV" as the input string. The *wParam* argument contains the asynchronous task handle returned by the original function call. The *lParam* argument contains the original verb control block (VCB) pointer and can be dereferenced to determine the final return code.

If the function returns successfully, a "WinAsyncCSV" message is posted to the application when the operation completes or the conversation is canceled.

WinCSVCleanup

Terminates and deregisters an application from a Windows CSV implementation.

> **Important** An application must call this function to deregister itself from the Windows CSV implementation.

WinCSVStartup

Allows an application to specify the version of Windows CSV required and to retrieve details of the specific CSV implementation.

> **Important** An application must call this function to register itself with a Windows CSV implementation before issuing any further Windows CSV calls.

Creating Specific NetView User Alerts

You can create NetView user alerts for users to send. Users identify the alerts by number; each number corresponds to a specific collection of information or requests that the user wants to send via NetView to a host operator.

Microsoft® Host Integration Server leaves blank fields for the user alert information in the structure that is returned from the sepdcrec function. To create specific user alerts, create appropriate data structures and call the TRANSFER_MS_DATA verb to send the user alert to NetView.

Using CSVs in C Programs

CSVs are available to C applications through the external function **WINCSV**.

Sample Programs

A collection of sample programs is delivered with the Microsoft® Host Integration Server Software Development Kit (SDK) in the \SDK\SAMPLES directory on the Host Integration Server CD. For more information, see APPC Samples.

CSV Verb Control Block

The only parameter passed to the **WINCSV** function is the address of a verb control block (VCB). The VCB is a structure made up of variables that identify the verb to be executed, supply information to be used by the verb, and contain information returned by the verb when execution is complete. Each verb has its own VCB structure, which is declared in the file WINCSV.H.

Bit Ordering

Bit 0 refers to the high-order bit in a byte or word. To set bit 0 on in a byte, use the bitwise **OR** operation (=) with a value of 128.

WINCSV Definition

The prototype definition of the **WINCSV** function is as follows:

```
extern void WINAPI WINCSV (LPCSV);
```

The verb control block (VCB) address parameter, a 32-bit pointer, is declared as a long integer and requires casting from a pointer to a long integer.

WINCSV.H File

Use the **#include** command to include the WINCSV.H file in any application that issues CSVs.

The WINCSV.H file, which is included with the Microsoft® Host Integration Server Software Development Kit (SDK), contains:

- The CSV function prototype.
- The structure declarations for the CSV verb control blocks (VCBs).
- The **#define** statements that substitute meaningful symbolic constants for hexadecimal values supplied to and returned by CSVs.

If a **#define** statement pertains to a hexadecimal value that is longer than one byte, a comment shows how the hexadecimal value is stored in memory.

When setting or testing CSV parameters, use the symbolic constants defined by the WINCSV.H file. When examining trace files or the contents of memory, use the hexadecimal values.

Issuing a CSV

The procedure for issuing a CSV is shown in the following sample code that uses CONVERT.

To issue a CSV

1. Create a structure variable from the verb control block (VCB) structure that applies to the verb to be issued.

   ```
   #include <wincsv.h>
       .
       .
   struct convert  conv_block;
   ```

   The VCB structures are declared in the WINCSV.H file; one of these structures is named **CONVERT**.

2. Clear (set to zero) the variables within the structure.

   ```
   memset( conv_block, '\0', sizeof( conv_block ) );
   ```

   This procedure is not required. However, it helps in debugging and reading the contents of memory. It also eliminates the possibility that future versions of a verb are sensitive to fields that are ignored in the current version.

3. Assign values to the required VCB variables.

   ```
   conv_block.opcode = SV_CONVERT;
   conv_block.direction = SV_ASCII_TO_EBCDIC;
   conv_block.char_set = SV_AE;
   conv_block.len = sizeof(tpstart_name);
   conv_block.source = (LPBYTE) tpstart_name;
   conv_block.target = (LPBYTE) tpstart.tp_name;
   ```

   The values SV_CONVERT, SV_ASCII_TO_EBCDIC, and SV_AE are symbolic constants representing integers. These constants are defined in the WINCSV.H file.

   The character array TPSTART_NAME contains an ASCII string to be converted to EBCDIC and placed in the character array TPSTART.TP_NAME.

4. Invoke the verb. The only parameter is a pointer to the address of the structure containing the VCB for the verb.

   ```
   ACSSVC((LONG) &conv_block);
   ```

   You can also use the following statement:

   ```
   ACSSVC_C((LONG) &conv_block);
   ```

5. Use the values returned by the verb.

   ```
   if( conv_block.primary_rc == SV_OK ) {
   /* other statements */
       .
       .
       .
   ```

Support for APPC Automatic Logon

This section describes the support for automatic logon for Advanced Program-to-Program Communications (APPC) applications available in Microsoft® Host Integration Server 2004. This feature requires specific configuration by the network administrator.

The APPC application must be invoked on the local area network (LAN) side from a client of Host Integration Server 2004. The client must be logged on to a Microsoft Windows Server™ 2003, Microsoft Windows® XP, or Windows 2000 domain.

The client application is coded to use "program" level security, with a special hard-coded APPC user name (MS$SAME) and password (MS$SAME). When this session allocation flows from client to Host Integration Server, the server looks up the host account and password corresponding to the Windows 2000 account under which the client is logged on, and substitutes the host account information into the APPC attach message it sends to the host.

To use this feature for an APPC application, the **user_id** and **pwd** fields in the ALLOCATE or MC_ALLOCATE verbs must be hard-coded to use the string mentioned above, and **security** must be set to AP_PGM.

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CPI-C Programmer's Guide

This section of the Microsoft® Host Integration Server 2004 Developer's Guide provides information about developing applications with the Common Programming Interface for Communications (CPI-C).

For API references and other technical information for CPI-C, see the CPI-C Programmer's Reference section of the SDK.

For sample code using CPI-C, see CPI-C Samples section of the SDK.

This section contains:

- Introduction to CPI-C
- CPI-C Call Summary
- Writing CPI-C Applications
- Support for CPI-C Automatic Logon
-

Introduction to CPI-C

Common Programming Interface for Communications (CPI-C) is an application programming interface (API) that enables peer-to-peer communications among programs in a Systems Network Architecture (SNA) environment.

Through CPI-C, programs distributed across a network can work together, communicating with each other and exchanging data, to accomplish a single processing task such as querying a remote database, copying a remote file, or sending and receiving electronic mail.

The CPI-C calls and information presented in this section represent an evolving Microsoft® Windows® CPI-C that is composed of CPI-C version 1.2 and a set of Windows extensions that enable multiple applications and asynchronous call completion.

CPI-C version 1.0 was first introduced to provide a means by which two applications could speak and listen to each other; in other words, have a conversation. A conversation is the logical connection between two programs that enables the programs to communicate with each other. Programs using CPI-C converse with each other by making program calls. These calls are used to establish the full characteristics of the conversation, to exchange data, and to control the information flow between the two programs.

CPI-C version 1.1 includes four new areas of function:

- Support for resource recovery (not supported in Windows CPI-C).
- Automatic parameter conversion.
- Support for communicating with non-CPI-C programs.
- Local and remote transparency.

Built upon CPI-C version 1.1, X/Open CPI-C provided the following:

- Support for nonblocking calls.
- The ability to accept multiple conversations.
- Support for data conversion (beyond parameters).
- Support for security parameters.

CPI-C version 1.2 consolidated CPI-C version 1.1 and X/Open CPI-C and provided all the functions described previously. Windows CPI-C adds to this functionality by providing a set of extensions for asynchronous communication in addition to supporting most features in CPI-C version 1.2 with the exception of the following features:

- Full duplex operation.
- Nonblocking call behavior (as defined in the CPI-C 1.2 specification).
- Some data conversion functions.

For a complete list of unsupported functions, see CPI-C Functions Not Supported.

The use of the Windows CPI-C interface on Microsoft® Windows Server™ 2003 and Windows 2000 causes additional threads to be created within the calling process. These other threads perform interprocess communication with the SNA service over the local area network (LAN) interface that the client is configured to use (TCP/IP, IPX/SPX, or named pipes, for example).

Stopping the SNABASE service causes the application to be unloaded from memory.

This section contains:

- Windows CPI-C Asynchronous Support
- Before Using Windows CPI-C
- Using Asynchronous Call Completion
- Initial Conversation Characteristics
- Side Information for CPI-C Programs
- Configuration for CPI-C Programs
- CPI-C Considerations on Windows Server 2003, Windows XP, and Windows 2000
- Operating Systems Support for CPI-C Development
- Finding Further Information about CPI-C

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Windows CPI-C Asynchronous Support

A program that issues a call and does not regain control until the call completes cannot perform any other operations. This type of operation, referred to as blocking, is not suited to a server application designed to handle multiple requests from many clients. Asynchronous call completion returns the initial call immediately, so the application can continue with other processes.

Windows® Common Programming Interface for Communications (CPI-C) support is related to asynchronous communications and includes the following calls and extensions:

- Set_Processing_Mode
- Specify_Windows_Handle
- Wait_For_Conversation
- WinCPICExtractEvent
- WinCPICIsBlocking
- WinCPICSetBlockingHook
- WinCPICSetEvent
- WinCPICUnhookBlockingHook

Two methods under Microsoft® Windows Server™ 2003 and Windows 2000 are available for asynchronous verb completion:

- Message posting using window handles.
- Waiting for Win32® events.

The traditional method uses messages posted to a window handle to notify an application of verb completion. This method was used in earlier versions of the product to support Windows 3*.x*.

Asynchronous support using message posting is appended to the Set_Processing_Mode call and enables an application to be notified of call completion on a window handle. Calling **RegisterWindowsMessage** with "WinAsyncCPIC" as the string, an application passes a window handle by which the application is notified of call completion. The application then makes the CPI-C call, and when it completes a message is posted to the window handle that was passed, notifying the application that the call is complete.

With the exception of an asynchronous Receive call that can issue certain other calls while pending, a conversation can have only one incomplete operation at any time. For more information about using an asynchronous **Receive** call, see Using Asynchronous Call Completion. In the case of an incomplete operation, the program can issue Wait_For_Conversation to test for its completion or Cancel_Conversation to end the conversation and the incomplete operation.

A second method using Win32 events for notification is supported on Microsoft® Host Integration Server 2004.

If an event has been registered with the conversation using **WinCPICSetEvent**, an application can call the Win32 **WaitForSingleObject** or **WaitForMultipleObjects** function to wait to be notified of the completion of the verb.

The only Windows extension functions required for Windows CPI-C are for initialization (WinCPICStartup) and termination (WinCPICCleanup) purposes. Depending on your application, other Windows extensions for handling asynchronous verb completion can be useful, but they are not required. For an example of how to use Windows CPI-C asynchronous calls and Windows extensions, see Using Asynchronous Call Completion. For a complete description of all Windows CPI-C calls and extensions, see CPI-C Calls and Extensions for the Windows Environment.

Before Using Windows CPI-C

The following Common Programming Interface for Communications (CPI-C) calls and Windows® extensions are of particular importance. You should review them before using Microsoft® Host Integration Server 2004.

> **Note** The names of the calls are pseudonyms. The actual C function names appear in parentheses after the pseudonym. For example, **Set_Processing_Mode** is the pseudonym for a call. The actual function name is **cmspm**.

Set_Processing_Mode (**cmspm**)

Specifies for the conversation whether subsequent calls are returned when the operation they request is complete (blocking) or immediately after the operation is initiated (nonblocking). A program is notified of the completion of nonblocking calls when it issues **Wait_For_Conversation** or through a Windows message sent to a WndProc identified by *hwndNotify* in **Specify_Windows_Handle**. When the processing mode is set for a conversation, it applies to all subsequent calls on the conversation until the mode is set again.

Specify_Windows_Handle (**xchwnd**)

Sets the window handle to which a message is sent on completion of an operation in nonblocking mode.

Wait_For_Conversation (**cmwait**)

Waits for the completion of an operation that was initiated when the processing mode conversation characteristic was set to CM_NON_BLOCKING and CM_OPERATION_INCOMPLETE was returned in the *return_code* parameter. Use **Wait_For_Conversation** when running a background thread or a single-threaded application for Microsoft® Windows Server™ 2003 or Windows 2000. This most likely occurs when porting code from older versions of Host Integration Server and SNA Server.

> **Important** An application can set the processing mode by calling **Set_Processing_Mode**. If the window handle is set to NULL, or this call is never issued, the application must call **Wait_For_Conversation** to be notified when the outstanding operation completes.

When an asynchronous operation is complete, the application's window *hwndNotify* receives the message returned by **RegisterWindowMessage** with "WinAsyncCPIC" as the input string. The *wParam* value contains the conversation return code from the operation that is completing. Its values depend on which operation was originally issued. The *lParam* argument contains the CM_PTR to the conversation identifier specified in the original function call.

WinCPICCleanup

Terminates and unregisters an application from a Windows CPI-C implementation.

> **Important** This function must be called by an application when finished to unregister the application from the Windows CPI-C implementation.

WinCPICExtractEvent

Provides a method for an application to determine the event handle being used for a CPI-C conversation.

WinCPICIsBlocking

Determines if a task is executing while waiting for a previous blocking call to finish. This was used when Windows version 3.*x* went into a **PeekMessageLoop** while allowing Windows to continue. Although a call issued on a blocking function appears to an application as though it blocks, the Windows CPI-C dynamic-link library (DLL) has to relinquish the processor to allow other applications to run. This means that it is possible for the application that issued the blocking call to be re-entered, depending on the messages it receives. In this instance, **WinCPICIsBlocking** can be used to determine whether the application task currently has been re-entered while waiting for an outstanding blocking call to finish.

This extension is intended to provide help to an application written to use the CM_BLOCKING characteristic of the Windows **Specify_Processing_Mode** function. **WinCPICIsBlocking** serves the same purpose as **InSendMessage** in the Windows API.

Older applications that were originally targeted at Windows version 3.*x* and that support multiple conversations must specify CM_NONBLOCKING in **Specify_Processing_Mode** so they can support multiple outstanding operations simultaneously. Applications are still limited to one outstanding operation per conversation in all environments.

> **Note** Windows CPI-C prohibits more than one outstanding blocking call per thread.

WinCPICSetBlockingHook

Allows a Windows CPI-C implementation to block CPI-C function calls by means of a new function. Blocking calls apply only if you do not use asynchronous calls. If a function needs to block, the blocking call is called repeatedly until the original request completes. This allows Windows to continue to run while the original application waits for the call to return. Note that while inside the blocking call, the application can be re-entered. **WinCPICSetBlockingHook** was used by Windows version 3.*x* applications that went into a **PeekMessageLoop** to make blocking calls without blocking the rest of the system.

Note By default, Windows Server 2003 and Windows 2000 do not go into a **PeekMessageLoop**. Rather, they block an event waiting for the call to complete. The only time you need to use **WinCPICSetBlockingHook** for Windows Server 2003 or Windows 2000 is when a single-threaded application for Windows Server 2003 or Windows 2000 shares common source code. In this case, you must explicitly make this call. Contrast this call with **WinCPICIsBlocking** and **WinCPICUnhookBlockingHook**.

WinCPICSetEvent	Associates a Win32® event handle with a verb completion.
WinCPICStartup	Allows an application to specify the version of Windows CPI-C required and to retrieve details of the specific CPI-C implementation.

Important An application must call this function to register itself with a Windows CPI-C implementation before issuing any further Windows CPI-C calls.

WinCPICUnhookBlockingHook	Removes any previous blocking hook that has been installed and reinstalls the default blocking mechanism.

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Using Asynchronous Call Completion

With one exception, Microsoft® Host Integration Server permits one outstanding Windows® SNA asynchronous call per connection and one blocking verb per thread. The exception to this is that when issuing an asynchronous Receive call, the following calls can be issued while the **Receive** is outstanding:

- Cancel_Conversation
- Deallocate
- Request_To_Send
- Send_Error
- Test_Request_To_Send_Received

This enables an application, in particular a 5250 emulator, to use an asynchronous **Receive** to receive data. Use of this feature is strongly recommended.

The following example illustrates how to use asynchronous call completion with Host Integration Server:

```
void ProcessVerbCompletion (WPARAM wParam LPARAM lParam)
{
    for ( i = 0; i<nPendingVerbs; i++ )
        if (memcmp  (pPending [i].ConvID, (Conversation_ID) lParam)== 0)
            ProcessCommand  (wParam, lParam);
}

LRESULT CALLBACK SampleWndProc  ( . . .)
{
    if (msg = = uAsyncCPIC ) {
        ProcessVerbCompletion (wParam, lParam);
    }
    else switch  (msg)  {
       case WM_USER:
        Initialize_Conversation (lpConvId, "GORDM", &lError  );
        if  (lError  ! = CM_OK )   {
            ErrorDisplay ( ) ;
            break ;
        }
        Set_Processing_Mode (lpConvId, CM_NON_BLOCKING, &lError  ) ;
        if  ( lError ! = CM_OK )  {
            ErrorDisplay ( ) ;
            break ;
        }
        Allocate  (lpConvId,  &lError )  ;
        switch  (lError )  {
        case CM_OK:
            break ;
        case CM_OPERATION_INCOMPLETE:
            memcopy (pPending [nPending ++].ConvId, lpConvId, sizeof (C) ;
            break ;
        default:
            ErrorDisplay ( ) ;
        }
        break ;
}
WinMain  ( . . . )
{
    if  ( ( WinCPICStartup  ( . . . )  =  =  FALSE  )   {
        return FALSE;
    }
    uAsyncCPIC = RegisterWindowMessage  ("WinAsyncCPIC"");
    Specify_Windows_Handle  (hwndSample) ;
    while  (GetMessage  ( . . . )   )   {
    . . . . .
    }
    WinCPICCleanup  ( . . . )
}
```

For more information about CPI-C calls and Windows extensions, see CPI-C Calls and Extensions for the Windows Environment. For additional information about using CPI-C, see the *IBM Systems Application Architecture Common Programming Interface Communications Reference*, part number SC26-4399-04.

Initial Conversation Characteristics

Common Programming Interface for Communications (CPI-C) maintains a set of internal values called characteristics for each conversation. Some characteristics affect the overall operation of the conversation, such as the conversation type. Others affect the behavior of specific calls, such as the receive type.

Many of these characteristics are initially derived from the side information table (see Side Information for CPI-C Programs) in memory. Initialize_Conversation specifies the symbolic destination name (*sym_dest_name*) associated with the wanted side information table entry.

The following table lists the initial values of the conversation characteristics and tells which call can change a given value.

Characteristic	Initial value set by Initialize_Conversation	Initial value set by Accept_Conversation	Can be changed by
Conversation state	CM_INITIALIZE_STATE	CM_RECEIVE_STATE	Depends on call
Conversation type	CM_MAPPED_ CONVERSATION	The value specified by the invoking program.	Set_Conversation_Type
Deallocate type	CM_DEALLOCATE_ SYNC_LEVEL	CM_DEALLOCATE_ SYNC_LEVEL	Set_Deallocate_Type
Error direction	CM_RECEIVE_ERROR	CM_RECEIVE_ ERROR	Set_Error_Direction
Fill	CM_FILL_LL	CM_FILL_LL	Set_Fill
Log data	Null	Null	Set_Log_Data
Log data length	0	0	Set_Log_Data
Mode name	The mode name contained in the side information. If no *sym_dest_name* is specified, this is a null string.	The mode name for the session on which the conversation startup request arrived.	Set_Mode_Name
Mode name length	Length of mode name. If no *sym_dest_name* is specified, this is zero.	Length of mode name.	Set_Mode_Name
Partner LU name	The partner logical unit (LU) name contained in the side information. If no *sym_dest_name* is specified, this is a single blank.	The partner LU name for the session on which the conversation startup request arrived.	Set_Partner_LU_Name
Partner LU name length	Length of partner LU name. If no *sym_dest_name* is specified, this is 1.	Length of partner LU name.	Set_Partner_LU_Name
Partner program name	The program name contained in the side information. If no *sym_dest_name* is specified, this is a single blank.	Not applicable.	Set_TP_Name
Partner program name length	Length of partner program name. If no *sym_dest_name* is specified, this is 1.	Not applicable.	Set_TP_Name
Password	The password contained in the side information. If no *sym_dest_name* is specified, this is a single blank.	The value specified by the invoking program.	Set_Conversation_Security_Password
Password length	Length of password. If no *sym_dest_name* is specified, this is 1.	Length of password.	Set_Conversation_Security_Password
Prepare-to-receive type	CM_PREP_TO_ RECEIVE_SYNC_ LEVEL	CM_PREP_TO_ RECEIVE_SYNC_ LEVEL	Set_Prepare_To_Receive_Type
Receive type	CM_RECEIVE_AND_ WAIT	CM_RECEIVE_AND_ WAIT	Set_Receive_Type
Return control	CM_WHEN_SESSION_ ALLOCATED	Not applicable.	Set_Return_Control
Security type	The security type contained in the side information.	The value specified by the invoking program.	Set_Conversation_Security_Type
Send type	CM_BUFFER_DATA	CM_BUFFER_DATA	Set_Send_Type

Synchronization level	CM_NONE	The value specified by the invoking program.	Set_Sync_Level
User identifier	The user identifier contained in the side information. If no *sym_dest_name* is specified, this is a single blank.	The value specified by the invoking program.	Set_Conversation_Security_User_ID
User identifier length	Length of user identifier. If no *sym_dest_name* is specified, this is 1.	Length of user identifier.	Set_Conversation_Security_User_ID

Side Information for CPI-C Programs

The information required for two Common Programming Interface for Communications (CPI-C) programs to communicate is stored as a table, called the side information table, in memory. The table is derived from the symbolic destination name (configured in Host Integration Server) and from the Set_CPIC_Side_Information, Extract_CPIC_Side_Information, and Delete_CPIC_Side_Information calls.

The side information is maintained by the system administrator.

If you are developing commercial programs or programs that will be installed on multiple computers within your organization, it is recommended that you include logic that enables a user or system administrator to specify configuration information for each copy of the program.

Each side information entry contains the following fields:

Symbolic destination name

This is the *sym_dest_name* parameter specified by Initialize_Conversation. It is the identifier for the side information entry. The name can be up to eight ASCII characters. See Set_CPIC_Side_Information for the allowed characters.

Partner LU name

This is the name by which the partner logical unit (LU) is known to the local program. It can be an alias of up to eight ASCII characters or a fully qualified network name of up to 17 characters. For the allowed characters, see Set_Partner_LU_Name.

Partner program type and name

These fields indicate whether the partner program is an application transaction program (TP) or an SNA service TP, and provide the partner program name. An application TP name can contain up to 64 ASCII characters. A service TP name can contain up to four characters. For the allowed characters, see Set_TP_Name.

Mode name

This name represents a set of characteristics to be used in an LU-to-LU session. The mode name can contain up to eight ASCII characters. For the allowed characters, see Set_Mode_Name.

Conversation security type

This field indicates whether security will be used and if so, what type.

You can use conversation security to require that the invoking program provides a user identifier and password before CPI-C allocates a conversation with the invoked program.

For an invoked program that in turn invokes another program, the security type can inform the second invoked program that security has already been verified.

For further information about conversation security, see Set_Conversation_Security_Type.

Security user identifier and password

If you intend to use conversation security, a valid combination of user identifier and password is required to access the invoked program. The user identifier and password can be up to 10 ASCII characters. For information about allowed characters, see Set_Conversation_Security_User_ID and Set_Conversation_Security_Password.

Configuration for CPI-C Programs

In addition to maintaining the side information (specified by *sym_dest_name*), the system administrator must define the following entities during configuration:

- Modes
- Local logical units (LUs)
- Partner LUs
- Invokable programs
- User identifiers and passwords

> **Note** For a user or group using transaction programs (TPs), 5250 emulators, or Advanced Program-to-Program Communications (APPC) applications, you can assign a default local APPC LU and a default remote APPC LU. These default LUs are accessed when the user or group member starts an APPC program (TP, 5250 emulator, or APPC application) and the program does not specify LU aliases by leaving the field NULL or filling with blanks.

CPI-C Considerations on Windows Server 2003, Windows XP, and Windows 2000

This topic summarizes information you should keep in mind when you develop programs based on Microsoft® Windows Server™ 2003, Windows® XP, and Windows 2000.

Asynchronous completion notification using message posting

When an asynchronous operation is complete, the application's window *hwndNotify* receives the message returned by **RegisterWindowMessage** with "WinAsyncCPIC" as the input string. The *wParam* value contains the *conversation_return_code* from the operation that is completing. Its values depend on which operation was originally issued. The *IParam* argument contains the CM_PTR to the *conversation_ID* specified in the original function call.

Asynchronous completion notification using Win32® events

When a verb is issued on a nonblocking conversation, it returns CM_OPERATION_INCOMPLETE if it is going to complete asynchronously. If an event has been registered with the conversation, the application can call **WaitForSingleObject** or **WaitForMultipleObjects** to be notified of the completion of the verb. WinCPICExtractEvent allows a Common Programming Interface for Communications (CPI-C) application to determine this event handle. After the verb has completed, the application must call Wait_For_Conversation to determine the return code for the asynchronous verb. The Cancel_Conversation function can be called to cancel an operation and the conversation itself.

It is the responsibility of the application to reset the event, as it is with other APIs.

If no event has been registered, the asynchronous verb completes as it does at present, which is by posting a message to the window that the application has registered with the CPI-C library.

Byte ordering

By default, Intel-byte ordering is used. For inline environments, defining NON_INTEL_BYTE_ORDER does all the required flipping for constants. Nonconstant input parameters in verb control blocks (VCBs)—for example, lengths and pointers—are always in the native format.

Events

To receive data asynchronously, an event handle is passed in the semaphore field of the VCB. This event must be in the nonsignaled state when passed to CPI-C, and the handle must have EVENT_MODIFY_STATE access to the event.

Library name

The Win32® DLL name is WINCPIC32.DLL.

Multiple threads

A transaction program (TP) can have multiple threads that issue verbs. Windows CPI-C makes provisions for multithreaded Windows-based processes. A process contains one or more threads of execution. All references to threads refer to actual threads in a multithreaded Windows environment.

Packing

For performance reasons, the VCBs are not packed. As a result, DWORDs are on DWORD boundaries, WORDs on WORDs, and BYTEs on BYTEs. VCBs should be accessed using the structures provided.

Run-time linking

For a TP to be dynamically linked to CPI-C at run time, the TP must issue:

- **LoadLibrary** to dynamically load WINCPIC.DLL or WINCPIC32.DLL, the libraries for WINCPIC.
- **GetProcAddress** to specify WINCPIC as the desired entry point to the dynamic-link library (DLL).
- **FreeLibrary** when the CPI-C library is no longer required.

Simultaneous conversations

A program can simultaneously participate in as many as 64 conversations per process.

Terminating applications

In Microsoft® Windows Server™ 2003 and Windows® 2000, CPI-C cannot tell when an application terminates. Therefore, if an application must close (for example, it receives a WM_CLOSE message as a result of an ALT+F4 from a user), the application should call WinCPICCleanup.

Yielding to other components

When processing CPI-C and Common Service Verbs (CSV), it may be necessary for the library code to yield to enable another component, such as the SnaBase, to receive messages and pass them to the application. This can be accomplished by using the Windows extensions WinCPICSetBlockingHook and WinCPICUnhookBlockingHook.

WinCPICSetBlockingHook enables a Windows CPI-C implementation to block CPI-C function calls by means of a new function. To call **WinCPICSetBlockingHook**:

```
FARPROC WINAPI WinCPICSetBlockingHook (FARPROC 1pBlockFunc)
```

WinCPICUnhookBlockingHook removes any previous blocking hook that has been installed and reinstalls the default blocking mechanism. To call **WinCPICUnhookBlockingHook**:

```
BOOL WINAPI WinCPICUnhookBlockingHook (void)
```

Operating Systems Support for CPI-C Development

Microsoft® Host Integration Server 2004 supports the development of CPI-C applications for Microsoft® Windows Server™ 2003, Windows XP and Windows® 2000. Support for CPI-C applications is provided only for the Win32® subsystem.

The previous Microsoft SNA Server products also supported the development of CPI-C applications for Microsoft® Windows NT®, Windows 98, Windows 95, Windows 3.*x*, and OS/2. Most CPI-C applications developed for Windows 3.*x* and OS/2 with SNA Server can be used with Host Integration Server 2004.

Finding Further Information about CPI-C

For information about SNA architecture, refer to your system network documentation.

The following topics provide additional information about Microsoft® Host Integration Server 2004 application programming interfaces (APIs) based on SNA architecture:

- About the APPC Guide
- About the LUA Guide

For more information about SNA and about 3270 information display systems, see the following manuals:

- *IBM 3270 Information Display System: 3274 Control Unit Description and Programmer's Guide*
- *IBM 3270 Information Display System: Color and Programmed Symbols*
- *IBM 3270 Information Display System: 3274 Control Unit Display Station: Operator's Guide*
- *IBM Systems Network Architecture: Technical Overview*
- *IBM Systems Network Architecture: Concepts and Products*
- *IBM Advanced Communications Function Products Installation Guide*
- *IBM Installation and Resource Definition*
- *IBM 9370 LAN Token Ring Support*
- *IBM SNA Format and Protocol Reference Manual: Architectural Logic*

For background information about logical unit (LU) 6.2, Advanced Program-to-Program Communications (APPC), or CPI-C, see the following manuals:

- *IBM Systems Network Architecture: Introduction to APPC*
- *IBM Systems Network Architecture: Transaction Programmer's Reference Manual for LU Type 6.2*
- *IBM SNA: Format and Protocol Reference Manual: Architecture Logic for LU Type 6.2*
- *IBM SNA: Formats*
- *IBM SNA: Technical Overview*
- *IBM SNA: ACF/VTAM Programming for LU Type 6.2*

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CPI-C Call Summary

This section briefly describes each Common Programming Interface for Communications (CPI-C) call. The features provided by a CPI-C call can be broader than this section indicates. The calls are grouped in categories according to the function they perform. There are calls that start and stop a conversation, send and receive data, get information, and get side information.

This section contains:

- Starting a Conversation
- Sending Data
- Receiving Data
- Confirming Receipt of Data and Reporting Errors
- Getting Information
- Ending a Conversation
- Administering Side Information

Starting a Conversation

The calls in this category are used to start a conversation between two programs.

> **Note** The names of the calls are pseudonyms. The actual C function names appear in parentheses after the pseudonyms. For example, **Accept_Conversation** is the pseudonym for a call. The actual function name is **cmaccp**.

Accept_Conversation (**cmaccp**)
Issued by the invoked program to accept the incoming conversation and set certain conversation characteristics. Upon successful execution of this call, Common Programming Interface for Communications (CPI-C) generates a conversation identifier.

Allocate (**cmallc**)
Issued by the invoking program to allocate a conversation with the partner program, using the current conversation characteristics. CPI-C can also start a session between the local logical unit (LU) and partner LU if one does not already exist. The type of conversation allocated depends on the conversation type characteristic—mapped or basic.

Initialize_Conversation (**cminit**)
Issued by the invoking program to obtain a conversation identifier and to set the initial values for the conversation's characteristics. The initial values are derived from side information associated with the symbolic destination name or are CPI-C defaults.

After issuing **Initialize_Conversation**, the invoking program can issue any of the following **Set_** calls to change the initial conversation characteristics. These calls cannot be issued after **Allocate** has been issued.

Call	**Sets**
Set_Conversation_Security_Password (**cmscsp**)	Security password
Set_Conversation_Security_Type (**cmscst**)	Conversation security type
Set_Conversation_Security_User_ID (**cmscsu**)	Security user identifier
Set_Conversation_Type (**cmsct**)	Conversation type
Set_Mode_Name (**cmsmn**)	Mode name
Set_Partner_LU_Name (**cmspln**)	Partner LU name
Set_Return_Control (**cmsrc**)	Return control
Set_Sync_Level (**cmssl**)	Synchronization level
Set_TP_Name (**cmstpn**)	Program name

Sending Data

The following calls are used to send data to the partner program:

> **Note** The names of the calls are pseudonyms. The actual C function names appear in parentheses after the pseudonyms. For example, **Accept_Conversation** is the pseudonym for a call. The actual function name is **cmaccp**.

Confirm (**cmcfm**)
Sends the contents of the local logical unit's (LU) send buffer and a confirmation request to the partner program and waits for confirmation.

Flush (**cmflus**)
Sends the contents of the local LU's send buffer to the partner LU (and partner program). If the send buffer is empty, no action takes place.

Prepare_To_Receive (**cmptr**)
Changes the state of the conversation for the local program from SEND to RECEIVE, making it possible for the local program to begin receiving data. Before changing the conversation state, this call performs the equivalent of the **Flush** or **Confirm** call.

Request_To_Send (**cmrts**)
Notifies the partner program that the local program wants to send data. The partner program may or may not act on this request.

Send_Data (**cmsend**)
Puts data in the local LU's send buffer for transmission to the partner program. The data collected in the local LU's send buffer is transmitted to the partner LU (and partner program) when one of the following occurs:

- The send buffer fills up.
- The local program issues a **Flush**, **Confirm**, or Deallocate call or other call that flushes the LU's send buffer. (Some send types, set by **Set_Send_Type**, include flush functionality.)

Set_Prepare_To_Receive_Type (**cmsptr**)
Sets the conversation's prepare-to-receive type, which specifies whether subsequent **Prepare_To_Receive** calls will include **Flush** or **Confirm** functionality. The prepare-to-receive type affects all subsequent **Prepare_To_Receive** calls. It can be changed by reissuing **Set_Prepare_To_Receive_Type**.

Set_Send_Type (**cmsst**)
Sets the conversation's send type. The send type specifies how data will be sent by **Send_Data**. The send type can specify that only data be sent or that, in addition to sending data, Common Programming Interface for Communications (CPI-C) executes the equivalent of **Flush**, **Confirm**, **Prepare_To_Receive**, or Deallocate. The send type value affects all subsequent **Send_Data** calls. It can be changed by reissuing **Set_Send_Type**.

Receiving Data

The following calls or extensions enable a program to receive data from its partner program:

> **Note** The names of the calls are pseudonyms. The actual C function names appear in parentheses after the pseudonyms. For example, **Accept_Conversation** is the pseudonym for a call. The actual function name is **cmaccp**.

Receive (**cmrcv**)

Issuing this call while the conversation is in RECEIVE state causes the local program to receive any data that is currently available from the partner program. If no data is available and the receive type is set to CM_RECEIVE _AND_WAIT, the local program waits for data to arrive. If the receive type is set to CM_RECEIVE_IMMEDIATE, the program does not wait.

Issuing this call while the conversation is in SEND or SEND_PENDING state is allowed only if the receive type is set to CM_RECEIVE_AND_WAIT. This flushes the logical unit's (LU) send buffer and changes the conversation state to RECEIVE. The local program then begins to receive data.

Set_Fill (**cmsf**)

Used in a basic conversation, this call sets the conversation's fill type, which specifies whether programs will receive data in the form of logical records or as a specified length of data. This call has an effect only in basic conversations. The fill value affects all subsequent **Receive** calls. It can be changed by reissuing **Set_Fill**.

Set_Processing_Mode (**cmspm**)

Specifies for the conversation whether subsequent calls will be returned when the operation they have requested is complete (blocking) or immediately after the operation is initiated (non-blocking). A program is notified of the completion of non-blocking calls when it issues Wait_For_Conversation or through a Microsoft® Windows® message sent to a WndProc identified by the *hwndNotify* parameter in **Specify_Windows_Handle**.

Set_Receive_Type (**cmsrt**)

Sets the conversation's receive type, which specifies whether a program issuing a **Receive** call will wait for data to arrive if data is not available. The receive type value affects all subsequent **Receive** calls. It can be changed by reissuing **Set_Receive_Type**.

Specify_Windows_Handle (**xchwnd**)

Sets the window handle to which a message is sent on completion of an operation in non-blocking mode. An application can set the processing mode by calling **Set_Processing_Mode**. If the window handle is set to NULL or this call is never issued, then the application must call **Wait_For_Conversation** to be notified when the outstanding operation completes.

WinCPICSetBlockingHook

Allows a Windows Common Programming Interface for Communications (CPI-C) implementation to block CPI-C function calls by means of a new function. This call had to be explicitly issued for Windows version 3.*x* applications to make blocking calls without blocking the rest of the system. Under Windows 2000 and later, this is not necessary.

A Windows CPI-C implementation has a default mechanism by which blocking CPI-C functions are implemented. This function enables the application to execute its own function at blocking time in place of the default function.

Confirming Receipt of Data and Reporting Errors

The following calls confirm receipt of data or report an error:

> **Note** The names of the calls are pseudonyms. The actual C function names appear in parentheses after the pseudonyms. For example, **Accept_Conversation** is the pseudonym for a call. The actual function name is **cmaccp**.

Confirmed (**cmcfmd**)

Replies to a confirmation request from the partner program. It informs the partner program that the local program has not detected an error in the received data. Because the program issuing the confirmation request waits for a confirmation, **Confirmed** synchronizes the processing of the two programs.

Send_Error (**cmserr**)

Notifies the partner program that the local program has encountered an application-level error. The local program can use **Send_Error** to inform the partner program of an error encountered in received data, to reject a confirmation request, or to truncate an incomplete logical record it is sending.

Set_Error_Direction (**cmsed**)

Specifies whether a program detected an error while receiving data or while preparing to send data. Error direction is relevant only when a program issues **Send_Error** in SEND_PENDING state—immediately after issuing Receive and receiving data as well as a *status_received* value of CM_SEND_RECEIVED.

Set_Log_Data (**cmsld**)

Used in a basic conversation, this call specifies a log message (log data) and its length to be sent to the partner logical unit (LU). This call has an effect only in basic conversations. If present, log data is sent when **Send_Error** is issued or when the conversation is abnormally deallocated. After the log data is sent, Common Programming Interface for Communications (CPI-C) resets the log data to NULL and the log data length to zero.

Getting Information

The following calls retrieve information about the characteristics of a specified conversation:

> **Note** The names of the calls are pseudonyms. The actual C function names appear in parentheses after the pseudonyms. For example, **Accept_Conversation** is the pseudonym for a call. The actual function name is **cmaccp**.

Extract_Conversation_Security_Type (**xcecst**)
Retrieves security type.
Extract_Conversation_Security_User_ID (**cmecsu**)
Retrieves security user identifier.
Extract_Conversation_State (**cmecs**)
Retrieves conversation state.
Extract_Conversation_Type (**cmect**)
Retrieves conversation type.
Extract_Mode_Name (**cmemn**)
Retrieves mode name.
Extract_Partner_LU_Name (**cmepln**)
Retrieves partner LU name.
Extract_Sync_Level (**cmesl**)
Retrieves synchronization level.
Test_Request_To_Send_Received (**cmtrts**)
Determines whether a request-to-send notification has been received from the partner program.

Ending a Conversation

The following calls end a conversation:

> **Note** The names of the calls are pseudonyms. The actual C function names appear in parentheses after the pseudonyms. For example, **Accept_Conversation** is the pseudonym for a call. The actual function name is **cmaccp**.

Deallocate (**cmdeal**)
: Deallocates a conversation between two programs. Before deallocating the conversation, this call performs the equivalent of the Flush or Confirm call, depending on the current conversation synchronization level and deallocate type.

Set_Deallocate_Type (**cmsdt**)
: Specifies how the conversation is to be deallocated. The deallocation instructions specified by this call take effect when **Deallocate** is issued or when the send type is set to CM_SEND_AND_DEALLOCATE and Send_Data is issued.

Administering Side Information

The following calls let CPI-C applications add, replace, retrieve, or delete side information entries from memory:

> **Note** The names of the calls are pseudonyms. The actual C function names appear in parentheses after the pseudonyms. For example, **Accept_Conversation** is the pseudonym for a call. The actual function name is **cmaccp**.

Delete_CPIC_Side_Information **(xcmdsi)**
Deletes side information entry.
Extract_CPIC_Side_Information **(xcmesi)**
Retrieves side information.
Set_CPIC_Side_Information **(xcmssi)**
Adds or replaces side information entry.

See Also

Side Information

Writing CPI-C Applications

A processing task accomplished by programs using Common Programming Interface for Communications (CPI-C) is called a transaction. Consequently, programs that use CPI-C are called transaction programs (TPs). These programs communicate as peers, on an equal (rather than hierarchical) basis. The TPs use CPI-C calls to exchange status information and application data. Each TP uses CPI-C calls to supply parameters to CPI-C, which performs the preferred function and returns parameters to the TP.

TPs distributed across a local or wide area network perform distributed transaction processing.

This section describes how to write transaction programs using CPI-C and how to configure the systems on which TPs run. The topics in this section cover the following general areas:

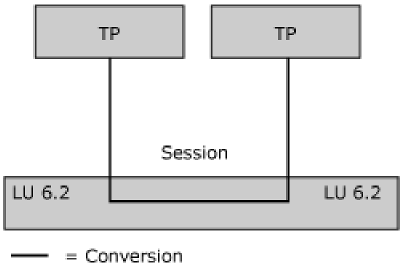
- Understanding fundamental concepts related to TPs.
- Designing and coding TPs.
- Configuring registry and environment variables for invokable TPs.
- Configuring Microsoft® Host Integration Server to work with your TPs.

This section contains:

- Communication Between TPs
- Designing and Coding TPs
- Configuring Invokable TPs
- Configuring Host Integration Server to Support TPs
- Simplifying CPI-C Configuration

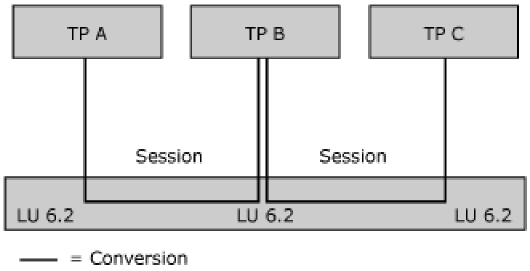
Communication Between TPs

Various hardware and software elements in the SNA environment are required for two transaction programs (TPs) to communicate with each other. The following figure illustrates several fundamental elements.



Each TP is associated with a logical unit (LU) of type 6.2. The LU enables the TP to access the network. Note that several TPs can be associated with the same LU.

A partner TP can invoke another TP, which, in turn, invokes another TP, and so on. In the following figure, TP A invokes TP B, and TP B invokes TP C.



This section contains:

- Fundamental Terms for TPs and LUs
- Sample TPs Illustrating Fundamental Concepts
- Configuring and Controlling TPs
- Creating TPs and Their Supporting Configuration

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Fundamental Terms for TPs and LUs

The following terms describe some fundamental characteristics of transaction programs (TPs) communicating through logical units (LUs):

basic conversation
A type of conversation more complex than a mapped conversation and generally used by service TPs (SNA-based programs that provide services to other programs). For a basic conversation, use Set_Conversation_Type and specify CM_BASIC_CONVERSATION for the *conversation_type*. For more information, see Basic and Mapped Conversations Compared.

conversation
The interaction between TPs carrying out a specific task. Each conversation requires an LU-LU session. A TP can be involved in several conversations simultaneously, as shown with TP B in Communication Between TPs.

invokable TP
A TP that can be invoked by another TP. Invokable TPs are usually server-type applications. That is, they work in the same general way that an IBM CICS application works. Parameters for an invokable TP are configured through registry or environment variables.

There are several types of invokable TPs:

operator-started invokable TP

A TP that is started manually in preparation for being invoked.

autostarted invokable TP

A TP that is automatically started by Common Programming Interface for Communications (CPI-C) when invoked.

queued TP

A TP that, when invoked multiple times, loads once, and then queues up subsequent requests to be dealt with one at a time. All operator-started TPs and some autostarted TPs are queued.

nonqueued TP

A TP loaded multiple times, once for every time it is invoked. Some autostarted TPs are nonqueued but no operator-started TPs are nonqueued.

For more information, see Invokable TPs.

invoking TP
A TP that can invoke (that is, initiate a conversation with) other TPs. Invoking TPs are usually client-type applications. That is, they work in the same general way that an emulator works. For more information see Invoking TPs.

local LU and local TP
An LU and TP working together, when viewed as the home base for a particular conversation. From this viewpoint, some other LU and TP are seen as the partner or remote LU and TP.

LU alias
The string that identifies an LU to a TP. The alias can be up to eight characters long.

LU-LU session
The communication between two LUs over a specific connection for a specific amount of time. An LU-LU session is needed for two TPs to interact. One session can be used serially by many pairs of TPs.

An LU 6.2 can have multiple sessions (two or more concurrent sessions with different partner LUs) and parallel sessions (two or more concurrent sessions with the same partner LU).

LUs are configured through SNA Manager on Microsoft® Host Integration Server 2004. This administration tool is also used to configure LU-LU pairs and modes. The LU and mode configurations control how many sessions a particular LU-LU pair supports.

mapped conversation
A type of conversation simpler than a basic conversation and generally used by application TPs (programs that accomplish tasks for end users). The default for conversation type is mapped. The conversation type can be changed with the Set_Conversation_Type call. For more information, see Basic and Mapped Conversations Compared.

partner LU and partner TP, or remote LU and remote TP
An LU and TP working together, when viewed as being at the far end of a particular conversation.

Sample TPs Illustrating Fundamental Concepts

A set of sample transaction programs (TPs) is provided on the Host Integration Server 2004 CD in the \SDK\Samples\SNA subdirectory. Included with the sample code is TPSETUP, a program that simplifies the setting of registry or environment variables needed by autostarted invokable TPs. Without an interface like that provided by TPSETUP, configuring such variables can be complicated and error-prone. Therefore, it is recommended that you use code like TPSETUP in installation programs for autostarted invokable TPs.

For information about TPSETUP and about the sample TPs, see CPI-C Samples.

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Configuring and Controlling TPs

The following table shows how the characteristics of the transaction programs (TPs) and selection of the logical units (LUs) for a conversation are controlled.

Characteristic	How controlled
Type of conversation: basic or mapped.	Written into the code. For two TPs to communicate successfully, both must use the same type of conversation, basic or mapped. The default for conversation type is mapped. The type can be changed with the Set_Conversation_Type call. For more information, see Basic and Mapped Conversations Compared.
Type of TP: invoking or invokable.	Written into the code. Invoking TPs start with Initialize_Conversation and Allocate. Invokable TPs start with Accept_Conversation. For more information, see Invoking TPs and Invokable TPs.
The local LU alias to be used by an invoking TP.	Three options: • Configured with a registry or environment variable. • Configured (using SNA Manager) as the default local APPC LU for the user who starts the invoking TP. • Configured (using SNA Manager) as a member of the default outgoing local APPC LU pool. For more information, see Invoking TPs and SNA Service Configuration.
The symbolic destination name used by an invoking TP.	Written into the code, in Initialize_Conversation.
The invokable (partner) TP requested by an invoking TP.	Specified within the symbolic destination name, which can be configured using SNA Manager.
The LU alias to be used by an invokable TP (the partner LU alias from the point of view of the invoking TP).	Specified within the symbolic destination name, which can be configured through SNA Management using SNA Manager. For more information, see Invoking TPs and SNA Service Configuration and Matching Invoking and Invokable TPs.
Type of autostarted invokable TP: queued or nonqueued.	Configured with registry or environment variables. For more information, see Configuring Invokable TPs.
Local LU and remote LU aliases.	Configured using SNA Manager.
The pairing of local and remote LUs, and the mode used for each LU-LU pair.	Configured using SNA Manager.

Creating TPs and Their Supporting Configuration

The following procedure describes how to create transaction programs (TPs) and set up a supporting configuration.

To create TPs and set up a supporting configuration

1. Write, compile, and link each TP.
2. Place each TP on an appropriate computer.

   For TPs that you start many times or that are started by a user, arrange for the TP to be started easily. That is, for graphical interfaces, create a program icon for starting the TP and for non-graphical interfaces, make sure the TP is in the path.

3. On one or more computers running Host Integration Server, configure logical units (LUs), modes, LU-LU pairs, and a symbolic destination name for use by the TPs.

   For information about how to set up LU-LU pairs to support TPs, see Using Invoking and Invokable TPs.

   For information about symbolic destination names and side information, see Side Information for CPI-C Programs.

4. Set any registry or environment variables needed for the invoking and invokable TPs.

   For autostarted invokable TPs, it is recommended that you use the sample TP configuration program, TPSETUP, for this step. When you write an installation program for autostarted invokable TPs, it is recommended that you include code similar to TPSETUP.

   For information about registry or environment variables, see Configuring Invokable TPs and Invoking TPs. For information about TPSETUP, see CPI-C Samples.

5. If the invokable TP is operator-started, start it, or arrange for it to be started when the computer is restarted, and then restart the computer.

   If the invokable TP is autostarted, Host Integration Server will start it when needed.

6. Start the invoking TP.

Designing and Coding TPs

The following topics provide background information about designing and coding transaction programs (TPs).

This section contains:

- CPI-C Calls in C Programs
- CPI-C and LU 6.2
- Conversation States
- Confirmation Processing
- Conversation Security
- Basic and Mapped Conversations Compared
- Using Invoking and Invokable TPs

CPI-C Calls in C Programs

This implementation of Common Programming Interface for Communications (CPI-C) is available to programs written in Microsoft® C version 6 or later.

The WINCPIC.H header file defines the prototypes for each CPI-C function. Other definitions include:

- Types specifically defined for use by CPI-C parameters.
- The structure of the side information entries.
- Symbolic names defined for integer parameters.

To use CPI-C calls, the C program must include WINCPIC.H and declare the variables to be used in passing parameters on CPI-C calls.

Note that you must define WIN32® before including WINCPIC.H

For example:

```
        #define WIN32
        #include <wincpic.h>
```

Note also that previous operating systems such as Microsoft® Windows® 98, Windows 95 and OS/2 are no longer supported.

In the case of strings, the program must also determine the preferred string length.

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CPI-C and LU 6.2

Common Programming Interface for Communications (CPI-C) applications can communicate with non-CPI-C LU 6.2 applications, such as Advanced Program-to-Program Communications (APPC).

CPI-C supports all functions of logical unit (LU) 6.2 except for the following:

- Sync Point/back out processing
- PIP data
- LOCKS=LONG
- MAP_NAME
- FMH_DATA

Conversation States

The state of the conversation (as viewed by a particular transaction program (TP)) governs which Common Programming Interface for Communications (CPI-C) calls can be made by the TP at a particular time. For example, a TP cannot issue Send_Data if the conversation is not in SEND or SEND_PENDING state for that TP.

The state of a conversation depends on the TP from which it is viewed. A local TP can view a conversation as being in SEND state while the partner TP views the conversation as being in RECEIVE state. A particular TP can be in several conversations, each of which is in a different state.

The possible conversation states are summarized in this topic.

CONFIRM

The TP has received a request for confirmation of receipt of data. It must respond positively or send error information to the partner TP.

CONFIRM_DEALLOCATE

The TP has received a request for confirmation and must respond positively or send error information. If the TP responds positively, the conversation is automatically deallocated.

CONFIRM_SEND

The TP has received a request for confirmation. It must respond positively or send error information. After responding, the TP can begin to send data.

INITIALIZE

The conversation has been initialized successfully.

RECEIVE

The TP can receive application data and status information from the partner TP. When the conversation is in RECEIVE state, the TP can also send error information and request permission to send data.

RESET

The conversation has not started or has been terminated.

SEND

The TP can send data to the partner TP and request confirmation. When the conversation is in SEND state, the TP can also begin to receive data, which can cause the state to change to RECEIVE.

SEND_PENDING

The TP issued a Receive call and received data as well as a send indicator (*status_received* = CM_SEND_RECEIVED), indicating that the TP can begin to send data. This state differs from the SEND state, which occurs when the TP receives data on one **Receive** call and the send indicator on a subsequent **Receive** call.

This section contains:

- State Checks
- Changing Conversation States

State Checks

A state check occurs when a transaction program (TP) issues a Common Programming Interface for Communications (CPI-C) call and the conversation is not in the appropriate state. For example, a state check occurs if a TP issues Send_Data while the conversation is in RECEIVE state. When a state check occurs, CPI-C does not execute the call. It returns state check information through the *return_code* parameter.

Changing Conversation States

A change in the conversation state can result from:

- A call made by the local transaction program (TP).
- A call made by the partner TP.
- An error condition.

The following example shows how Common Programming Interface for Communications (CPI-C) calls can change the state of the conversation from SEND to RECEIVE and from RECEIVE to SEND.

> **Note** Any TP can send or receive data, regardless of whether it is the invoking TP (the TP that started the conversation) or the invokable TP (the TP that responded to a request to start a conversation).

This example shows how CPI-C calls can change the conversation state. In this table, each conversation state appears in bold and precedes the CPI-C calls that are used while in that state.

Issued by the invoking TP	**Issued by the invokable TP**
Conversation state: RESET	
Initialize_Conversation	
Conversation state: INITIALIZE	
Set_Sync_Level	
(sync_level=CM_CONFIRM)	
Allocate	
Conversation state: SEND	
Send_Data	
Prepare_to_Receive	**Conversation state: RESET**
	Accept_Conversation
	Conversation state: RECEIVE
	(status_received= CM_CONFIRM_SEND_RECEIVED)
	Conversation state: CONFIRM_SEND
	Confirm
	Conversation state: SEND
(return_code=CM_OK)	Send_Data
Conversation state: RECEIVE	Confirm
(status_received= CM_CONFIRM_RECEIVED)	
Conversation state: CONFIRM	
Request_To_Send	
Confirmed	
Conversation state: RECEIVE	(return_code=CM_OK)
	(request_to_send_received= CM_REQ_TO_SEND_RECEIVED)
	Prepare_To_Receive
Receive	
(status_received= CM_CONFIRM_SEND_RECEIVED)	
Conversation state: CONFIRM_SEND	
Confirmed	
Conversation state: SEND	(return_code=CM_OK)
	Conversation state: RECEIVE
Send_Data	
Deallocate	
	Receive
	(status_received= CM_CONFIRM_DEALLOC_RECEIVED)

	Conversation state: CONFIRM_DEALLOCATE
	Confirmed
(return_code=CM_OK)	**Conversation state: RESET**
Conversation state: RESET	

Initial States

Before the conversation is allocated, the state is RESET for both TPs.

In the example, after the conversation is allocated, the initial state is SEND for the invoking TP and RECEIVE for the invokable TP.

Changing to RECEIVE State

The Prepare_To_Receive call allows a TP to change the conversation from SEND to RECEIVE state. This call:

- Flushes the local LU's send buffer.
- Sends a CM_CONFIRM_SEND indicator to the partner TP through the *status_received* parameter of a Receive call, because the synchronization level is set to CM_CONFIRM. This indicator tells the partner TP that a Confirmed response is expected before the partner TP can begin to send data.

Changing to SEND State

The Request_To_Send call informs the partner TP (for which the conversation is in SEND state) that the local TP (for which the conversation is in RECEIVE state) wants to send data. This request is communicated to the partner TP through the *request_to_send_received* parameter of the Confirm call. (The *request_to_send_received* parameter is also returned to Send_Data and other calls.)

When the partner TP issues the Prepare_To_Receive call, the conversation state changes to RECEIVE for the partner TP, making it possible for the local TP to send data.

> **Important** Issuing Request_To_Send does not change the state of the conversation. Upon receiving a request to send, the partner TP is not required to change the conversation state. It can ignore the request.

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Confirmation Processing

The sequence of events for confirmation processing is as follows:

1. Establish the synchronization level.
2. Send a confirmation request.
3. Receive data and confirmation request.
4. Respond to the confirmation request.
5. Deallocate the conversation.

Using confirmation processing, a transaction program (TP) sends a confirmation request with the data. The partner TP confirms receipt of the data or indicates that an error occurred. Each time the two TPs exchange a confirmation request and response, they are synchronized.

> **Note** Although the example in this section does not show this, any TP can send or receive data, regardless of whether the TP is the invoking TP or the invokable TP.

The following table illustrates the steps involved in confirmation processing.

Step	Issued by the invoking TP	Issued by the invokable TP
1	Initialize_Conversation	
2	Set_Sync_Level (*sync_level*=CM_CONFIRM)	
3	Allocate	
4	Send_Data	
5	Confirm	
6		Accept_Conversation
7		Receive (data_received= CM_COMPLETE_DATA_RECEIVED) (status_received= CM_CONFIRM_RECEIVED)
8		Confirmed
9	(*return_code*=CM_OK)	
10	Send_Data	
11	Deallocate	
12		Receive
13		(status_received= CM_CONFIRM_DEALLOC_RECEIVED)
14		Confirmed
15	(return_code=CM_OK)	

Establishing the Synchronization Level

The Set_Sync_Level call lets you override the default synchronization level of the conversation. The synchronization level is one of the conversation's characteristics. There are two possible synchronization levels:

- CM_CONFIRM, under which the TPs can request confirmation of receipt of data and respond to such requests.
- CM_NONE, the default, under which confirmation processing does not occur.

The Initialize_Conversation call sets the default characteristics of a conversation. There are several calls that begin with **Set_**. These calls let you override the default conversation characteristics.

Sending a Confirmation Request

Issuing the Confirm call has two effects:

- It flushes the local LU's send buffer and sends any data contained in the buffer to the partner TP.
- It sends a confirmation request that the partner TP receives through the *status_received* parameter of a Receive call.

After issuing **Confirm**, the local TP waits for confirmation from the partner TP.

Receiving a Confirmation Request

The *status_received* parameter of the Receive call indicates any future action required by the local TP.

In the example, the first Receive has a *status_received* of CM_CONFIRM_RECEIVED, indicating that a confirmation is required before the partner TP can continue.

Responding to a Confirmation Request

The partner TP issues the Confirmed call to confirm receipt of data. This frees the local TP to resume processing.

Deallocating the Conversation

Because the synchronization level of the conversation is set to CM_CONFIRM, Deallocate sends a confirmation request with the data flushed from the buffer.

For the second Receive call, *status_received* is CM_CONFIRM_DEALLOC_RECEIVED, indicating that the partner TP requires a confirmation, generated by the Confirmed call, before the conversation can be deallocated.

Conversation Security

You can use conversation security to require that the invoking transaction program (TP) provides a user identifier and password before Common Programming Interface for Communications (CPI-C) allocates a conversation with the invokable TP.

For the invoking TP, conversation security is activated and configured (with user identifier and password) through the symbolic destination name in SNA Manager or by the following calls, which override the symbolic destination name:

- Set_Conversation_Security_Type
- Set_Conversation_Security_User_ID
- Set_Conversation_Security_Password

For the invokable TP, conversation security is activated and configured through registry or environment variables on the computer where the invokable TP is located.

With communication involving more than two TPs, the verification of a user identifier and password can be passed from one TP to another. Suppose that TP A invokes TP B, which requires security information, and TP B in turn invokes TP C, which also requires security information. TP B can inform TP C that conversation security has already been verified.

For information about the registry or environment variables affecting conversation security, see Configuring Invokable TPs. For information about symbolic destination names and side information, see Side Information for CPI-C Programs.

Basic and Mapped Conversations Compared

The following table offers some guidelines for choosing between basic and mapped conversations for your transaction programs (TPs). The default for conversation type is mapped. To change to a basic conversation, use Set_Conversation_Type, and specify CM_BASIC_CONVERSATION for the *conversation_type*. For definitions of basic and mapped conversations, see Fundamental Terms for TPs and LUs.

Characteristic	**Basic conversations**	**Mapped conversations**
Common use	Generally used for service TPs.	Generally used for application TPs.
Partnering	Must be used to communicate with an existing TP that uses basic verbs.	Must be used to communicate with an existing TP that uses mapped verbs.
Sending and receiving method	Before a TP can begin a send operation, it must convert data records into logical records. The TP does this by adding a 2-byte prefix that indicates the length of the record. A TP can send several logical records at one time. When a partner TP receives logical records, it must reconstruct them into usable data records. For more information, see Logical Records Used in Basic Conversations.	A TP sends data one record at a time. Neither the sending TP nor the receiving TP needs to convert data records between different forms.
Abnormal termination	In the Deallocate call, a TP can indicate whether an error or ABEND (abnormal program termination) was caused by a TP or by a program using the TP.	A TP can indicate an error or ABEND, but cannot tell whether a problem was caused by a TP or by a program using a TP.
ABEND	A TP can indicate whether an ABEND was caused by a time-out or by a critical error.	A TP cannot indicate the cause of an ABEND.
Error logging	For an error or ABEND, a TP can send an error message, in the form of a general data stream (GDS) error log variable, to the local log and to the partner logical unit (LU).	For an error or ABEND, a TP cannot send an error message to the local log or to the partner LU.

This section contains:

- Logical Records Used in Basic Conversations
- An Example of a Mapped Conversation

Logical Records Used in Basic Conversations

Logical records are sent and received in basic conversations only.

A transaction program (TP) can send or receive multiple logical records with a single Send_Data or Receive call. A TP can also send or receive a logical record in successive portions: beginning, middle, and end.

A logical record is made up of:

- A 2-byte record-length (LL) field.
- A data field that can range in length from 0 bytes through 32765 bytes.

The LL field contains a hexadecimal value that is the length of the data field plus two bytes (for the LL field). For example, if a record contains 228 bytes of application data, the logical record length is 230. The LL field is 0x00E6, the hexadecimal equivalent of 230. If the length of the data field is 0, the value contained in the LL field is 0x0002.

Logical records are sent from or received in a data buffer established by the TP. In the data buffer, the LL field must not be in Intel byte-swapped format. For example, a length of 230 must be 0x00E6, not 0xE600.

The LL field cannot be 0x0000 or 0x0001, which allow less than the two bytes required for the LL field itself. The LL field also cannot be greater than or equal to 0x8000, which is equivalent to decimal 32768 and therefore allows for a data field greater than 32765 or an LL field greater than 2.

Setting the most significant bit of the LL field to 1 indicates that the information contained in the current logical record is continued in the next logical record.

An Example of a Mapped Conversation

The following example of a mapped conversation shows the Common Programming Interface for Communications (CPI-C) calls used to start a conversation, exchange data, and end the conversation. Call parameters are in parentheses.

Issued by the invoking TP	**Issued by the invokable TP**
Initialize_Conversation	
Allocate	
Send_Data	
Deallocate	Accept_Conversation
	Receive
	(data_received=
	CM_COMPLETE_DATA_RECEIVED)
	(*return_code*=
	CM_DEALLOCATED_NORMAL)

The following paragraphs describe the calls that are used in a mapped conversation.

Calls for Starting a Mapped Conversation

To start a conversation, the invoking transaction program (TP) issues the following calls:

- Initialize_Conversation, which requests CPI-C to set the values defining the characteristics of the conversation. The **Initialize_Conversation** call specifies a symbolic destination name that is associated with an entry in a side information table in memory. The side information specifies partner TP, partner LU, mode, security, and so on.
- Allocate, which requests that CPI-C establish a conversation between the invoking TP and the invokable TP.

The invokable TP issues the Accept_Conversation call, which informs CPI-C that it is ready to begin a conversation with the invoking TP.

Calls for Sending Data in a Mapped Conversation

The Send_Data call puts one data record (a record containing application data to be transmitted) in the send buffer of the local logical unit (LU). Data transmission to the partner TP does not happen until one of the following events occurs:

- The send buffer fills up.
- The sending TP makes a call that forces CPI-C to flush the buffer and send data to the partner TP.

In addition to the data record, the send buffer also contains the allocation request (which precedes the data record).

In the preceding example, Deallocate flushes the send buffer, sending the allocation request and data to the partner TP. Other calls that flush the buffer are Confirm and Flush.

Calls for Receiving Data in a Mapped Conversation

The **Receive** call receives the data record and status information from the partner TP. If no data or status information is currently available, the local TP, by default, waits for data to arrive.

The *data_received* parameter of Receive tells the program whether it received data and if so, whether or not the data is complete.

Calls for Ending a Mapped Conversation

To end a conversation, one of the TPs issues Deallocate, which causes CPI-C to deallocate the conversation between the two TPs.

Using Invoking and Invokable TPs

There are two kinds of transaction programs (TPs): TPs that can invoke (that is, initiate a conversation with) other TPs, and TPs that can be invoked. A TP that can invoke another TP is called an invoking TP, and a TP that can be invoked is called an invokable TP.

The following topics describe how:

- Invoking TPs request invokable TPs.
- Invokable TPs identify themselves to the SNA service in preparation for being invoked.
- An invokable TP is matched to an invoking TP's request.

For information about how to configure logical units (LUs) to support TPs, see Configuring Host Integration Server to Support TPs.

This section contains:

- Invoking TPs
- Invoking TPs and Contention
- Invokable TPs
- Subcategories for Invokable TPs
- Matching Invoking and Invokable TPs

Invoking TPs

An invoking transaction program (TP) can be located on any system on the SNA network. An invoking TP identifies itself by issuing Initialize_Conversation, which specifies the name of the invoking TP and the symbolic destination name to be used. A local logical unit (LU) alias can be specified for the invoking TP by using a registry or environment variable, as shown in the following table.

Operating system on computer that contains invoking TP	**Location and name of variable**
Windows 2000, Windows XP and Windows server 2003	Location in Windows 2000 registry: HKEY_LOCAL_MACHINE SYSTEM CurrentControlSet Services SnaBase Parameters Client <*exename*>:REG_SZ:*localLUalias* Any *exename* registry entries under the Client key represent the file names of Win32 executable files (without the file extension) for any invoking TPs. A REG_SZ value associated with each *exename* registry entry specifies the local LU alias for the invoking TP. For example, the APING.EXE Common Programming Interface for Communications (CPI-C) sample included with the Microsoft® Host Integration Server software development kit (SDK) would have the following registry entry: HKEY_LOCAL_MACHINE SYSTEM CurrentControlSet Services SnaBase Parameters Client APING:REG_SZ:*localLUalias*

The registry parameter for the local LU alias takes greatest precedence when associating a local LU to an invoking CPI-C application. If a registry value is not configured, two other methods are used to associate a local LU to the CPI-C application.

A local APPC LU can be associated with the user context under which the CPI-C application is running A local APPC LU can be configured by checking the **member of default local APPC LU pool** check box. Of the two possible options, a local LU associated with user context has the higher precedence.

If the local LU alias is not specified in a registry or environment variable, SNA service must be configured to supply it through one of these two types of default local LUs. Otherwise, Initialize_Conversation will fail. For more information, see Invoking TPs and SNA Service Configuration.

Next, the symbolic destination name specified in Initialize_Conversation provides the name of the invokable (or partner) TP and the partner LU alias (the LU alias to be used by the invokable TP). With this information available, the invoking TP can issue the Allocate call.

After a TP successfully issues an Allocate call, an allocation request flows. For more information about what happens after an invoking TP requests an invokable TP, see Matching Invoking and Invokable TPs.

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Invoking TPs and Contention

The following information applies only to cases where logical units (LUs) are communicating in complex ways (such as chains of LUs) over multiple sessions. In such cases, two LUs may attempt to allocate a conversation on the same session at the same time. If this happens, one LU must win (the contention winner) and one must lose (the contention loser). The contention-winner LU and the contention-loser LU are determined for each session when the session is established. During that particular session, the contention-loser LU must receive permission from the contention-winner LU before allocating a conversation. In contrast, the contention-winner LU on that session allocates a conversation as needed.

Note that when two LUs are communicating over multiple sessions, one LU can be the contention winner for some of the sessions, and the other LU the contention winner for others.

An invoking transaction program (TP) operates most efficiently if the number of concurrent Allocate requests that the TP issues is matched by the number of sessions on which the local LU is the contention winner. The choice of contention winner is controlled through the modes configured at the two ends of the communication. A mode must be configured to work with the mode on the remote system for communication to begin between two LUs.

Invokable TPs

An invokable transaction program (TP) is a TP that can be invoked by another TP. Invokable TPs are written or configured through registry or environment variables to supply their names to the SNA service as a notification that they are available for incoming requests. An SNA service invokable TP can be run on any computer running Host Integration Server or client.

There are two types of invokable TPs:

Operator-started invokable TPs

An operator-started invokable TP must be started by an operator before the TP can be invoked. When the operator-started invokable TP is started, it notifies the SNA service of its availability by issuing an Accept_Conversation call. The **Accept_Conversation** call causes the name of the invokable TP to be communicated to all the SNA services in the domain, along with the alias of an associated LU if one has been configured through a registry or environment variable.

Autostarted invokable TPs

An autostarted invokable TP can be started by the SNA service when needed. The TP must be registered through registry entries or environment variables on its local system, so that it can be identified to the SnaBase component of the SNA service. The registered information defines the TP as autostarted and must specify the TP name. The registered information can also specify the local LU alias that the invokable TP will use.

The recommended method for setting registry or environment variables for autostarted invokable TPs is to use the sample TP configuration program, TPSETUP, or similar code written into your own installation program. For more information about registry or environment variables for invokable TPs, see Configuring Invokable TPs. For information about TPSETUP, see CPI-C Samples.

If no local LU alias is registered with autostarted TPs, the resulting SNA service configuration can be more flexible in responding to invoking requests. For more information about such flexible configurations, see TP Name Not Unique; Local LU Alias Unspecified.

After an autostarted invokable TP is started by SNA service, the TP issues Accept_Conversation just as an operator-started TP does. Accept_Conversation must provide the TP name that was registered for the TP.

Autostarted TPs must be configured through registry or environment variables to be either queued or nonqueued. All operator-started TPs act as queued TPs.

Queued TPs

If an autostarted TP is configured as queued, or if the TP is operator-started, incoming allocation requests are queued, and then sent only when the invokable TP issues **Accept_Conversation**. For autostarted invokable TPs, if a copy of the TP is not yet running, one is started when an incoming allocation request specifies that TP.

> **Note** For the Microsoft® Windows Server™ 2003 and Windows 2000 system, only one copy of a service can be running at any given time. This means that all autostarted TPs that run as services under Windows Server 2003 and Windows 2000 must be queued. To write an autostarted TP so it runs under Windows Server 2003 and Windows 2000 as a service and also runs in a nonqueued way, write a multithreaded program with an **Accept_Conversation** always outstanding.

Nonqueued TPs

If an autostarted TP is configured as nonqueued, a new copy will be started every time an Allocate is received for the TP. Nonqueued TPs should process the conversation they have been allocated, and then exit, because they will not receive any additional **Allocate** requests.

Subcategories for Invokable TPs

The following table shows subcategories for invokable transaction programs (TPs).

Queued or nonqueued	Application or service	Starting method
Queued	Running as an application or a service	Autostarted or operator-started
Nonqueued	Running as an application	Autostarted

The concept of a TP running as a service or running as an application is distinct from a service TP or an application TP. Service TP and application TP are SNA terms that describe how a TP is used: either as a supportive service program for other Common Programming Interface for Communications (CPI-C) programs, or directly by a user, as an application. For detailed information about services in Windows Server 2003 and Windows 2000, see the documentation for Windows Server 2003 and Windows 2000.

To write an autostarted TP so it runs under Windows Server 2003 and Windows 2000 as a service and also runs in a nonqueued way, write a multithreaded program with an Accept_Conversation always outstanding. For more information, see Invokable TPs.

To run an autostarted TP as an application under Windows Server 2003 and Windows 2000, make sure the TPSTART program is always started before the TP. For more information, see CPI-C Samples.

Matching Invoking and Invokable TPs

Each SNA service maintains a list of available invokable transaction program (TP) names and any logical unit (LU) aliases to be associated with the TP names. This information is obtained as follows:

- For autostarted invokable TPs, registry or environment variables identify a TP name containing a maximum of eight characters, and can specify an associated LU. This information is sent from the client to the server that sponsors the client. A client learns about the domain through a sponsor connection to a server. Clients must establish the sponsor connection before proceeding with any other tasks.
- For operator-started invokable TPs, a TP name (with a maximum of 64 characters) is specified in Specify_Local_TP_Name. The TP name is truncated to eight characters and sent from the client to the server that sponsors the client, along with the alias of an associated LU if one has been configured through a registry or environment variable.

> **Note** If you want a TP name to be unique, it is recommended that you limit the name to eight characters or fewer, or make the name unique within the first eight characters. This is because the preliminary routing of allocation requests is carried out using the first eight characters. Although further matching is later carried out between the full TP names, it is inefficient to allow the preliminary routing to succeed when in some cases the later matching will fail.

The next step in the matching of invoking and invokable TPs is the creation of a side information table from the parameters in the symbolic destination name. Then the invoking TP issues the Allocate call and an allocation request flows to the partner LU specified in the side information table, stating the name of the invokable TP that has been requested (also listed in the side information table).

When an allocation request arrives, the SNA service compares the requested invokable TP name and LU alias to the list of available invokable TPs (which can include associated LU aliases). The comparison can be modified by registry variables, but by default is carried out as follows:

- Although the TP name requested in the symbolic destination name can be as long as 64 characters, any name received through a registry or environment variable is limited to eight characters or less. Therefore, only the first eight characters of TP names are used in comparisons.
- The comparison is carried out first on both the TP name and the LU alias. An invokable TP for which there is a match on both TP name and LU alias will be chosen ahead of a TP for which no LU alias has been configured through a registry or environment variable. A TP for which no LU alias has been configured can be matched with any request that specifies that TP name, because there cannot be a mismatch based on LU alias.
- The comparison of requested and available TP names is carried out in a specific order:
    1. The SNA service first checks for operator-started invokable TPs on the local system (the local Host Integration Server).
    2. If no match is found, the SNA service checks for autostarted invokable TPs on the local system (the local Host Integration Server).
    3. If no match is found, the SNA service checks for operator-started invokable TPs on other computers running Host Integration Server or clients.
    4. If no match is found, the SNA service checks for autostarted invokable TPs on other computers running Host Integration Server or clients.

This comparison can be modified somewhat by registry entries for the SnaServr service. The entries are called **DloadMatchTPOnly** and **DloadMatchLocalFirst**.

If a match is found, the SNA service signals the system containing the requested TP to connect to that SNA service. If no match is found, the SNA service rejects the incoming request.

For suggestions about specific ways to handle TP names and LU aliases, see Arranging TPs Within an SNA Network.

> **Note** Because of the way Common Programming Interface for Communications (CPI-C) works, an allocation request does not flow until local data buffers are full, or a Confirm or Flush call is made. This may mean that the allocation request does not flow until some time after the Allocate call is made. Therefore, any allocation failure caused by the rejection of the allocation request at the partner LU will be observed as the failure of a later call with one of the allocation failure return codes.

Configuring Invokable TPs

The following topics tell how to configure invokable transaction programs (TPs) for the various Microsoft® SNA service client types.

This section contains:

- Clients Running Windows XP or Windows 2000

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Clients Running Windows XP or Windows 2000

On clients running Microsoft® Windows® XP or Windows 2000, invokable transaction programs (TPs) are configured through the Windows XP or Windows 2000 registry.

> **Note** With Windows XP and Windows 2000, the recommended method for setting registry variables for autostarted invokable TPs is to use the sample TP configuration program, TPSETUP. Compile INSTALL.C, the source code for TPSETUP, for the Windows XP and Windows 2000 environment. When you write an installation program for autostarted invokable TPs, it is recommended that you add code similar to TPSETUP to the installation program. For information about TPSETUP, see CPI-C Samples.

For clients running Windows XP or Windows 2000, it is recommended that autostarted invokable TPs be written as Windows XP or Windows 2000 services. Be sure to include code like that in TPSETUP in the program that installs your TPs. Among other things, TPSETUP shows how to use the **CreateService** function when installing a TP. For important information about how services work under Windows 2000, see the documentation for Windows 2000.

The following table lists the registry entries used for the types of invokable TPs that can be run on Windows XP or Windows 2000 clients.

Type of TP	**Location in registry**	**Possible registry entries**
Autostarted invokable TP running as a service on Windows XP or Windows 2000 client.	**HKEY_LOCAL_MACHINE** **SYSTEM** **CurrentControlSet** **Services** ***TPName*** (and subkeys)	Registry entries created by the **CreateService** call, including entries that specify the path, display name, and other characteristics of the service. —plus— Linkage OtherDependencies:REG_MULTI_SZ:SnaBase Parameters SNAServiceType:REG_DWORD:0x5 LocalLU:REG_SZ:*LUalias* Parameters:REG_SZ:*ParameterList* Timeout:REG_DWORD:*number* AcceptNames:REG_SZ:*TPNameList* ConversationSecurity:REG_SZ:{ YES | NO } AlreadyVerified:REG_SZ:{ YES | NO } *Username1*:REG_SZ:*Password1* ... *UsernameX*:REG_SZ:*PasswordX* For more information, see the notes following this table.
Autostarted invokable TP running as an application on a Windows XP or Windows 2000 client. For more information, see the notes following this table.	**HKEY_LOCAL_MACHINE** **SYSTEM** **CurrentControlSet** **Services** **SnaBase** **Parameters** **TPs** ***TPName*** Parameters	**SNAServiceType:**REG_DWORD:{ 0x5 | 0x6 } **PathName:**REG_EXPAND_SZ:*path* **LocalLU:**REG_SZ:*LUalias* **Parameters:**REG_SZ:*ParameterList* **TimeOut:**REG_DWORD:*number* **AcceptNames:**REG_SZ:*TPNameList* **ConversationSecurity:**REG_SZ:{ YES | NO } **AlreadyVerified:**REG_SZ:{ YES | NO } ***Username1*:**REG_SZ:*Password1* ... ***UsernameX*:**REG_SZ:*PasswordX* For more information, see the notes following this table.

Operator-started invokable TP running as a service on a Windows XP or Windows 2000 client.	**HKEY_LOCAL_MACHINE** **SYSTEM** **CurrentControlSet** **Services** ***TPName*** (and subkeys)	Registry entries created by the **CreateService** call, including entries that specify the path, display name, and other characteristics of the service. —plus— Linkage OtherDependencies:REG_MULTI_SZ:SnaBase Parameters SNAServiceType:REG_DWORD:0x1A LocalLU:REG_SZ:*LUalias* Timeout:REG_DWORD:*number* ConversationSecurity:REG_SZ:{ YES | NO } AlreadyVerified:REG_SZ:{ YES | NO } *Username1*:REG_SZ:*Password1* ... *UsernameX*:REG_SZ:*PasswordX* For more information, see the note following this table.
Operator-started invokable TP running as an application on a Windows XP or Windows 2000 client.	**HKEY_LOCAL_MACHINE** **SYSTEM** **CurrentControlSet** **Services** **SnaBase** **Parameters** **TPs** ***TPName*** Parameters	**SNAServiceType:**REG_DWORD:0x1A **LocalLU:**REG_SZ:*LUalias* **TimeOut:**REG_DWORD:*number* **ConversationSecurity:**REG_SZ:{ YES | NO } **AlreadyVerified:**REG_SZ:{ YES | NO } ***Username1*:**REG_SZ:*Password1* ... ***UsernameX*:**REG_SZ:*PasswordX* For more information, see the note following this table.

CPI-C Samples

AlreadyVerified and Username/Password entries are used only if ConversationSecurity is set to YES.

This section contains:

- Registry Entries for Clients Running Windows XP or Windows 2000
- Example of Registry Entries for Windows XP or Windows 2000

Registry Entries for Clients Running Windows XP or Windows 2000

The following list gives details about registry entries for clients running Windows XP or Windows 2000. For each transaction program (TP) type, the applicable variables and their locations are shown in Clients Running Windows XP or Windows 2000.

OtherDependencies:REG_MULTI_SZ:SnaBase
For a TP running as a service, ensures that the SnaBase service is started before the TP is started. This entry belongs under the **Linkage** subkey.

SNAServiceType:REG_DWORD:{ 0x5 | 0x6 | 0x1A }
Indicates the type of TP. Use a value of 0x5 for an autostarted queued TP, 0x6 for an autostarted nonqueued TP, and 0x1A for an operator-started TP.

Note that the value for an autostarted TP running as a service must be 0x5, because these TPs are always queued, as described in Invokable TPs.

PathName:REG_EXPAND_SZ:*path*
For an autostarted TP running as an application, specifies the path and file name of the TP. The data type of REG_EXPAND_SZ means that the path can contain an expandable data string For example, %SystemRoot% represents the directory containing the Windows 2000 system files. Note that for a TP running as a service, an equivalent entry is inserted by the **CreateService** call. No additional path entry is needed.

LocalLU:REG_SZ:*LUalias*
Specifies the alias of the local LU to be used when this TP is started on this computer.

Parameters:REG_SZ:*ParameterList*
Lists parameters to be used by the TP. Separate parameters with spaces.

Timeout:REG_DWORD:*number*
Specifies the time, in milliseconds, that an Accept_Conversation will wait before timing out. Specify *number* in decimal. The registry editor converts this to hexadecimal before displaying it. The default is infinity (no limit).

AcceptNames:REG_SZ:*TPNameList*
With Windows 2000, used for autostarted TPs only. Lists additional names under which the invokable TP can be invoked. Separate TP names with spaces. The default is none. If an invokable TP does not issue a Specify_Local_TP_Name for each name configured under AcceptNames in the registry, that TP will fail.

ConversationSecurity:REG_SZ:{ YES | NO }
Indicates whether this TP supports conversation security. The default is NO.

AlreadyVerified:REG_SZ:{ YES | NO }
Indicates whether this TP can be invoked with a user identifier and password that have already been verified. **AlreadyVerified** is ignored if **ConversationSecurity** is set to NO.

For a diagram of three TPs in a conversation, where the third TP can be invoked with a password that is already verified by the second TP, see Communication Between TPs. The following table shows the requirements for using password verification in a chain of TPs.

First TP (an invoking TP)	**Second TP (invokable TP that confirms password, and then invokes another TP)**	**Third and subsequent TPs (invokable TPs that invoke other TPs)**
Does not need registry or environment variables.	**ConversationSecurity** setting must be YES.	**ConversationSecurity** setting must be YES.
Does not need registry or environment variables.	**AlreadyVerified** setting can be YES or NO.	**AlreadyVerified** setting must be YES.
Symbolic destination name or **Set_Conversation_ Security_Type** in this TP specifies PROGRAM for the security type. As a result, the TP passes along the user identifier and password supplied in the symbolic destination name (or through calls (1)).	Symbolic destination name or **Set_Conversation_ Security_Type** in this TP specifies SAME for the security type. As a result, after confirming the user identifier and password, the TP passes along the user identifier and an already-verified flag.	Symbolic destination name or **Set_Conversation_ Security_Type** in this TP specifies SAME for the security type. As a result, the TP passes along the user identifier as received, along with the already-verified flag.

Note Set_Conversation_Security_User_ID or **Set_Conversation_Security_Password** overwrites the user identifier and password specified in the symbolic destination name.

If you set **AlreadyVerified** to NO, this TP cannot join in a chain of conversations where password verification is already done. (The exception to this is when **ConversationSecurity** is set to NO, in which case the TP could be the final TP in such a chain, because it performs no checking.)

If you are configuring a TP that sometimes needs to confirm a password and sometimes accepts an already-verified flag, set AlreadyVerified to YES and configure the UsernameX variable appropriately. In this case, whenever the TP is invoked without the already-verified flag set, AlreadyVerified is ignored. Verification is attempted with the user identifier and password configured for the TP.

The default for AlreadyVerified is NO. If you set AlreadyVerified to YES, make sure that ConversationSecurity is also set to YES.

Username1:REG_SZ:*Password1*
...
UsernameX:REG_SZ:*PasswordX*

Sets one or more user names and passwords to be compared with those sent by the invoking TP. The user name and password can each be as many as 10 characters. Both parameters are case-sensitive.

This variable is ignored if conversation security is not activated or if the password has already been verified, as described for the AlreadyVerified entry.

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Example of Registry Entries for Windows XP or Windows 2000

For an autostarted invokable transaction program (TP) called **BounceTP** and running as a service, the following registry entries might be added to a client running Windows XP or Windows 2000. The entries would be added to **HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services**, under the subkeys shown in bold type.

> **Note** In the following list, the parameters listed directly under the **BounceTP** key (such as **DisplayName** and **ErrorControl**) are service parameters created when TPSETUP or similar code is run to install the TP. These parameters should be created by TPSETUP or similar code. They should not be set manually. For more information about TPSETUP, see CPI-C Samples.

BounceTP
  DisplayName:REG_SZ:BounceTP
  ErrorControl:REG_DWORD:0x1
  ImagePath:REG_EXPAND_SZ:c:\sna\system\bouncetp.exe
  ObjectName:REG_SZ:LocalSystem
  Start:REG_DWORD:0x3
  Type:REG_DWORD:0x10

Linkage

OtherDependencies:REG_MULTI_SZ:SnaBase

Parameters

SNAServiceType:REG_DWORD:0x5
LocalLU:REG_SZ:JohnDoe
Parameters:REG_SZ:Arg1 Arg2 Arg3
Timeout:REG_DWORD:0x100
ConversationSecurity:REG_SZ:yes
AlreadyVerified:REG_SZ:no
JohnDoe:REG_SZ:SecretPassword

Configuring Host Integration Server to Support TPs

The following topics describe how the Microsoft® Host Integration Server 2004 configuration works with invoking and invokable transaction programs (TPs.)

This section contains:

- Invoking TPs and SNA Service Configuration
- Invokable TPs and the SNA Service Configuration
- Arranging TPs Within an SNA Network
- Troubleshooting for Invokable TPs

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Invoking TPs and SNA Service Configuration

For an SNA service to support the beginning of the invoking process, the following parameters must be configured correctly:

- If the invoking transaction program (TP) specifies the logical unit (LU) alias that it uses (in a registry or environment variable), that LU alias must match a local Advanced Program-to-Program Communications (APPC) LU alias on the supporting SNA service. If the invoking TP does not specify a local LU alias, one of two methods for designating a default LU must be carried out on the supporting SNA service:
    - Assign a default local APPC LU to the user or group that starts the invoking TP (that is, the user or group logged on at the system from which Initialize_Conversation is issued).

      —or—

    - Designate one or more LUs as members of the default outgoing local APPC LU pool. Host Integration Server or SNA service first attempts to determine the default local APPC LU of the user who started the TP, then attempts to assign an available LU from the default outgoing local APPC LU pool. If these attempts fail, SNA service rejects the request.
- In most situations, the supporting SNA service must contain an appropriate connection to another system (host or peer). Sometimes, for testing purposes, the SNA service contains two local LUs paired together (for invoking and invokable TPs that are in the same domain). In this situation, a connection to a host or peer is not necessary.
- The partner LU alias specified in the symbolic destination name must match an LU alias that is paired with the local LU alias used by the invoking TP.

The preceding parameters support the beginning of the invoking process. For the invoking process to successfully complete, additional parameters must be configured as described in Invokable TPs and the SNA Service Configuration.

Invokable TPs and the SNA Service Configuration

For an SNA service to receive allocation requests from an invoking transaction program (TP) on another system and route those requests to an invokable TP, certain parameters must be configured correctly:

- The SNA service must have a connection to the system from which the invoking TP's request is sent.
- The SNA service must have a remote logical unit (LU) capable of receiving the incoming request. This remote LU can be configured either explicitly or implicitly.

  When configured explicitly, there is an explicit match between a remote LU alias on the SNA service and the alias of the LU that conveys the invoking TP's request.

  When configured implicitly, an implicit incoming remote LU (with its implicit incoming mode) is used. This means that several items must work together. First, the LU alias specified in the incoming request (the LU alias requested for the invokable TP) must match a local LU alias on the SNA service receiving the request. Second, the local LU on the server must have an implicit incoming remote LU assigned to it. The properties of the implicit incoming remote LU will be used for that LU-LU session.

- Appropriate local LUs must be defined in the SNA service configuration. For descriptions of several ways to set up these local LUs, see Arranging TPs Within an SNA Network.

Arranging TPs Within an SNA Network

If your Host Integration Server installation contains multiple systems (clients or SNA services), you can place a given invokable transaction program (TP) on more than one system. When an invoking request is received in such an installation, there can be a choice of systems on which to run the invokable TP. You can maintain specific control over this choice. Alternatively, by following the instructions in TP Name Not Unique; Local LU Alias Unspecified, you can enable SNA service to make the choice randomly to distribute the load.

You can maintain specific control over this choice of system by setting up invokable TPs with unique names, or by setting up each invokable TP to run only with a specific, unique logical unit (LU) alias. With this arrangement, the information provided by the invoking TP (in the symbolic destination name) specifies the system on which the invokable TP should run.

You can allow the SNA service to make the system choice randomly by setting the **DloadMatchLocalFirst** registry entry to NO and using invokable TPs that leave the local LU alias unspecified. Then, when an incoming request is received, it is routed randomly, rather than preferentially to the local server. In addition, no matter what LU alias is requested for the invokable TP, there cannot be a mismatch. SNA service starts one instance of the requested TP, choosing randomly among the available systems.

The following topics describe some of the possible arrangements that can be made for running TPs.

This section contains:

- TP Name Unique for Each TP
- TP Name Not Unique; Local LU Alias Unique
- TP Name Not Unique; Local LU Alias Unspecified

TP Name Unique for Each TP

One way to specify the intended system where the invokable transaction program (TP) will run is to use a unique TP name for each invokable TP. In this arrangement, the invoking TP identifies the intended invokable TP (and system) simply by naming the TP. This makes it unnecessary for an invokable TP to specify any logical unit (LU) alias in registry or environment variables.

TP Name Not Unique; Local LU Alias Unique

Another way to specify the intended system where the invokable transaction program (TP) will run is to give the same name to multiple invokable TPs, but associate each TP with a unique local logical unit (LU) alias. To do this, configure each invokable TP (through registry or environment variables) to use a unique local LU alias. Then set up the invoking TPs so that each one is routed not only to the correct TP name but also to the correct partner LU alias for the intended invokable TP.

TP Name Not Unique; Local LU Alias Unspecified

If it does not matter on which system an invokable transaction program (TP) runs, use the same name for multiple invokable TPs and do not specify a logical unit (LU) alias in the registry or environment variables for the TPs. In this situation, there are no associated LU aliases in the list of available invokable TP names on a computer running Host Integration Server. Thus, a request received from an invoking TP cannot cause a mismatch on the LU alias, and will match according to the TP name.

In this situation, if you set the **DloadMatchLocalFirst** registry entry to NO, the SNA service randomly routes the request to one of the available TPs. This spreads the processing load among multiple systems and provides hot backup (the ability to take systems online and offline without disrupting service).

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Troubleshooting for Invokable TPs

If there are difficulties with starting an invokable transaction program (TP), there may be a mismatch between the information for the invokable TP, the invoking TP, or logical units (LUs) in the SNA service configuration. That is, there may be a mismatch between the symbolic destination parameters, the registry or environment variables, or LU aliases specified in SNA Manager. For details about how to specify LU aliases in SNA Manager, see Invoking TPs and SNA Service Configuration.

Simplifying CPI-C Configuration

There are several features in Microsoft® Host Integration Server 2004 that can simplify configuration for Common Programming Interface for Communications (CPI-C):

- The implicit, incoming remote logical unit (LU) and the implicit, incoming mode which allow SNA service to accept requests that arrive by unrecognized remote LUs and modes.
- The default local Advanced Program-to-Program Communications (APPC) LU and the default remote APPC LU, which allow LU aliases to be associated with user or group names, simplifying the routing of incoming requests and the configuration of client systems.
- The default outgoing local APPC LU pool, which enables LUs to be allocated dynamically to any invoking TP that does not specify a local LU.
- Automatic partnering, which automatically creates LU-LU pairs and assigns modes to the pairs.

Support for CPI-C Automatic Logon

This section describes the support for automatic logon for Common Programming Interface for Communications (CPI-C) applications that is available in Microsoft® Host Integration Server 2004. This feature requires specific configuration by the network administrator. The CPI-C application must be invoked on the local area network (LAN) side from a client of Host Integration Server. The client must be logged into a Microsoft® Windows® domain, and the client application must be running on Microsoft® Windows Server™ 2003, Windows XP, or Windows 2000.).

To use this feature, the CPI-C client application is coded to use program level security, with a special hard-coded user name of MS$SAME and password of MS$SAME. When this session allocation flows from client to SNA services, Host Integration Server looks up the host account and password corresponding to the Windows 2000 account under which the client is logged on, and substitutes the host account information into the APPC attach message it sends to the host.

Use the following function calls to use CPI-C:

- Call the Set_Conversation_Security_Type function with the *conversation_security_type* parameter set to CM_SECURITY_PROGRAM.
- Call the Set_Conversation_Security_User_ID function with the *security_user_ID* parameter set to the MS$SAME string and the *security_user_ID_length* parameter set to 7.
- Call the Set_Conversation_Security_Password function with the *security_password* parameter set to the MS$SAME string and the *security_password_length* parameter set to 7.

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LUA Programmer's Guide

This section of the Microsoft® Host Integration Server 2004 Developer's Guide provides the programmatic techniques and procedures for creating applications with the logical unit application (LUA) programming interface.

For API references and other technical information about LUA, see LUA Programmer's Reference.

For sample code using LUA, see LUA Samples.

This section contains:

- About the LUA Guide
- LUA Concepts
- Writing LUA Applications
- Support for LUA Single Sign-On

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About the LUA Guide

This section provides information required to develop C-language applications that use the conventional logical unit application (LUA) programming interface to exchange data in a Systems Network Architecture (SNA) environment.

This implementation of LUA is compatible with the Request Unit Interface (RUI) and the Session Level Interface (SLI) of earlier versions of the LUA for the Microsoft® Windows NT® and Microsoft Windows® 95 operating systems, the Windows graphical environment, and the IBM Extended Services for OS/2 version 1.0.

This section provides conceptual information and detailed reference information.

To use this section effectively, you should be familiar with:

- Microsoft Host Integration Server 2004
- Microsoft Windows Server™ 2003 and Windows 2000 Server
- SNA concepts
- General concepts for the communications software you have installed. (Refer to your product documentation for information.)
- Microsoft Visual C++® version 6.0 or later

This section contains

- Operating Systems Support for LUA Development
- Finding Further Information about LUA

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Operating Systems Support for LUA Development

This section contains information relating to Microsoft® Windows Server 2003 and Windows® 2000 Server.

Microsoft Host Integration Server 2004 supports the development of logical unit application (LUA) applications for Windows Server 2003 and Windows 2000 Server. Support for LUA applications is provided only for the Win32® subsystem.

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Finding Further Information about LUA

This section does not provide a detailed explanation of products, architectures, or standards other than those directly pertaining to the Microsoft® Windows® logical unit application (LUA) programming interface. For information about specific operating environments, refer to your system documentation. For information about SNA, refer to your system network documentation.

The following topics provide additional information about Microsoft Host Integration Server application programming interfaces (APIs) based on SNA architecture:

- About the APPC Guide
- APPC Programmer's Guide
- CPI-C Programmer's Guide

For more information about SNA and about 3270 information display systems, see the following manuals:

- *IBM 3270 Information Display System: 3274 Control Unit Description and Programmer's Guide*
- *IBM 3270 Information Display System: Color and Programmed Symbols*
- *IBM 3270 Information Display System: 3274 Control Unit Display Station: Operator's Guide*
- *IBM Systems Network Architecture: Technical Overview*
- *IBM Systems Network Architecture: Concepts and Products*
- *IBM Advanced Communications Function Products Installation Guide*
- *IBM Installation and Resource Definition*
- *IBM 9370 LAN Token Ring Support*
- *IBM SNA Format and Protocol Reference Manual: Architectural Logic*

For background information about logical unit (LU) 6.2, Advanced Program-to-Program Communications (APPC), and/or the Common Programming Interface for Communications (CPI-C), see the following manuals:

- *IBM Systems Network Architecture: Introduction to APPC*
- *IBM Systems Network Architecture: Transaction Programmer's Reference Manual for LU Type 6.2*
- *IBM SNA: Format and Protocol Reference Manual: Architecture Logic for LU Type 6.2*
- *IBM SNA: Formats*
- *IBM SNA: Technical Overview*
- *IBM SNA: ACF/VTAM Programming for LU Type 6.2*

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LUA Concepts

The conventional logical unit application (LUA) programming interface is an application programming interface (API) that enables you to write LUA applications to communicate with host applications.

The interface is provided at the request/response unit and session levels, enabling programmable control over the Systems Network Architecture (SNA) messages sent between your communications software and the host. It can be used to communicate with any of the logical unit types 0, 1, 2, or 3 at the host. The application must send the appropriate SNA messages as required by the host.

For example, you can use LUA to write a 3270 emulation program that communicates with a host 3270 application.

This section contains:

- Windows LUA Overview
- LUs and Sessions
- Configuring for LUA
- LUA Verb Summary
- A Sample LUA Communication Sequence

Windows LUA Overview

To provide one common application programming interface (API) to port applications from various operating environments to Microsoft® Windows Server™ 2003 or Windows® 2000 Server, a Windows Systems Network Architecture (SNA) standard was created. As a direct result of this work, Windows logical unit application (LUA) was developed. The LUA verbs, routines, and information presented in this guide represent an evolving Windows LUA that is based on IBM Extended Services for OS/2 version 1.0 and includes a set of Windows extensions.

The use of the Windows LUA interface on Windows Server 2003 or Windows 2000 causes additional threads to be created within the calling process. These other threads perform interprocess communication with the SNA service over the LAN interface that the client is configured to use (for example, TCP/IP, IPX/SPX, or named pipes).

If an application using Windows LUA is running on Windows Server 2003 or Windows 2000, stopping the SNABASE service causes the application to be unloaded from memory.

This section contains:

- Windows LUA Asynchronous Support
- Before Using Windows LUA
- Using LUA and Asynchronous Verb Completion

Windows LUA Asynchronous Support

Asynchronous verb completion returns immediately from issuing an initial verb (before results have been received) so the application can continue with other processes. A program that issues a verb and does not regain control until the operation completes cannot perform any other operations. This synchronous type of operation, called blocking, is not suited to a server application designed to handle multiple requests from many clients.

By design, logical unit application (LUA) is asynchronous and uses semaphores for notification messages. Semaphores work well for Windows Server 2003 or Windows 2000. Windows LUA provides the following functions for issuing the Request Unit Interface (RUI) and Session Level Interface (SLI) verbs:

- RUI
- SLI
- WinRUI
- WinSLI

WinRUI and **WinSLI** provide asynchronous message notification for all Windows-based RUI and SLI verbs, while **RUI** and **SLI** provide support for event notification. Windows version 3.*x* applications use **WinRUI** and **WinSLI** for asynchronous message notification.

Asynchronous support allows you to be notified of verb completion based on a window handle. You can register a window handle using the RegisterWindowsMessage function with "WinRUI" or "WinSLI" as the string. You then issue a verb using the WinRUI or WINSLI function and passing a window handle. When the LUA verb conversation completes, a message is posted to the window handle that you passed, notifying you that the verb is complete.

The only other Windows extension functions required for Windows LUA are for initialization (WinRUIStartup or WinSLIStartup) and termination (WinRUICleanup or WinSLICleanup) purposes. Depending on your application, other Windows extensions may be useful, but they are not required. A complete description of all Windows LUA verbs, routines, and extensions is provided in LUA RUI Verbs, LUA SLI Verbs, and LUA Extensions for the Windows Environment.

Before Using Windows LUA

The following Windows extensions are of particular importance and should be reviewed before using the logical unit application (LUA) application programming interface (API) and this version of Host Integration Server 2004:

- RUI

  Provides event notification for all Request Unit Interface (RUI) verbs. The application must provide a handle to an event in the **lua_post_handle** member of the verb control block (VCB). The event must be in the not-signaled state. When the asynchronous operation is complete, the application is notified through the signaling of the event. Upon signaling of the event, examine the primary return code and secondary return code for any error conditions.

- SLI

  Provides event notification for all Session Level Interface (SLI) verbs. The application must provide a handle to an event in the **lua_post_handle** member of the VCB. The event must be in the not-signaled state. When the asynchronous operation is complete, the application is notified through the signaling of the event. Upon signaling of the event, examine the primary return code and secondary return code for any error conditions.

- WinRUI

  Provides asynchronous notification for all Windows-based RUI verbs. When the asynchronous operation is complete, the application's window *hWnd* receives the message returned by **RegisterWindowMessage** with "WinRUI" as the input string. The *lParam* argument of the message contains the address of the VCB being posted as complete. The *wParam* argument of the message is undefined.

  An application must call WinRUIStartup for initialization before calling WinRUI.

- WinRUICleanup

  An application must call this function when finished using RUI verbs to deregister itself from the Windows LUA implementation. This function terminates and deregisters an application from a Windows LUA implementation.

- WinRUIStartup

  An application must call this function to register itself with a Windows LUA implementation before issuing any further Windows LUA calls using RUI verbs. This function allows an application to specify the version of Windows LUA required and to retrieve details of the specific LUA implementation.

- WinSLI

  Provides asynchronous notification for all Windows-based SLI verbs. When the asynchronous operation is complete, the application's window *hWnd* receives the message returned by **RegisterWindowMessage** with "WinSLI" as the input string. The *lParam* argument of the message contains the address of the VCB being posted as complete. The *wParam* argument of the message is undefined.

  An application must call WinSLIStartup for initialization before calling WinSLI.

- WinSLICleanup

  An application must call this function when finished using SLI verbs to deregister itself from the Windows LUA implementation. This function terminates and deregisters an application from a Windows LUA implementation.

- WinSLIStartup

  An application must call this function to register itself with a Windows LUA implementation before issuing any further Windows LUA calls using SLI verbs. This function allows an application to specify the version of Windows LUA required and to retrieve details of the specific LUA implementation.

Using LUA and Asynchronous Verb Completion

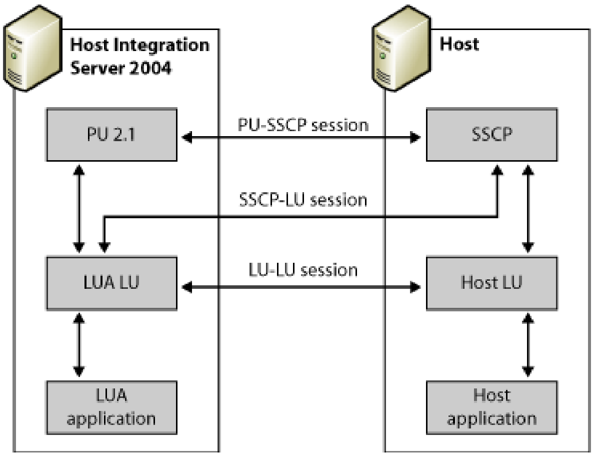
Host Integration Server permits one outstanding Windows SNA asynchronous call per connection and one blocking verb per thread. When the asynchronous verb completes, logical unit application (LUA) does the following for a Windows Server 2003 or Windows 2000 system.

Two types of notification are possible:

- The preferred type is the event method, in which the LUA application issues **WaitForSingleObject/WaitForMultipleObject**.
- The application can also post the "WinRUI"/"WinSLI" notification message to the window handle of the **WinRUI/WinSLI** message.

LUs and Sessions

The following figure shows the SNA components required for logical unit application (LUA) communications.



An LUA application uses a local LU, which uses Microsoft® Host Integration Server to communicate with the host system. There are three progressive sessions when Host Integration Server connects to the host node:

- The PU-SSCP session, between the Host Integration Server physical unit (PU) and the host's system services control point (SSCP). This is used mainly for diagnostic information. LUA communications require only the capabilities of PU 2.0. Host Integration Server provides these capabilities, plus the additional capabilities included in PU 2.1.
- The SSCP-LU session, between the LUA LU at the computer and the SSCP. This is used for controlling the LU.
- The LU-LU session, between the LUA LU at the computer and the host LU. This is used for data transfer between the computer and the host application.

LUA allows applications to send and receive data on the SSCP-LU session and on the LU-LU session. An LUA application can send data on this session using the common service verb TRANSFER_MS_DATA. LUA does not provide access to the PU-SSCP session.

The SSCP and LU sessions each provide two priorities of messages, normal and expedited. Expedited messages take precedence over other messages waiting to be transmitted on the same session. There are four different flows on which a message can be sent or received:

- SSCP session (expedited flow)
- LU session (expedited flow)
- SSCP session (normal flow)
- LU session (normal flow)

The LU session normal flow carries most of the data. The other flows are used only for control purposes.

> **Note** The implementation of LUA in Host Integration Server 2004 does not allow applications to send data on the SSCP expedited flow and does not return data to an application on this flow.

Configuring for LUA

The Microsoft® Host Integration Server 2004 configuration file, which is set up and maintained by the system administrator, contains information that is required for logical unit application (LUA) applications to communicate. An LUA LU is configured by the link service to use a connection to the host, and is given an LU number that matches that of an LU on the host.

The configuration can include LUA LU pools. A pool is a group of LUs with similar characteristics, and it enables an application to use any free LU from the pool. This feature can be used to allocate LUs on a first-come, first-served basis when there are more applications than LUs available, or to provide a choice of LUs on different connections.

The following communications components are configured for use with an LUA application.

Component	Description
Link service	A link service for communicating with the host. This component is normally configured by the setup program during Host Integration Server 2004 installation.
Connection	A connection to the host that uses the link service.
Local node	A local node that owns the connection. This component is configured automatically.
LUA LU	An LUA LU on the local node, configured to use the connection, with an LU number that matches an LU on the host.
LUA LU pool (optional)	If necessary, you can configure more than one LUA LU for the application, and group the LUs into a pool. This means that an application can specify the pool rather than a specific LU when issuing the RUI_INIT verb to start a session. Host Integration Server 2004 uses this name in one of the following ways: • If the name supplied is the name of an LU that is not in a pool, a session is assigned using that LU if it is available (that is, if it is not already in use by an LUA application). • If the name supplied is the name of an LU pool, or the name of any LU within the pool, a session is assigned using the first available LU in the pool (if one is available). Note that this may not be the LU whose name was specified by the RUI_INIT verb.

LUA Verb Summary

Logical unit application (LUA) application programs can establish and use SNA sessions with either the Request Unit Interface (RUI) application programming interface (API) or the Session Level Interface (SLI) API. If an LUA application establishes an SNA session using **RUI_INIT**, it cannot issue any SLI verbs for that session. Likewise, if an LUA application establishes an SNA session using **SLI_OPEN**, it cannot issue any RUI verbs for that session.

Following is a brief summary of each LUA verb or user-supplied routine. Each verb supplies parameters to LUA, which performs the desired function and returns parameters to the application:

RUI_BID
: Allows the application to determine when information from the host is available to be read.

RUI_INIT
: Sets up the SSCP-LU session for an LUA application.

RUI_PURGE
: Cancels an outstanding **RUI_READ**.

RUI_READ
: Receives data or status information sent from the host to the LUA application's LU, on either the SSCP session or the LU session.

RUI_TERM
: Ends the SSCP session for an LUA application. It also terminates the LU session if it is active.

RUI_WRITE
: Sends data to the host on either the SSCP session or the LU session.

SLI_BID
: Notifies the SLI application that a message is waiting to be read using **SLI_RECEIVE**. It also provides the current status of the session to the LUA application.

SLI_BIND_ROUTINE
: An optional, user-supplied exit routine that notifies the LUA application that a BIND request has come from the host. It allows the routine to examine the request and formulate a response.

SLI_CLOSE
: Ends a session opened with **SLI_OPEN**.

SLI_OPEN
: Transfers control of the specified LU to the LUA application. It establishes a session between the SSCP and the specified LU, as well as an LU-LU session.

SLI_PURGE
: Cancels **SLI_RECEIVE** verbs issued with a wait condition.

SLI_RECEIVE
: Receives responses, SNA commands, and data into the buffer of an LUA application. It also provides the current status of the session to the LUA application.

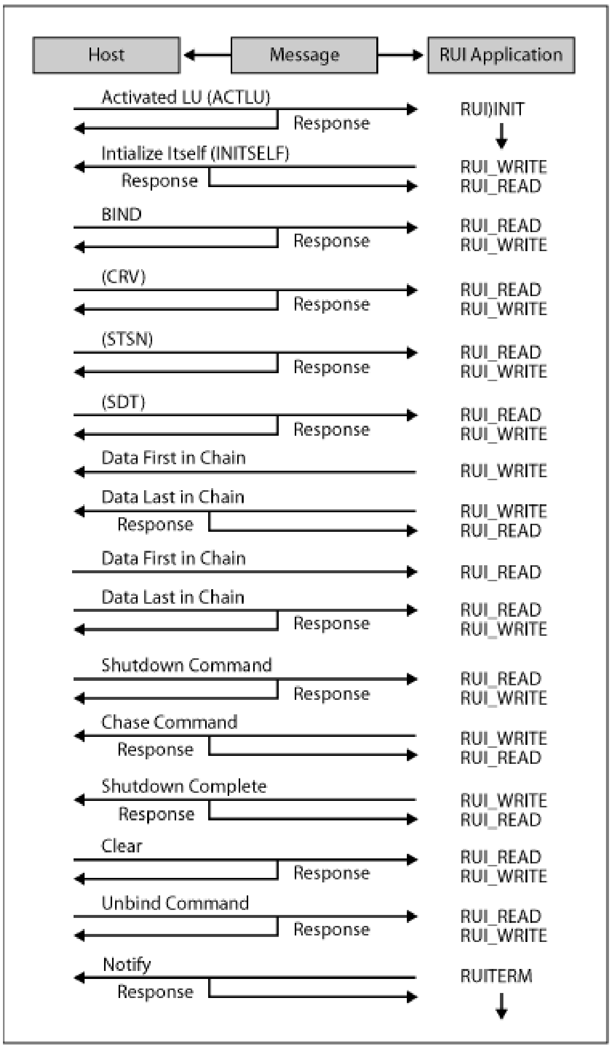
SLI_SEND
: Sends responses, SNA commands, and data from an LUA application to a host LU.

SLI_STSN_ROUTINE
: An optional, user-supplied exit routine that notifies the LUA application that a set and test sequence number (STSN) command has come from the host. It allows the routine to examine the request and formulate a response.

A Sample LUA Communication Sequence

This section illustrates how Request Unit Interface (RUI) and Session Level Interface (SLI) verbs are used for a logical unit application (LUA) communication sequence. The two figures illustrate the LUA verbs used to start a session, to exchange data, and to end the session, as well as the SNA messages sent and received. The arrows indicate the direction in which SNA messages flow.

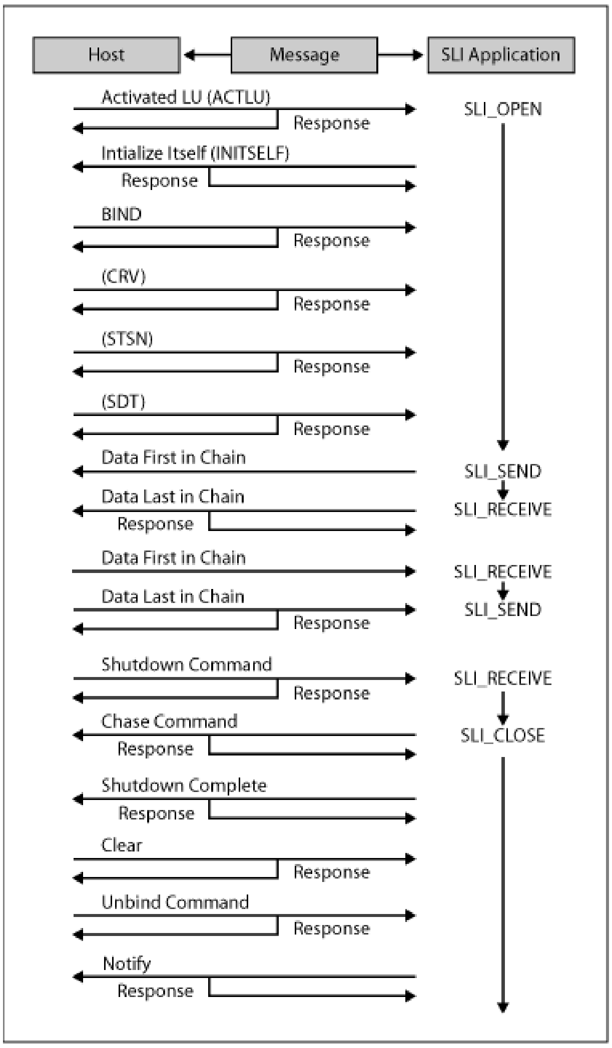
Communication Sequence Using RUI Verbs


Host
Message
RUI Application
Activated LU (ACTLU)
Response
RUI)INIT
Intialize Itself (INITSELF)
Response
RUI_WRITE
RUI_READ
BIND
Response
RUI_READ
RUI_WRITE
(CRV)
Response
RUI_READ
RUI_WRITE
(STSN)
Response
RUI_READ
RUI_WRITE
(SDT)
Response
RUI_READ
RUI_WRITE
Data First in Chain
RUI_WRITE
Data Last in Chain
Response
RUI_WRITE
RUI_READ
Data First in Chain
RUI_READ
Data Last in Chain
Response
RUI_READ
RUI_WRITE
Shutdown Command
Response
RUI_READ
RUI_WRITE
Chase Command
Response
RUI_WRITE
RUI_READ
Shutdown Complete
Response
RUI_WRITE
RUI_READ
Clear
Response
RUI_READ
RUI_WRITE
Unbind Command
Response
RUI_READ
RUI_WRITE
Notify
Response
RUITERM

In this example, the application performs the following tasks:

- Issues an RUI_INIT verb to establish the system services control point (SSCP) session. (**RUI_INIT** does not complete until the LUA application has received an ACTLU message from the host and sent a positive response. However, these messages are handled by Microsoft® Host Integration Server 2004 and are not exposed to the LUA application.)
- Sends an INITSELF message to the SSCP to request a BIND and reads the response.
- Reads a BIND message from the host and writes the response. This establishes the LU session.
- Reads an SDT message from the host, which indicates that initialization is complete and data transfer can begin.
- Sends a chain of data consisting of three request/response units (RUs) and reads the response. The last RU indicates that a definite response is required.
- Reads a chain of data consisting of three RUs and writes the response.
- Reads an UNBIND message from the host and writes the response. This terminates the LU session.
- Issues RUI_TERM to terminate the SSCP session. (Host Integration Server 2004 sends a NOTIFY message to the host and waits for a positive response. However, these messages are handled by Host Integration Server 2004 and are not exposed to the LUA application.)

Communication Sequence Using SLI Verbs


Host
Message
SLI Application
Activated LU (ACTLU)
Response
SLI_OPEN
Intialize Itself (INITSELF)
Response
BIND
Response
(CRV)
Response
(STSN)
Response
(SDT)
Response
Data First in Chain
SLI_SEND
Data Last in Chain
SLI_RECEIVE
Response
Data First in Chain
SLI_RECEIVE
Data Last in Chain
SLI_SEND
Response
Shutdown Command
SLI_RECEIVE
Response
Chase Command
SLI_CLOSE
Response
Shutdown Complete
Response
Clear
Response
Unbind Command
Response
Notify
Response

In the example shown here, the application performs the following tasks:

- Issues an SLI_OPEN verb to establish the SSCP session.
- Sends an INITSELF message to the SSCP to request a BIND and reads the response.
- Reads a BIND message from the host and writes the response. This establishes the LU session.
- Reads an SDT message from the host, which indicates that initialization is complete and data transfer can begin.

> **Note** INITSELF, BIND, and SDT messages are handled by Host Integration Server 2004 if the application is using SLI. The **SLI_OPEN** does not return until Host Integration Server 2004 has sent an SDT and response.

- Issues SLI_SEND and SLI_RECEIVE to transfer data, SNA commands, or SNA responses between the host and the application.
- Issues SLI_CLOSE to terminate the SSCP session. (Host Integration Server 2004 sends a NOTIFY message to the host and waits for a positive response. However, these messages are handled by Host Integration Server 2004 and are not exposed to the LUA application.)

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Writing LUA Applications

The information contained in this section will help you write logical unit application (LUA) application programs for use with Microsoft® Host Integration Server.

This section contains:

- Using LUA Verbs
- LUA VCB Format
- LUA Synchronous and Asynchronous Verb Completion
- Compiling and Linking an LUA Application
- Resetting LUA LUs
- Multiple Processes and Multiple Sessions Using LUA
- Programming Techniques for LUA Pools
- Writing Portable LUA Applications
- LUA System Considerations on Microsoft Windows Server 2003 or Windows 2000
- SNA Considerations Using LUA

Using LUA Verbs

This implementation of logical unit application (LUA) is available to applications written in Microsoft® C++® version 6.0 or later. Applications access all LUA functions on Microsoft Windows™ Server 2003 or Windows® 2000 Server by issuing verbs using the external C functions RUI, SLI, WinRUI, and WinSLI.

Symbolic constants are defined in the WINLUA.H header file for many parameter values. Refer to the WINLUA.H file (contained in the Microsoft Host Integration Server SDK) for a list of LUA constants.

You should use the symbolic constant and not the hexadecimal value when setting values for supplied parameters, or when testing values of returned parameters.

Parameters marked as reserved should always be set to zero.

This section contains:

- RUI and SLI Definitions
- Using an LUA Verb

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RUI and SLI Definitions

The definitions of the RUI and SLI functions are as follows:

```
void WINAPI RUI(struct LUA_VERB_RECORD FAR * verb);
void WINAPI SLI(struct LUA_VERB_RECORD FAR * verb);
int WINAPI WinRUI(HWND handle, struct LUA_VERB_RECORD FAR * verb);
int WINAPI WinSLI(HWND handle, struct LUA_VERB_RECORD FAR * verb);
```

The WINLUA.H header file supplied with your Host Integration Server SDK includes prototypes of these functions.

The only parameter passed to the **RUI** or **SLI** function is the address of a verb control block (VCB). The VCB is a structure made up of variables that:

- Identify the logical unit application (LUA) verb to be executed.
- Supply information used by the verb.
- Contain information returned by the verb when execution is complete.

The parameters passed to the WinRUI or WinSLI function are a window handle and the address of a VCB. The window handle is used for message notification when the issued verb has completed.

The VCB structure is declared in the WINLUA.H header file. For general VCB information, see LUA VCB Format. For verb-specific VCB information, see the reference documentation for each verb.

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Issuing an LUA Verb

The following procedure is required to issue a logical unit application (LUA) verb. In this example, the verb issued is RUI_INIT.

To issue an LUA verb

1. Create a variable for the verb control block (VCB) structure. For example:

   ```
   #include <winlua.h>
           .
           .
   struct LUA_VERB_RECORD rui_init;
   ```

2. The LUA_VERB_RECORD structure is declared in the WINLUA.H header file.
3. Clear (set to zero) the variables within the VCB:

   ```
   memset( &rui_init, 0, sizeof( rui_init) );
   ```

   LUA requires that all reserved parameters, and all parameters not required by the verb being issued, must be set to zero. The simplest way to do this is to set the entire VCB to zeros before setting the parameters required for this particular verb.

4. Assign values to the VCB parameters that supply information to LUA:

   ```
   rui_init.common.lua_verb = LUA_VERB_RUI;
   rui_init.common.lua_verb_length = sizeof(struct LUA_COMMON);
   rui_init.common.lua_opcode = LUA_OPCODE_RUI_INIT;
   memcpy (rui_init.common.lua_luname, "THISLU  ", 8);
   ```

   The values LUA_VERB_RUI and LUA_OPCODE_RUI_INIT are symbolic constants. These constants are defined in the WINLUA.H header file in the Host Integration Server SDK. To ensure portability between different systems, use symbolic constants and not integer values.

5. Invoke LUA. The only parameter is a pointer to the address of the structure containing the VCB for the desired verb.

   ```
   RUI( &rui_init );
   ```

6. Check the asynchronous flag (**rui_init.common.lua_flag2.async**) to determine whether the verb completed asynchronously. If events are being used and the verb did complete asynchronously, wait for the event to complete.

   ```
   if (rui_init.common.lua_flag2.async)
   {
   /* verb will complete asynchronously so continue
   with other processing */
   /* then wait */
   WaitForSingleObject (...)
   }
   ```

   Do not check the return code. It may have changed from LUA_IN_PROGRESS to LUA_OK by the time you check it.

7. Check the variables returned by LUA.

   ```
   if( rui_init.common.lua_prim_rc == LUA_OK )
   {
   /* Init OK */
           .
           .
   }
   else
   {
   ```

```
/* Do error routine */
        .
        .
}
```

LUA VCB Format

The logical unit application (LUA) verb control block (VCB) is called LUA_VERB_RECORD. It is a structure with two parts:

- A structure, LUA_COMMON, which is used for all the LUA verbs.
- A union, LUA_SPECIFIC, which is used only by RUI_BID, SLI_BID, SLI_OPEN, and SLI_SEND.

This section contains:

- LUA_VERB_RECORD
- LUA_COMMON
- LUA_SPECIFIC

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LUA_VERB_RECORD

The logical unit application (LUA) verb control block (VCB) structure is as follows:

```
typedef struct LUA_VERB_RECORD {
    struct LUA_COMMON common;
    union LUA_SPECIFIC specific;
} LUA_VERB_RECORD;
```

To access parameters in the common part of the VCB, you need to include the structure member name **common**. For example, when using a verb record structure named **Lua_Verb**, you access its **lua_prim_rc** member as **Lua_Verb.common.lua_prim_rc**.

To access parameters in the specific part of the VCB, you need to include the union member name **specific.** For example, when issuing RUI_BID using a verb record structure named **Lua_Verb**, you access its **lua_peek_data** member as **Lua_Verb.specific.lua_peek_data**.

For a complete listing of the structures and related values in the LUA VCB, see LUA Verb Control Blocks.

LUA_COMMON

The following structure lists the common data structure parameters used by all the logical unit application (LUA) verbs.

```
struct LUA_COMMON {
    unsigned short lua_verb;
    unsigned short lua_verb_length;
    unsigned short lua_prim_rc;
    unsigned long  lua_sec_rc;
    unsigned short lua_opcode;
    unsigned long  lua_correlator;
    unsigned char  lua_luname[8];
    unsigned short lua_extension_list_offset;
    unsigned short lua_cobol_offset;
    unsigned long  lua_sid;
    unsigned short lua_max_length;
    unsigned short lua_data_length;
    char FAR *     lua_data_ptr;
    unsigned long  lua_post_handle;
    struct LUA_TH  lua_th;
    struct LUA_RH  lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char  lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char  lua_resv56[7];
    unsigned char  lua_encr_decr_option;
} LUA_COMMON;
```

Members

lua_verb

Supplied parameter. Contains the verb code, LUA_VERB_RUI for Request Unit Interface (RUI) verbs or LUA_VERB_SLI for Session Level Interface (SLI) verbs. For both of these macros the value is 0x5200.

lua_verb_length

Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc

Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc

Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode

Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, for example, LUA_OPCODE_RUI_BID for the RUI_BID verb.

lua_correlator

Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname

Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_OPEN and RUI_INIT require this parameter. Other Windows LUA verbs only require this parameter if **lua_sid** is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset

Specifies the offset from the start of the VCB to the extension list of user-supplied dynamic-link libraries (DLLs). Not used by RUI in Host Integration Server and should be set to zero.

lua_cobol_offset

Offset of the COBOL extension. Not used by LUA in Host Integration Server and should be zero.

lua_sid

Supplied and returned parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length

Specifies the length of received buffer for RUI_READ and SLI_RECEIVE. For other RUI and SLI verbs, it is not used and should be set to zero.

lua_data_length

Returned parameter. Specifies the length of data returned in **lua_peek_data** for the RUI_BID verb.

lua_data_ptr

Pointer to the application-supplied buffer that contains the data to be sent for SLI_SEND and RUI_WRITE or that will receive data for **SLI_RECEIVE** and **RUI_READ**. For other RUI and SLI verbs, this parameter is not used and should be set to zero.

lua_post_handle

Supplied parameter. Used under Windows Server 2003 or Windows 2000 if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th

Returned parameter. Contains the SNA transmission header (TH) of the message sent or received. Various sub parameters are set for write functions and returned for read and bid functions.

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits.

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh

Returned parameter. Contains the SNA request/response header (RH) of the message sent or received. It is set for the write function and returned by the read and bid functions.

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

RU category, two bits.

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1
Supplied parameter. Contains a data structure containing flags for messages supplied by the application. This parameter is used by RUI_BID, RUI_READ, RUI_WRITE, SLI_BID, SLI_RECEIVE, and SLI_SEND. For other LUA verbs, this parameter is not used and should be set to zero.

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

SSCP expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

lua_message_type
Specifies the type of the inbound or outbound SNA commands and data. This is a returned parameter for RUI_INIT and SLI_OPEN and a supplied parameter for SLI_SEND. For other LUA verbs, this variable is not used and should be set to zero.

Possible values are:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIND

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_CLEAR

LUA_MESSAGE_TYPE_CRV

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RQR

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SHUTD

LUA_MESSAGE_TYPE_SIGNAL

LUA_MESSAGE_TYPE_SDT

LUA_MESSAGE_TYPE_STSN

LUA_MESSAGE_TYPE_UNBIND

The SLI receives and responds to the BIND, CRV, and STSN requests through the LUA interface extension routines.

LU_DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2
Returned parameter. Contains flags for messages returned by LUA. This parameter is returned by RUI_BID, RUI_READ, RUI_WRITE, SLI_BID, SLI_RECEIVE, and SLI_SEND. For other LUA verbs this parameter is not used and should be set to zero.

lua_flag2.bid_enable

Indicates that **RUI_BID** was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56
Supplied parameter. Reserved field used by SLI_OPEN and RUI_INIT. For all other LUA verbs, this parameter is reserved and should be set to zero.

lua_encr_decr_option

Field for cryptography options. On **RUI_INIT**, only the following are supported:

- **lua_encr_decr_option** = 0
- **lua_encr_decr_option** = 128

For all other LUA verbs, this parameter is reserved and should be set to zero.

LUA_SPECIFIC

The following union shows the specific data structure that is included for functions that use the **LUA_SPECIFIC** part of a verb control block. The only logical unit application (LUA) verbs that use this union are RUI_BID, SLI_BID, SLI_OPEN, and SLI_SEND.

```
union LUA_SPECIFIC {
    struct SLI_OPEN open;
    unsigned char lua_sequence_number[2];
    unsigned char lua_peek_data[12];
} LUA_SPECIFIC;
```

Members

open
The union member of **LUA_SPECIFIC** used by the **SLI_OPEN** verb.

lua_sequence_number
The union member of **LUA_SPECIFIC** used by the **SLI_SEND** verb. Returned parameter. Sequence number of the RU to the host.

lua_peek_data
The union member of **LUA_SPECIFIC** used by the **RUI_BID** and **SLI_BID** verbs. Returned parameter. Contains up to 12 bytes of the data waiting to be read.

LUA_SPECIFIC.SLI_OPEN

The following structure shows the **SLI_OPEN** fields of the **LUA SPECIFIC** union member for the SLI_OPEN verb.

```
struct SLI_OPEN {
    unsigned char lua_init_type;
    unsigned char lua_resv65;
    unsigned short lua_wait;
    struct LUA_EXT_ENTRY lua_open_extension[3];
    unsigned char lua_ending_delim;
} SLI_OPEN;
```

Members

lua_init_type
  Type of session initiation.
lua_resv65
  Reserved field.
lua_wait
  Secondary retry wait time.
lua_open_extension
  Supplied parameter. Specifies any user-supplied dynamic-link libraries (DLLs) used to process specific LUA messages.
lua_ending_delim
  Extension list delimiter.

LUA_EXT_ENTRY

The following structure shows the **LUA_EXT_ENTRY** fields of the LUA SPECIFIC.SLI_OPEN union member for the SLI_OPEN verb.

```
struct LUA_EXT_ENTRY {
     unsigned char lua_routine_type;
     unsigned char lua_module_name[9];
     unsigned char lua_procedure_name[33];
};
```

Members

lua_routine_type
Extension routine type.
lua_module_name
Extension DLL module name.
lua_procedure_name
Procedure name to call in the extension DLL module.

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LUA Synchronous and Asynchronous Verb Completion

Logical unit application (LUA) verbs can complete execution either synchronously or asynchronously.

Synchronous Verb Completion

When LUA is able to complete all the processing for a verb as soon as it is issued, the verb has completed synchronously. When this happens, the primary return code is set to a value other than LUA_IN_PROGRESS, and the **lua_flag2.async** bit is set to zero.

The value of the **lua_flag2.async** bit should be tested, not the primary return code being not equal to LUA_IN_PROGRESS. (For information about these returned parameters, see individual verb descriptions.)

Asynchronous Verb Completion

Some LUA verbs (for example, RUI_PURGE) complete quickly after local processing. However, most verbs take some time to complete because they require messages to be sent to and received from the local node or the host application.

When LUA must wait for information from the remote LU or from the local node before it can complete a verb, the verb completes asynchronously.

When this happens, the **lua_flag2.async** bit is set to 1. The primary return code is also normally set to LUA_IN_PROGRESS, but this value cannot be relied on. The value of the **lua_flag2.async** bit should be tested. The application can now perform other processing, or wait for notification from LUA that the verb has completed. LUA issues this notification by setting the primary return code to its final value and leaving **lua_flag2.async** set to 1.

When the verb completes, LUA does the following depending on your environment:

- For Windows Server 2003 or Windows 2000, two types of notification are possible. The LUA application either:

  Issues **WaitForSingleObject** or **WaitForMultipleObject**.

  —or—

  Posts the "WinRUI"/"WinSLI" notification message to the window handle of the **WinRUI**/**WinSLI** message.

  The event method using **WaitForSingleObject** or **WaitForMultipleObject** is the preferred way to receive asynchronous notification on Windows Server 2003 or Windows 2000.
- In the Windows environment, it notifies the completion of an asynchronous request by posting the "WinRUI"/"WinSLI" notification message to the window handle of the **WinRUI**/**WinSLI** message. A window handle has been added as the first parameter passed to the WinRUI and WinSLI entry points.

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Compiling and Linking an LUA Application

Use the following procedure to compile and link a logical unit application (LUA) application.

To compile and link an LUA application for use with Host Integration Server

- Update the path statement to include the directory containing the LUA application.
- Set any required environmental variables.
- Compile the application, including the WINLUA.H header file provided in the Host Integration Server SDK, to produce the .obj files.
- Link the application with the WINLUA.LIB library to produce an .exe file.

Resetting LUA LUs

Microsoft® Host Integration Server provides a facility for resetting logical unit application (LUA) LUs or forcing off LUA applications, which is useful if an application has become deadlocked or is looping.

The NetView command **deactivate-oldlu** can also be used to reset an LUA LU. These facilities interact with the LUA application as described in the following paragraphs.

When an LUA LU is reset through Host Integration Server or by using the **deactivate-oldlu** command, Host Integration Server sends an UNBIND message to the application (as though the host had issued it).

The UNBIND message sent to the application is 0x32 0x0E, indicating a recoverable LU failure, and is returned to the application on a subsequent RUI_READ. The LU session is terminated, but the system services control point (SSCP) session remains active. (The LU is returned to the same state as if RUI_INIT has just completed.)

Multiple Processes and Multiple Sessions Using LUA

Two processes cannot use the same logical unit application (LUA) session. Only the process that issues RUI_INIT can use the session that is started by the verb. Before another process can use LUA, it must issue **RUI_INIT** to obtain a new session. However, different threads of the same process can issue verbs for the same LUA session.

A single process can simultaneously use more than one LUA session by issuing multiple **RUI_INIT** verbs. Win32® processes support for up to 15,000 sessions for applications based on the Microsoft® Windows Server™ 2003 or Windows® 2000 Server. Each session must use a different LU. Two or more sessions can use the same pool, but the **lua_luname** member (which is either the name of the pool or the name of an LU within the pool) must be different for each **RUI_INIT**.

Two or more instances of the same LUA application can run as different processes, but they must use different LUs. This can be done by using LU pools. The two processes can specify the same pool, but are allocated different LUs from that pool.

Programming Techniques for LUA Pools

When working with a logical unit application (LUA) LU pool, specify the pool name at the beginning of the conversation and then use the **lua_sid** member (not the pool name) with subsequent calls. This is necessary because the **lua_sid** member is a unique identifier, but the pool name is not, because a pool is designed to supply LUs for multiple conversations.

When using RUI_INIT or SLI_OPEN with an LUA pool, specify the pool name with the **lua_luname** member. For subsequent calls in the same conversation, use the **lua_sid** member returned from **RUI_INIT** or **SLI_OPEN** to specify the conversation.

> **Note** On completion of RUI_INIT or SLI_OPEN, the lua_luname member contains the actual name of the LU used. This allows you to create code for a display for the user, showing the actual LU name used in a particular conversation.

Writing Portable LUA Applications

Use the following guidelines for writing logical unit application (LUA) applications that are portable to other environments:

- Use the symbolic constant names for parameter values and return codes, and not the numeric values shown in the WINLUA.H file. (For more information, see the WINLUA.H file in the Microsoft® Host Integration Server SDK.)
- When accessing SNA sense codes in a data buffer, use the symbolic constants rather than the numeric values. This ensures that the byte storage order is correct for your particular system. You should use **memcpy** to set the values, and **memcmp** to test them. For example:

```
memcpy (this_verb.common.lua_data_ptr, LUA_INCORRECT_REQ_CODE, 4);
if (memcmp (this_verb.common.lua_data_ptr,
LUA_INCORRECT_REQ_CODE, 4) == 0)
{
.....
}
```

- Ensure that any parameters shown as reserved are set to zero.
- Set the **lua_verb_length** parameter as described in the verb description.

LUA System Considerations on Microsoft Windows Server 2003 or Windows 2000

This section provides specific information about developing logical unit application (LUA) applications for the following operating systems.

This section contains:

- LUA Considerations on Microsoft Windows Server 2003 or Windows 2000

LUA Considerations on Microsoft Windows Server 2003 or Windows 2000

This topic summarizes information for developing Win32® logical unit application (LUA) applications for Microsoft® Windows™ Server 2003 or Windows® 2000 Server.

Byte ordering

The values of constants defined in the WINLUA.H file are dependent on the byte ordering of the hardware used. Macros are used to set the constants to the correct value.

Currently, the include files in Windows Server 2003 or Windows 2000 to indicate the hardware. These same macros are used by Microsoft® Host Integration Server 2004, along with the Win32 macro, to indicate the byte ordering needs. The macros must be defined in the application or on the command line when building the application.

For example, the primary return code of LUA_PARAMETER_CHECK is defined to have a value of 0x0001. Depending on the environment, the constant LUA_PARAMETER_CHECK may or may not be 0x0001. Some formats define the value as it appears in memory. Others define it as a 2-byte variable. Because it cannot be assumed that an application will always use provided constants rather than hardwired values, a macro can be defined to swap the bytes. The following example shows how the macro can be used:

```
#define LUA_PARAMETER_CHECK LUA_FLIPI (0X0001)
```

Events

To receive data asynchronously, an event handle is passed in the semaphore field of the verb control block (VCB). This event must be in the non-signaled state when passed to LUA, and the handle must have EVENT_MODIFY_STATE access to the event.

Library names

To support the coexistence of Win16 and Win32 API libraries on the same computer, the Win32 dynamic-link library (DLL) names were changed from the names used by Win16 API libraries. Win32 stub DLL libraries using the old names are supplied with Host Integration Server 2004 so that older applications will still run, although these platforms are no longer supported.

Old DLL names	New DLL names
WINRUI.DLL	WINRUI32.DLL
WINSLI.DLL	WINSLI32.DLL

The new DLL names should be used for all new applications intended to run on Host Integration Server 2004.

Load-time linking

To be dynamically linked to LUA at load time, you must do one of the following at link time:

- Insert the following **IMPORTS** statements in the definition (.def) file used to link the application:

  (For RUI)

  ```
  IMPORTS WINRUI.RUI
  IMPORTS WINRUI WinRUI
  IMPORTS WINRUI.WinRUIStartup
  IMPORTS WINRUI.WinRUICleanup
  ```

  (For SLI)

  ```
  IMPORTS WINSLI.SLI
  IMPORTS WINSLI.WinSLI
  IMPORTS WINSLI.WinSLIStartup
  IMPORTS WINSLI.WinSLICleanup
  ```

- Link the application to WINRUI.LIB (for RUI) or WINSLI.LIB (for SLI), which contain the entry-point linkage information.

Multiple threads

An LUA application can have multiple threads that issue verbs. LUA for the Win32 system makes provisions for multithreading processes on Windows Server 2003 or Windows 2000. A process contains one or more threads of execution. All references to threads refer to actual threads in a multithreaded Windows Server 2003 or Windows 2000.

Packing

For performance considerations, the VCBs are not packed. VCB structure member elements after the first element are aligned on either the size of the member type or DWORD boundaries, whichever is smaller. As a result, DWORDs are aligned on DWORD boundaries, WORDs are aligned on WORD boundaries, and BYTEs are aligned on BYTE boundaries. This means, for example, that there is a 2-byte gap between the primary and secondary return codes. Therefore, the elements in a VCB should only be accessed using the structures provided.

This option for structure and union member alignment is the default behavior for Microsoft C/C++ compilers. For compatibility with the supplied LUA libraries, make sure to use an equivalent structure and union member packing option when using other C/C++ compilers or when explicitly specifying a structure alignment option when using Microsoft compilers.

Registering and deregistering applications

All LUA applications for the Windows Server 2003 or Windows 2000 system must call the Windows SNA extension WinRUIStartup or WinSLIStartup at the beginning of the session to register the application and WinRUICleanup or WinSLICleanup at the end of the session to deregister the application.

Restrictions on 3270-style LUs

A Windows Server 2003 or Windows 2000 process cannot access 3270-style LUs from both the function management interface (FMI) and LUA APIs at the same time. However, the process can use the LUA APIs to access LUA LUs while using FMI APIs to access 3270-style LUs.

Run-time linking

For an application to be dynamically linked to LUA at run time, it must issue the following calls:

- **LoadLibrary** to load the specified library module for Windows LUA. That is, WINRUI32.DLL (for RUI), and WINSLI32.DLL (for SLI).
- **GetProcAddress** to retrieve the address of the LUA function entry points exported by the DLL. For RUI, the function entry points are RUI, WinRUI, WinRUIStartup, and WinRUICleanup. For SLI, the function entry points are SLI, WinSLI, WinSLIStartup, and WinSLICleanup.

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SNA Considerations Using LUA

This section explains SNA information you need to consider when writing logical unit application (LUA) applications.

BIND checking

During initialization of the LU session, the host sends to the LUA application a BIND message that contains information such as request/response unit (RU) sizes for use by the LU session. Microsoft® Host Integration Server returns this message to the LUA application on RUI_READ. The LUA application must verify that the parameters specified on the BIND are suitable. The application has the following options:

- It can accept the BIND as it is, by issuing RUI_WRITE containing an OK response to the BIND. No additional BIND data can be sent on the response.
- It can try to negotiate one or more BIND parameters. (This is only permitted if the BIND is negotiable.) To do this, the application issues **RUI_WRITE** containing an OK response, but including the modified BIND as data.
- It can reject the BIND by issuing **RUI_WRITE** containing a negative response, using an appropriate SNA sense code as data.

  Validating the BIND parameters and ensuring that all messages sent are consistent with them is the responsibility of the LUA application. However, the following two restrictions apply:

- Host Integration Server rejects any **RUI_WRITE** that specifies an RU length greater than the size specified on the BIND.
- Host Integration Server requires the BIND to specify that the secondary LU is the contention winner and that error recovery is the responsibility of the contention loser.

> **Note** For SLI, an application must specify that it will use SLI_BIND_ROUTINE on the SLI_OPEN if it will do any BIND checking.

Courtesy acknowledgments

Host Integration Server keeps a record of requests received from the host to correlate any response sent by the application with the appropriate request. When the application sends a response, Host Integration Server correlates the response with the data from the original request, and can then free the storage associated with it.

If the host specifies exception response only (a negative response can be sent but a positive response should not be sent), Host Integration Server must still keep a record of the request in case the application subsequently sends a negative response. If the application does not send a response, the storage associated with this request cannot be freed.

Because of this, Host Integration Server enables the LUA application to issue a positive response to an exception-response-only request from the host. (This is known as a courtesy acknowledgment.) The response is not sent to the host, but is used by LUA to clear the storage associated with the request.

> **Note** The application does not need to send a courtesy acknowledgment for each exception-response-only request. For efficiency, the application can respond less frequently. The node treats a courtesy acknowledgment as an implicit acknowledgment for all prior pending requests.

Distinguishing SNA sense codes from other secondary return codes

A secondary return code that is not a sense code always contains a value of zero in its first two bytes.

An SNA sense code always contains a nonzero value in its first two bytes. The first byte gives the sense code category and the second identifies a particular sense code within that category. (The third and fourth bytes can contain additional information or can be zero.)

Information on SNA sense codes

If you need information about a returned sense code, see

- Status-Error Message
- Error and Sense Codes

Negative responses and SNA sense codes

SNA sense codes can be returned to an LUA application in the following cases:

- When the host sends a negative response to a request from the LUA application, it includes an SNA sense code indicating the reason for the negative response. This is reported to the application on a subsequent RUI_READ or SLI_RECEIVE with the following information.

Sense code	Description
Primary return code	LUA_OK.
Request/response indicator, response type indicator, and sense data included indicator	All set to 1, indicating a negative response that includes sense data.
Data returned	The SNA sense code.

- When Host Integration Server receives invalid data from the host, it generally sends a negative response to the host and does not pass the invalid data to the LUA application. This is reported to the application on a subsequent RUI_READ, SLI_RECEIVE, RUI_BID, or SLI_BID with the following information:

Sense code	Description
Primary return code	LUA_NEGATIVE_RESPONSE.
Secondary return code	The SNA sense code sent to the host.

- In some cases, Host Integration Server detects that data supplied by the host is invalid, but cannot determine the correct sense code to send. In this case, it passes the invalid data in an exception request (EXR) to the LUA application on RUI_READ or SLI_RECEIVE with the following information.

Sense code	Description
Request/response indicator	Set to 0, indicating a request.
Sense data included indicator	Set to 1, indicating that sense data is included. (This indicator is normally used only for a response.)
Message data	A suggested SNA sense code.

  The application must then send a negative response to the message. It can use the sense code suggested by Host Integration Server, or it can alter the sense code.

- Host Integration Server can send a sense code to the application to indicate that data supplied by the application was invalid. This is reported to the application on RUI_WRITE or SLI_SEND with the following information.

Sense code	Description
Primary return code	LUA_UNSUCCESSFUL.
Secondary return code	SNA sense code.

  The sense codes that can be returned as secondary return codes on LUA verbs are listed in the WINLUA.H header file. For this file, see the Host Integration Server or SNA SDK.

Pacing

Pacing is handled by the LUA interface. An LUA application does not need to control pacing and should never set the pacing indicator flag.

If pacing is being used on data sent from the LUA application to the host (determined by the BIND), RUI_WRITE or SLI_SEND may take some time to complete. This is because LUA has to wait for a pacing response from the host before it can send more data.

If an LUA application transfers large quantities of data in one direction, either to the host or from the host (for example, a file transfer application), the host configuration should specify that pacing is used in that direction. This ensures that the node receiving the data is not flooded with data and does not run out of data storage.

Purging data to end of chain

When the host sends a chain of request units to an LUA application, the application can wait until the last RU in the chain is received before sending a response, or it can send a negative response to an RU that is not the last in the chain. If a negative response is sent mid-chain, LUA purges all subsequent RUs from this chain and does not send them to the application.

When LUA receives the last RU in the chain, it indicates this to the application by setting the primary return code of RUI_READ or RUI_BID to LUA_NEGATIVE_RESPONSE with a zero secondary return code.

Note The host can terminate the chain by sending a message such as CANCEL while in mid-chain. In this case, the CANCEL message is returned to the application on RUI_READ. The LUA_NEGATIVE_RESPONSE return code is not used.

Segmentation

Segmentation of RUs is handled by the LUA interface. LUA always passes complete RUs to the application, and the application should pass complete RUs to LUA.

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Support for LUA Single Sign-On

This section describes the logical unit application (LUA) support for Single Sign-On using 3270 display sessions that is available in Microsoft® Host Integration Server 2004.

Over 3270 LUs, a Single Sign-On feature for LUA applications is supported to automate the overall logon process. When configured for this feature, Host Integration Server 2004 automatically replaces special keywords in the data stream with the actual host user name and password at appropriate points in the session.

> **Note** Single Sign-On is not supported over LUA logical units (LUs).

To open 3270 LUs from an LUA application using Request Unit Interface (RUI), the **lua_resv56[1]** field must be set to a nonzero value when this verb control block (VCB) is passed to RUI_INIT. To open 3270 LUs from an LUA application using a Session Level Interface (SLI), the **lua_resv56[2]** field must be set to a nonzero value when this VCB is passed to SLI_OPEN. For details, see the reference sections in RUI_INIT and SLI_OPEN.

This section contains:

- Prerequisites for LUA Single Sign-On
- Registry Settings Used for LUA Single Sign-On
- LUA User Name and Password Replacement

Prerequisites for LUA Single Sign-On

In preparation for using Single Sign-On over 3270 logical units (LUs), the system administrator must define a host security domain containing host connections. This host security domain must be initially created or modified to enable the Single Sign-On feature. The system administrator must enable a user's Microsoft® Windows Server™ 2003 or Windows® 2000 Server account in the host security domain and either the administrator or the user must establish a mapped host account for the Windows Server 2003 or Windows 2000 domain user name.

The user must be logged on to a Windows Server 2003 or Windows 2000 domain with a user name and password. Note that this Single Sign-On feature is only supported over 3270 LUs.

Registry Settings Used for LUA Single Sign-On

The logical unit application (LUA) Single Sign-On feature depends on Host Integration Server 2004 scanning 3270 logical units (LUs) used in the logon process for special keywords that are defined in the registry on the computer running Host Integration Server 2004. The values for these special keywords can be defined by the system administrator on the computer running Host Integration Server 2004.

The registry settings used by the LUA Single Sign-On process are located under the **HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services** registry node. Installed under the **SNASERVR\PARAMETERS** subkey are the following entries:

3270SSOPadByte

This entry should be set to an ASCIIZ string to use as the character for padding replacement text in the user name or password if these strings are shorter than the length of the special tag strings. The default value for this pad character is the ASCII space character.

3270SSOPostReplaceCount

This entry should be set to a DWORD that represents the number of message chains of request/response units (RUs) to scan after replacement of text for user name or password. The default value for this number is 10.

3270SSOPrefix

This entry should be set to an ASCIIZ string to use as the special prefix tag string in combination with the user name and password tags. The default value of this string is MS$.

3270SSOPwdTag

This entry should be set to an ASCIIZ string to use as the special tag string in combination with the **3270SSOPrefix** tag in defining the special host password string that will be replaced. The default value of this string is SAMEP, so the default host password string that is scanned for and replaced is MS$SAMEP. Note that length of the password string that is scanned for (MS$SAMEP, for example) determines the maximum length of the password string that can sent to the host using Single Sign-On. This limit occurs because the password substitution cannot change the length of the data message.

Note that the value of this string must be different from the value of the **3270SSOUserTag** entry for Single Sign-On to function properly.

3270SSOReplaceCount

A DWORD value that affects the time-out value for password substitution. User IDs and passwords will be substituted in each chain on the LU-SSCP and PLU-SLU sessions until the timer expires. By default the timer will be set to 30 seconds, but this behavior can be reconfigured in the registry using the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries. The timer is started when the OPEN SSCP is received by the node.

If the **3270SSOReplaceCount** registry entry is defined and the **3270SSOReplaceTimer** registry entry is not defined, the node counts this number of RUs (on PLU-SLU session only) before time-out occurs. If both the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries are defined, the value for **3270SSOReplaceCount** will be used to determine when a time-out will occur. By default, this key is not defined, and the node defaults to a time-out of 30 seconds.

3270SSOReplaceTimer

A DWORD value that affects the time-out value for password substitution. User IDs and passwords will be substituted in each chain on the LU-SSCP and PLU-SLU sessions until the timer expires. By default the timer will be set to 30 seconds, but this behavior can be reconfigured in the registry using the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries. The timer is started when the OPEN SSCP is received by the node.

If the **3270SSOReplaceTimer** registry entry is defined and **3270SSOReplaceCount** is not defined, the node uses this value in seconds before time-out occurs. If both the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries are defined, the value for **3270SSOReplaceCount** will be used to determine when a time-out will occur. By default, this key is not defined and the node defaults to a time-out of 30 seconds.

3270SSOUserTag

This entry should be set to an ASCIIZ string to use as the special tag string in combination with the **3270SSOPrefix** tag in defining the special user name string that will be replaced. The default value of this string is SAMEU, so the default user name string that is scanned for and replaced is MS$SAMEU. Note that length of the user name string that is scanned for (MS$SAMEU, for example) determines the maximum length of the user name string that can sent to the host using Single Sign-On. This limit occurs because the user name substitution cannot change the length of the data message.

Note that the value of this string must be different from the value of the **3270SSOPwdTag** entry for Single Sign-On to function properly.

LUA User Name and Password Replacement

The SNA node on the host monitors the inbound session for a replacement sequence consisting of the **3270SSOPrefix** string immediately followed by one of the strings **3270SSOUserTag** or **3270SSOPwdTag**. Thus, the default user name string that would be scanned for and replaced is MS$SAMEU. When this string is found in the inbound session data, the node looks up the corresponding information (host user name in the current host security domain) and overwrites MS$SAMEU with this information. The same process occurs for the password string that would be scanned for and replaced, which defaults to MS$SAMEP.

Note that this operation cannot change the length of the data message. If the actual user name or password that is retrieved from the current host security domain is shorter than the replacement sequence, it is padded out with the first character of the **3270SSOPadByte** string used as a padding character. If the actual host user name or password string is longer than the string that is scanned for, these strings are truncated to the length of the scanned string so that the data message length is not affected.

Note that because the user name and password can be sent in any order, the registry string values for the **3270SSOUserTag** and **3270SSOPwdTag** entries must be different for Single Sign-On to function properly.

The SNA node monitors the SSCP-LU session for these special tag strings at all times and replaces all occurrences of these strings with corresponding looked-up data. On the LU-LU session, the node starts monitoring at start of session (BIND). The node stops monitoring when it has received **3270SSOPostReplaceCount** chains of request/response units (RUs) without seeing a substitution tag. The node will not restart monitoring until it receives an UNBIND–BIND sequence for that session.

Note that the node considers the sequence:

```
BIND, data, UNBIND(BIND FORTHCOMING), BIND …
```

as a continuation of the same LU-LU session and does not restart monitoring on receipt of the second BIND. This sequence is often used by host session managers handing off a session to an application subsystem, and is considered a single terminal session.

User IDs and passwords will be substituted in each chain on the LU-SSCP and PLU-SLU sessions until the node has received **3270SSOPostReplaceCount** chains of RUs without seeing a substitution tag or a timer expires. By default the timer is set to 30 seconds, but this behavior can be reconfigured in the registry using the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries. The timer is started when the OPEN SSCP is received by the node. After the timer expires, the node will stop scanning messages for the 3270 replacements strings for the user ID and password. If the replacement strings arrive after the timer expires, the replacement strings will be sent to the host unmodified causing the sign-on to fail. The application will not receive any notification that the timer has expired. The only indication of a problem will likely be that the sign-on to the host session has failed.

> **Note** All strings are specified in the registry in ASCII, but the node translates them to EBCDIC through AE character mapping before scanning for a match.

3270 Emulator Programmer's Guide

This section provides information for independent software vendors who are developing their own 3270 Emulator client software to work with Microsoft® Host Integration Server 2004 or Microsoft SNA Server.

To use this section of the guide effectively, you should be familiar with:

- Host Integration Server 2004
- Microsoft Windows Server™ 2003 or Windows® 2000
- System Network Architecture (SNA) concepts

Operating systems support for 3270 development

Microsoft Host Integration Server 2004 supports the development of 3270 client applications for Windows Server 2003, Windows XP, and Windows 2000.

Network operating systems support for 3270 development

Microsoft Host Integration Server 2004 supports the following network operating systems:

- Native TCP/IP
- Novell NetWare

For API references and other technical information about the 3270 Emulator, see the 3270 Emulator Programmer's Reference section of the SDK.

This section contains:

- Host Integration Server Concepts for 3270 Client Access
- DL-BASE/DMOD Interface
- Function Management Interface
- FMI Status, Error, and Sense Codes
- Configuration Information
- Compiling and Linking 3270 Client Applications
- Support for 3270 Single Sign-On

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Host Integration Server Concepts for 3270 Client Access

This section describes some key concepts used in Microsoft® Host Integration Server 2004 when providing 3270 client access. The purpose of this section is to provide information that enables independent software vendors to integrate their 3270 emulators with Host Integration Server. Only the relevant parts of the Host Integration Server 2004 architecture are described.

This section contains:

- Structure of 3270 Client Access Components
- Messages
- LPI Connections

Structure of 3270 Client Access Components

The components of Microsoft® Host Integration Server 2004 that apply to 3270 client access are:

- Local nodes
- Link services
- 3270 emulation program

This section introduces the structure of these components and explains specialized terms.

This section contains:

- Role of the Base
- Localities and DMODs
- Application Localities
- Partners

Role of the Base

The Base is a part of each Host Integration Server gateway component, such as the local 2.1 node or a link service that provides the operating environment for the core functions of that component. It passes messages between components and provides functions common to all components, such as diagnostic tracing.

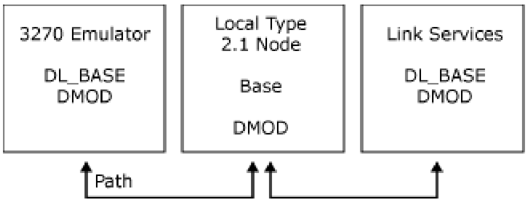
The Base type used with Host Integration Server 3270 emulation programs is DL-BASE. The Host Integration Server DL-BASE supports a single Host Integration Server component or a single user application, and has entry points for initialization, sending messages, receiving messages, and termination.

Localities and DMODs

A Base and the components within it are called a locality. The Host Integration Server system consists of one or more communicating localities, all running Host Integration Server executable programs within the local area network (LAN) Manager domain. For each Host Integration Server system, there is a single configuration file.

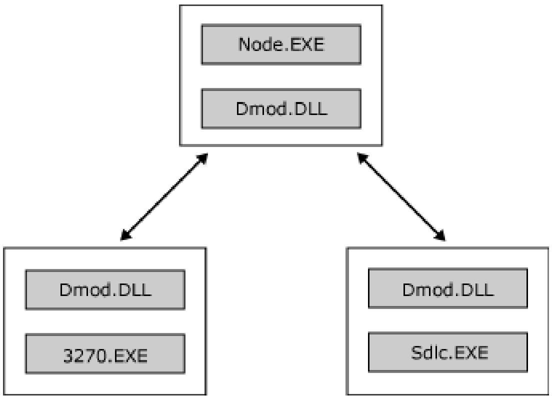
In a system such as Host Integration Server 2004, where the number of localities and their types are not configured in advance, the relationships between the localities are set up dynamically. Localities that can enter and leave a system in this way are called dynamic localities. Dynamic localities can enter or leave the system at any time.

Dynamic localities communicate using the Dynamic Access Module (DMOD) component, which provides the communications facilities needed to pass messages between the Bases. The following figure shows a system consisting of three dynamic localities.



This figure shows a system consisting of three dynamic localities. Dynamic localities can enter or leave this system at any time.

The DMOD is implemented as a dynamic-link library (DLL). The preceding figure can therefore be represented as follows.



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Application Localities

Applications such as 3270 emulators can enter dynamically into an SNA server system. The application, in conjunction with the Base, acts as a whole locality and communicates with the other localities in the system using a Dynamic Access Module (DMOD).

The topic DL-BASE/DMOD Interface describes the interface to the Base and the DMOD that enables an application to participate in an SNA server system.

Partners

For Host Integration Server components and applications to communicate with each other, it must be possible to identify a partner within a locality. A partner is an addressable component of a locality; that is, code to which messages can be sent. In a Host Integration Server system, there is generally only one partner within a locality (such as a link service or the 3270 emulation program). However, separate functions within the local 2.1 node (such as the 3270 and APPC functions) can be considered to be separate partners.

Messages

Messages are used to pass data between partners in Microsoft® Host Integration Server 2004. This section provides information about message formats.

This section contains:

- Overview of Message Formats
- Buffer Header Format
- Buffer Element Format

Overview of Message Formats

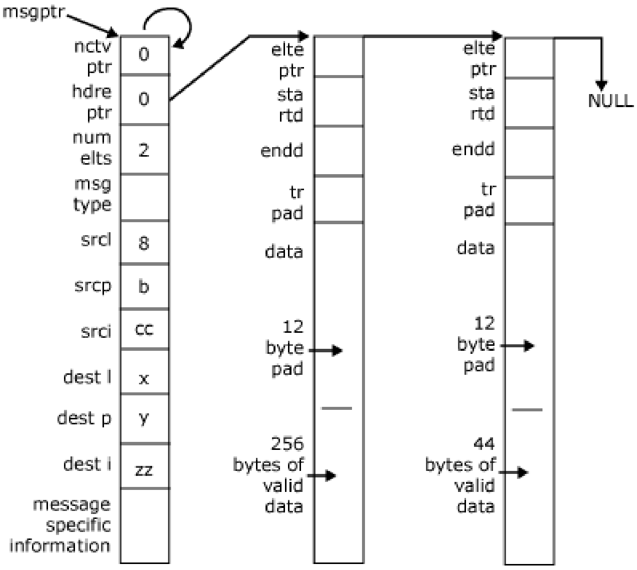
A message always contains fixed-format header information such as a message type and addressing information. It can also contain other header information specific to a particular message type (such as the message subtype) and an indefinite amount of extra data.

Messages are saved in buffers that consist of one header and zero or more elements:

- The header contains the fixed-format information and a pointer to an element. (This pointer is NULL if there are no elements associated with the message.)
- An element contains any extra data for a message and a pointer to another element if the data continues into another element.

Buffer headers and elements are regarded as contiguous (8-bit) byte sequences. Messages of any length can be built by chaining sufficient elements to a header.

The following figure shows a typical message with two elements.


msgptr
nctv ptr
0
hdre ptr
0
num elts
2
msg type
srcl
8
srcp
b
srci
cc
dest l
x
dest p
y
dest i
zz
message specific information
elte ptr
sta rtd
endd
tr pad
data
12 byte pad
256 bytes of valid data
elte ptr
sta rtd
endd
tr pad
data
12 byte pad
44 bytes of valid data
NULL

Buffer Header Format

The following table lists the common fields that always occur at the start of a buffer header. These are followed by further fields specific to the particular message. For details about individual message formats, see FMI Message Formats.

Field	Type	Description
nxtqptr	PTRBFHDR	When the buffer is in a queue, this field points to the header of the next buffer in the queue (NULL if it is the last buffer in the queue). When the buffer is not in a queue, this field points to itself. The SNA server buffer management routines use this field to check for buffer corruption.
hdreptr	PTRBFELT	Pointer to the first buffer element in the associated chain of buffer elements. NULL if the message consists only of a buffer header.
numelts	CHAR	Number of buffer elements chained from the header. Zero if the message consists only of a buffer header.
msgtype	CHAR	Message type. For details, see individual message descriptions in FMI Message Formats.
srcl	CHAR	Source locality. For details, see LPI Addresses.
srcp	CHAR	Source partner. For details, see LPI Addresses.
srci	INTEGER	Source index. For details, see LPI Addresses.
destl	CHAR	Destination locality. For details, see LPI Addresses.
destp	CHAR	Destination partner. For details, see LPI Addresses.
desti	INTEGER	Destination index. For details, see LPI Addresses.

> **Note** Fields that occupy two bytes, such as **opresid** in Open(PLU) Request are normally represented with the arithmetically most significant byte in the lowest byte address, irrespective of the normal orientation used by the processor on which the software executes. That is, the 2-byte value 0x1234 has the byte 0x12 in the lowest byte address. However, the following fields are exceptions:

- The **srci** and **desti** fields in buffer headers are stored in the local format of the application that assigns them (only the assigning application needs to interpret these values).
- The **startd** and **endd** fields in elements are always stored in low-byte, high-byte orientation (the normal orientation of an Intel processor).

Buffer Element Format

The following table lists the common fields that always occur at the start of a buffer element. The **dataru** field contains information specific to the particular message. For details about individual message formats, see FMI Message Formats.

Field	Type	Description
hdreptr->elteptr	PTRBFELT	Pointer to next buffer element in the chain. NULL if this element is the last or only element in the chain.
hdreptr->startd	INTEGER	Start of valid data in this element. The index into **dataru** of the first byte of valid data.
hdreptr->endd	INTEGER	End of valid data in this element. The index into **dataru** of the last byte of valid data.
hdreptr->trpad	CHAR	Pad byte (reserved).
hdreptr->dataru	CHAR[268]	An array of characters that contains the data for this element. Note that the valid data might not occupy the whole of the element. The **startd** and **endd** fields give the indexes into this array of the start and end of the valid data.

Use the following information to help you interpret the message formats:

- Certain messages are shown as having two elements in the message formats. For example, the Open(PLU) Request has the **CICB** field in the first element and the **BIND RU** in the second element. This indicates that the message consists of two distinct linked element chains. The **elteptr** field in the first element points to the second element.
- Fields that occupy two bytes are represented with the arithmetically most significant byte in the lowest byte address, irrespective of the normal orientation used by the processor on which the software executes. That is, the 2-byte value 0x1234 has the byte 0x12 in the lowest byte address. The exceptions to this are the **startd** and **endd** fields in elements, which are always stored in low-byte, high-byte orientation (the normal orientation of an Intel processor).
- The offsets indicated by the **startd** and **endd** fields are expressed in terms of the first byte of **dataru** being offset 1. The first byte of valid data is at **dataru[startd–1]**. For example, if **startd** is 11 and **endd** is 18, **dataru** begins with 10 bytes that are not valid data, followed by 8 bytes of valid data.
- It is possible for an element to arrive with **startd** greater than **endd**. This indicates there is no valid data in **dataru**.

In the sample message format shown in Overview of Message Formats, each element has a **startd** of 13, indicating 12 bytes of padding before the start of the valid data. This leaves room for 256 bytes of data, and so the element data (300 bytes long in this example) requires two elements.

LPI Connections

Partners communicate by passing messages to each other. If two partners want to communicate with each other, a locality partner index (LPI) connection is set up between the two partners. Messages then flow between the partners over this connection. The term LPI connection is explained in LPI Addresses. Note that this is not related to the Microsoft® Host Integration Server concept of a connection between the local node and a remote system.

This section contains:

- Paths and DMODs
- LPI Addresses
- Making Connections

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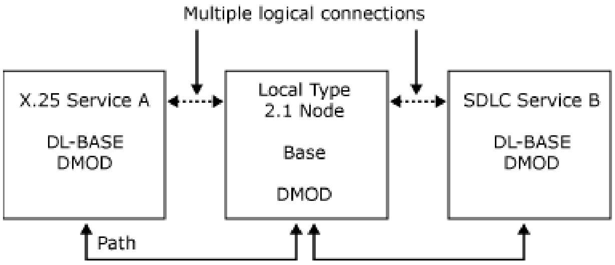
Paths and DMODs

Dynamic Access Modules (DMODs) are responsible for the communication between localities. When the DMODs in two localities can successfully pass messages between them, a path exists between the two localities. A path must exist between two localities before a connection can exist between partners in those localities.

Host Integration Server establishes a path using an appropriate method for the network operating system in use. For example, with Microsoft LAN Manager, a named pipe is used. With NetWare, an SPX connection is used. When the two localities are on the same computer, a local pipe is used. This is implemented using shared buffers to increase performance, but is used by the application in exactly the same way as communication with a remote locality.

The DMOD provides communication between dynamic localities and provides guaranteed in-order delivery of messages flowing over paths between localities. If the DMOD loses its path to another locality, it informs the Base.

The following figure illustrates the paths and connections between an SNA services local node and two 3270 emulation programs. Program A has two connections to the local node (one for each of two sessions). Program B has one connection to the local node.



LPI Addresses

An LPI address is used to identify each end of a connection. It has three components: locality (L), partner (P), and index (I), as described in the following list:

- **Locality** is a 1-byte identifier that uniquely identifies a locality within a system. This locality corresponds to an SNA services component (local node, link service, 3270 emulator, and so on).
- **Partner** is a 1-byte identifier that uniquely identifies a partner within the locality. This is not always used, but can be used to distinguish between parts of a component (for example, the 3270 functions in the local node rather than the Advanced Program-to-Program Communications (APPC) functions).
- **Index** is a 2-byte identifier that uniquely identifies a logical entity within the partner. The meaning and use of this field is defined by the communicating partners. It is used to distinguish multiple connections between the same partners (for example, to identify one of many 3270 sessions between the local node and a particular 3270 emulator). The value of zero should not be used as an index value. Applications must assign unique index values for every active LPI connection with the node.

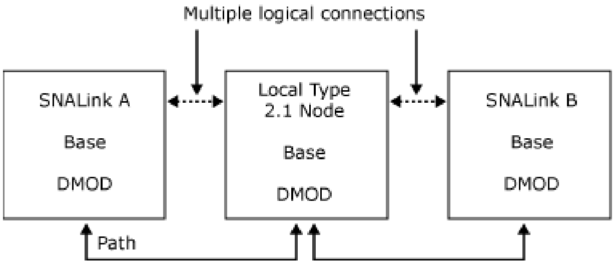
A message flowing over a connection carries a pair of LPIs that identify the source and destination of the message. These are the source LPI and destination LPI of the message. Together they identify the connection on which the message is flowing.

Note More than one connection can exist between any pair of partners. The I values are then used to distinguish the connections. For example, in communications between the local node and a 3270 emulator, the L and P values identify the message as being 3270 data for that local node, and the I value indicates which session the data is intended for.

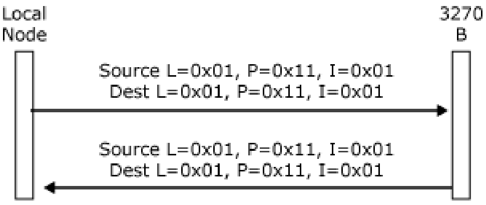
The LPIs are assigned by a combination of the partners and the DMODs when the connection is opened, as described in Making Connections.

Because they are assigned dynamically for each component, the L values are not the same across an entire system. For example, a local 2.1 node locality could be known as locality 4 to one 3270 locality, and locality 6 to a second 3270 locality. However, from the viewpoint of any locality, there exists a unique L value for each remote locality within which a path exists. This L value is used as an index into an internal table that identifies the path to that locality.

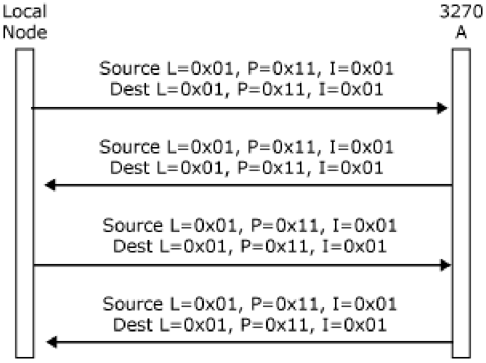
The following figures show an example of the L values that could be used between the components shown in Paths and DMODs, and examples of the LPI values that would be used by the local node on messages flowing between the components. (For more information about how the LPI values are assigned and used, see Opening the PLU Connection.)



Example L values


Local Node
3270 B
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x11, I=0x01
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x11, I=0x01

L values specified on messages between the local node and 3270 B


Local
Node
3270
A
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x11, I=0x01
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x11, I=0x01
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x11, I=0x01
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x11, I=0x01

LPI values specified on messages flowing on two different connections between the local node and 3270 A

The Base is called by any piece of code that wants to send a message. It uses the destination L value on the message to determine where to send it. When the message reaches the remote locality, the Base in that locality routes it to the appropriate partner if the locality contains more than one partner.

Making Connections

Before messages can flow across a connection, the connection must be established or opened. This is necessary because a partner (P1) does not initially know the locality partner index (LPI) address of the partner with which it wants to communicate. There may not even be a suitable partner with which to communicate.

A component of the Base, known as the Resource Locator, and a message with a type of Open, known as an Open message, are used to establish a connection between partners.

The following procedure outlines how a connection is established. More specific information is available in Function Management Interface.

To establish a connection between partners

1. The Open message has two forms: an Open request and an Open response. The Open request contains information on the type of partner P1 is looking for.

   P1 fills in an Open request and calls the Base with it. Because it does not know the LPI address of its partner, it sets the destination LPI values to zero.

2. The Base cannot forward the Open to a particular partner, because it has no destination LPI address. Therefore it passes the Open to the Resource Locator, which attempts to find a locality that will accept the Open. The Dynamic Access Module (DMOD) has a record of all the localities that could accept this type of Open. The Resource Locator tries each of these localities until the Open is accepted. If no locality is found, the Resource Locator returns a negative response to the Open to inform the sender that no partner could be found.
3. When a remote locality receives an Open, the Base passes the Open to the partner (P2). If P2 can accept the Open, it responds by sending a positive Open response message to P1.
4. The Open response message returned to P1 contains both the source and destination LPI values for the particular connection. At the end of this exchange, both P1 and P2 know each other's addresses and can communicate over the connection.

Note The terms source and destination in the context of LPIs refer to the source and destination of the particular message. When the 3270 emulator builds a message to send to the local 2.1 node, it needs to swap the source and destination LPIs received on the Open response from the local 2.1 node.

For a detailed example of how LPI addresses are assigned during initialization of the system services control point (SSCP) and primary logical unit (PLU) sessions, see Opening the PLU Connection.

DL-BASE/DMOD Interface

This section describes the interface to the Microsoft® Host Integration Server 2004 DL-BASE. It includes a listing of the entry points that an application such as a 3270 emulator can call. These entry points allow messages to be sent to and received from services such as the local 2.1 node.

This section contains:

- About DL-BASE/DMOD
- DL-BASE/DMOD Entry Point Summary
- Sample Code: Initialization and Routing Procedure

About DL-BASE/DMOD

The following topics describe an example in which a 3270 emulator is to be adapted to use Microsoft® Host Integration Server 2004. The emulator needs to communicate with the local 2.1 node.

This section contains:

- Initialization
- Sending Messages
- Receiving Messages
- Opening a Connection
- Termination

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Initialization

The 3270 emulator should initialize the DL-BASE and then call the Dynamic Access Module (DMOD) to obtain the necessary configuration information. This also registers the user name with the DMOD. It can then obtain further system information such as the Host Integration Server version number, if required.

The following table lists the functions involved with this process.

Function	Description
sbpuinit	Initializes the DL-BASE.
sepdcrec	Gets configuration information.
sepdgetinfo	Gets system information.

The **sbpuinit** entry point should always be called before any other DL-BASE/DMOD entry points except SNAGetVersion. For new emulators, **sepdcrec** should be called after **sbpuinit**. (Because of the order of calls used in older emulators, a call to **sepdcrec** before **sbpuinit** is still supported, but this order is not recommended.)

Sending Messages

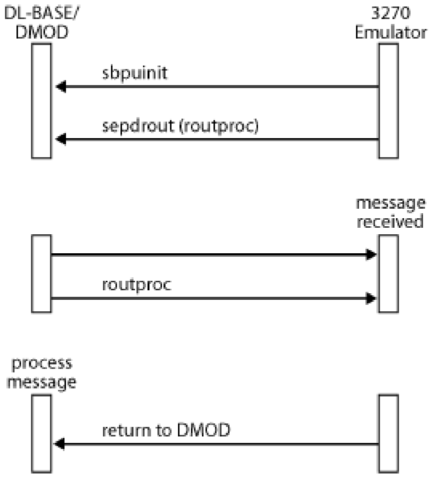
The 3270 emulator inserts a message in a buffer and then calls the DL-BASE to send it. The message contains source and destination locality partner indexes (LPIs), which are set up when the connection is opened. For more information, see LPI Connections.

The application can either obtain a new buffer to contain the message to be sent (using sepdbubl), or reuse a buffer in which it previously received a message. The application is responsible for any buffer it has obtained or in which it has received a message. The application must either use (or reuse) the buffer to send a message or release it (using sepdburl). If the buffer to be reused does not contain the correct number of elements for the message to be sent, the application can obtain additional elements (using sbpibegt) or release existing ones (using sbpiberl). In this case, it must also ensure that the **numelts** field in the buffer header indicates the correct number of elements.

The function used to send the message is sbpusend.

Receiving Messages

The following figure shows the method for receiving messages from the Dynamic Access Module (DMOD).



After DMOD initialization, the 3270 emulator registers the routing procedure by calling sepdrout. When the DMOD receives a message, it calls the 3270 emulator routing procedure, which can then process the message.

With this approach, there is no context switch between the DMOD thread and the 3270 emulator thread. However, the routing procedure must return control to the DMOD quickly. For instance, it cannot suspend waiting for a keyboard input.

The application must determine whether the received message is for this application or for another application. If the message is not for this application, the routing procedure must return, indicating that the message was not processed. If the application processes the message, it is responsible for freeing the buffer when the processing is finished.

In some cases, the routing procedure can process the message to completion. An alternative is for the routing procedure to put the message on an application queue and then clear an application semaphore. The application can then subsequently process the message.

Performance can be improved further by sending a Status-Resource message (to return credit to the local node, enabling it to send further data) from the routing procedure when a message is received, rather than waiting until the message is processed to completion. This usage is illustrated in Sample Code: Initialization and Routing Procedure. For more information about credit and flow control, see Pacing and Chunking.

Note After the application has received a message, the application is responsible for the buffer in which the message was received. The application must either reuse the buffer to send a message (using sbpusend) or release it (using sepdburl). If the buffer to be reused does not contain the correct number of elements for the message to be sent, the application can obtain additional elements (using sbpibegt) or release existing ones (using sbpiberl). In this case, the application must also ensure that the **numelts** field in the buffer header indicates the correct number of elements.

Opening a Connection

Before a locality partner index (LPI) connection can be used to transfer data, it needs to be opened. This is performed by sending Open messages, starting with an Open request. The format of an Open message is defined by the interface being used. For example, the 3270 emulator uses the function management interface (FMI) to communicate with the local 2.1 node.

The interface also defines the initiator of the Open request. In this case, the 3270 emulator sends the Open(SSCP) Request, and the local 2.1 node sends the Open(PLU) Request.

On the **Open(SSCP) Request**, the 3270 emulator sets all the source and destination LPIs to zero, except for the source index, which can be used by the 3270 emulator for internal routing (for example, to distinguish between two sessions).

The DL-BASE and Dynamic Access Module (DMOD) ensure that Open messages are routed to a suitable destination. If a routing procedure is used, it should always first call sbpurcvx to process Open responses. When **sbpurcvx** indicates that it has not processed a received message, and the received message is an Open OK response, the application is informed that the connection was established successfully.

Termination

The 3270 emulator must call sbputerm to free DL-BASE/Dynamic Access Module (DMOD) resources before it terminates.

DL-BASE/DMOD Entry Point Summary

The following table shows entry points divided into the categories DL-BASE, Dynamic Access Module (DMOD), and buffer management, and listed in alphabetical order within each category.

DL-BASE entry points

DL-BASE entry points	Description
sbpuinit	Initializes the DL-BASE.
sbpurcvx	Processes Open from routing procedure.
sbpusend	Sends message.
sbputerm	Terminates.

DMOD entry points

DMOD entry points	Description
routproc	Sample routing procedure.
sepdchnk	Gets the function management interface (FMI) chunk size.
sepdcrec	Gets user and diagnostics records from configuration file.
sepdgetinfo	Gets SNA server system information.
sepdrout	Sets up the routing procedure (Microsoft® Windows Server™ 2003 and Windows® 2000 Server only).

Buffer management entry points

Buffer management entry points	Description
sbpibegt	Gets the buffer element.
sbpiberl	Releases the buffer element.
sepdbubl	Gets the buffer.
sepdburl	Releases the buffer.

> **Note** The standard-call convention (CDECL) is used on Windows Server 2003 and Windows 2000.
>
> **Note** The format of buffer headers and elements is described in Messages. The formats of individual messages contained in buffers are defined in FMI Message Formats.

Sample Code: Initialization and Routing Procedure

This topic contains an outline of source code for receiving messages from the Dynamic Access Module (DMOD).

> **Note** **TRACE*n*()** is a macro used to specify data to be traced. This data can include variable parameters. The value **n** identifies the severity level of the trace. The unmatched parentheses are deliberate. They are resolved by the expansion of the macro.

```
/********************************************************************/
/* Sample code for initialization and routing procedure.           */
/********************************************************************/

HSEM  dummysem = NULL;      /* This semaphore is never used         */

/********************************************************************/
/* Initialization procedure                                         */
/********************************************************************/
USHORT init_proc()
{
  COM_ENTRY("initp");
  rc = sbpuinit(&dmodsem, CLIENT, CES3270, username);
  TRACE4()"DMOD initialized, rc=%d",rc));
  if (rc == NO_ERROR)
  {

    /********************************************************************/
/* The procedure routproc will be called whenever a message is      */
/* received by the DMOD. This is used to post back the application, */
/* but take care to protect any queues against concurrent access by */
/* multiple threads.                                                */
/********************************************************************/
    rc = sepdrout(routproc);
    TRACE4()"Rout proc set up, rc=%d",rc));
    if (rc == NO_ERROR)
    {
      /* Other initialization here                                  */
    }
  }
  return (rc);
}
/********************************************************************/
/* The routine routproc is called whenever the DMOD receives a      */
/* message or a status indication.                                   */
/********************************************************************/
USHORT FAR _loadds routproc(buf, srcl, status)
BUFHDR FAR *buf;        /* Buffer that has been received            */
USHORT      srcl;       /* Locality from which buffer was received  */
USHORT      status;     /* Reason for call                          */
                        /* CEDINMSG = message received              */
                        /* CEDINLLN = path error occurred (on srcl) */
{
  COM_ENTRY("routp");   /* initialize rc=FALSE                      */

                        /* Call the DL BASE to handle re-resource   */
                        /* location                                 */
  if (!sbpurcvx(&buf, srcl, status))
  {
    switch (status) {
      case CEDINMSG:
        if (buf->destp == S3PROD)         /* Is the message for us? */
        {
          /********************************************************************/
     /* Process the received message.                               */
     /*                                                             */
     /* If the message is DATAFMI on the PLU-SLU session, and the   */
     /* application has requested to use flow control on the        */
     /* session, then this processing should include:               */
     /*                                                             */
     /* -  increment number of messages received by the client      */
     /* -  check whether the number received exceeds the threshold  */
     /*    for normally returning credit to the node. If so, check  */
     /*    whether it is OK to return credit (for example, not short of      */
     /*    buffers), and if OK send a status-resource message to    */
     /*    the node to give it credit to send more messages to the  */
     /*    client.                                                  */
/********************************************************************/
          rc = TRUE;
          TRACE2()"Routing proc got message at %p",buf));
        }
        else
        {
          TRACE2()"Routing proc did not take message at %p",buf));
        }
        break;

      case CEDINLLN:
        TRACE2()"Path error on %d",srcl));
            /********************************************************************/
        /* Process the path error status.                         */
/********************************************************************/
        break;
    }

    /********************************************************************/
    /* If the message/status cannot be completely processed here,   */
    /* the application can queue the message and clear a semaphore for the   */
    /* main thread to continue the processing.                      */
/********************************************************************/
  } else {
    rc = TRUE;       /* DLBase handled the message on our behalf    */
  }
  /* Returning a value of TRUE indicates that we processed the      */
  /* event return(rc);
}
```

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Function Management Interface

The function management interface (FMI) provides applications with direct access to SNA data flows and information about SNA control flows by means of status messages. This section provides information about the SNA sessions and connections over which FMI messages can flow, and summarizes the messages. The FMI is particularly suited to the requirements of 3270 emulation applications.

This section contains:

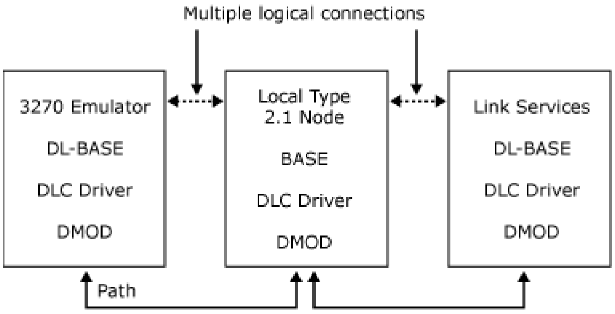
- FMI Concepts
- SSCP Connection
- PLU Connection
- Data Flow
- Status Messages
- FMI Message Summary

FMI Concepts

The local node provides the SNA layers of path control, transmission control, and data flow control (DFC), as well as logical unit (LU) services as shown in the following figure. In terms of the SNA layers, the function management interface (FMI) is between presentation services and DFC. This means that most of the SNA protocol handling is performed by the local node. In particular, the DFC layer of the local node is responsible for the state changes associated with chaining, bracket, and quiesce protocols.

The FMI is defined in terms of the messages that are sent across the interface. Note that this is logically distinct from the definition of the DL-BASE/Dynamic Access Module (DMOD) interface, which defines the mechanism for sending messages between two components in Microsoft® Host Integration Server (for example, between the local node and the 3270 emulator).

The FMI is used by LU types 0, 1, 2, and 3, but not by LU type 6.2. It provides access to the system services control point (SSCP)-LU session as well as the main primary logical unit (PLU)-SLU session. (For more information about these sessions, see Sessions and Connections.) An application can use the FMI to access multiple sessions and hence multiple LUs, simultaneously.



In this example, the 3270 emulator on the client communicates over the local area network (LAN) with the local node on the server by exchanging messages. The content and format of the messages are defined by the FMI. The DMOD is used to transport the messages, but does not interpret them. The local node provides the SNA service for formatting the message. The link service and the data link control (DLC) driver are responsible for transferring data between the local node and the DLC adapter.

This section contains:

- Sessions and Connections
- Application Flags

Sessions and Connections

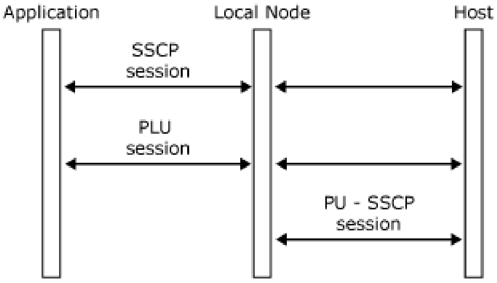
An application using the function management interface (FMI) can communicate with the host on two SNA sessions as described in the following list:

- The system services control point (SSCP) session, between an SNA server logical unit (LU) and the host SSCP, provides information about the activation of the LU and supports communication with the SSCP for commands such as character-coded and field-formatted logon and logoff commands. There is one SSCP session for each SNA server LU.
- The primary logical unit (PLU) session, between an SNA server LU and the host PLU, is the main session for data transfer between the local application and the host application. There is one PLU session for each SNA server LU.

The local node communicates directly with the host on the physical unit (PU)-SSCP session:

- The PU-SSCP session, between the PU (local node) and the host SSCP, supports the reporting of alert information and link statistics to the host SSCP.

The following figure shows the three sessions.

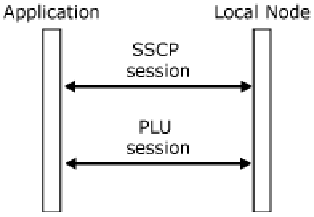


The application can communicate with the local node by means of two locality, partner, index (LPI) sessions. Rather than specifying the session on which a message is to flow, the application sends the message to the local node on one of these connections. The local node then routes it to the appropriate SNA session.

The connections are used as follows:

- The SSCP session is used for the initial startup and logon information for a 3270 session. The Host Integration Server 3270 emulation programs also send network management information, such as user alerts and Response Time Monitor (RTM) statistics, to the local node on this session. For more information about this connection, see SSCP Connection.
- The PLU session is used for the transfer of application data, and for status and flow control messages between the application and the local node. For more information about this connection, see PLU Connection.

The following figure shows these sessions.



These sessions are specific to the local node and the application. Data and status messages passed across a connection result in SNA data and SNA control requests being sent on the appropriate SNA session. Similarly, SNA data and SNA control responses received on an SNA session result in data and control messages being passed to the application on the appropriate connection.

The relationship between the three SNA sessions and the two connections is as follows:

- SNA messages on the SSCP session from the host to the local node result in messages from the local node to the application on the SSCP connection. Messages from the application to the local node on the SSCP connection normally result in SNA messages on the SSCP session from the local node to the host (with the exception of network management information, which results in messages on the PU-SSCP session).
- SNA messages on the PLU session from the host to the local node result in messages from the local node to the application on the PLU connection. Messages from the application to the local node on the PLU connection result in SNA messages on the PLU session from the local node to the host.
- SNA messages on the PU-SSCP session from the local node to the host are generated by messages from the application to the local node on the SSCP connection. When the application sends network management information such as 3270 user

alerts on the SSCP connection, the local node distinguishes it from other data on this connection (which normally corresponds to the SSCP session) and sends the appropriate information about the PU-SSCP session to the host. For more information, see 3270 User Alerts.

Note the distinction between these SNA sessions and 3270 emulation sessions. A 3270 emulator can have more than one 3270 emulation session. For each emulation session, there are separate SSCP and PLU sessions.

Each connection between the application and the local node is opened, managed, and closed separately. This means that an application must maintain a separate internal control block containing the LPI pair, message keys, and state of the connection for each of the SNA sessions associated with each 3270 emulation session. For example, an application using three 3270 emulation sessions, each with an SSCP session and a PLU session, will require six control blocks.

An application identifies the connection (and hence the session) to which a particular message belongs using the LPI pair present in the message. On a received message, the destination index (I) value contains the application's identifier for the connection, and the source I value contains the local node's identifier for the connection. These are reversed for messages sent by the application.

The application selects the LU within the local node that it can use for communications by the relationship in the configuration table between the LU record and APPL record. (For more information, see Opening the SSCP Connection.) The application may be unaware of which LU it accesses if the LUs are arranged within LU groups.

Application Flags

Application flags are included on the following messages:

- All Data messages (both inbound and outbound)
- Status-Acknowledge(Ack) (outbound only)
- Status-Acknowledge(Nack-1) (outbound only)
- All Status-Control messages (both inbound and outbound)

These flags represent key indicators of the state of the session to which the message relates and are closely related (but not always equivalent) to the request header or response header (RH) indicators in the SNA request or response. Note that for inbound messages, applications need to set the flags on **Data** messages and **Status-Control** messages only.

For outbound messages, the local node sets the application flags to reflect the contents of the RH in the corresponding SNA message. The local node performs checks on the SNA message before sending it to the application. Therefore, the application can assume that the RH indicators follow the SNA protocols and need not perform its own checks. The application's task in interpreting the application flags is much simpler than if the local node presented the message with the uninterpreted RH. For example:

- If the application specified the segment delivery option when the primary logical unit (PLU) connection was opened, the end chain indicator (ECI) on an SNA request will occur on the first segment of the last request/response unit (RU) in a chain, but the chain is not complete until the last segment of that RU is received. In this case, the local node manipulates the application flags so that the ECI flag is set in the last segment rather than the first. (For more information, see Opening the PLU Connection.)
- Applications using Transmission Service profile 4 (TS profile 4) on the PLU session can receive the definite response 2 (DR2) RH indicator in combination with definite response 1 (DR1) or exception response (ER) to give RQD2, RQD3, RQE2, and RQE3 requests. The local node interprets the RH indicators and sets the **COMMIT** application flag accordingly.

For inbound Data and Status-Control messages, you should set the application flags to control session characteristics such as chaining, direction control, and brackets. For **Status-Acknowledge** messages, the local node generates an SNA response and sets the RH indicators using information saved from the corresponding request. The application does not need to set the flags on this message.

For information about application flag usage when you are using function management interface (FMI) chunking, see Chunking.

In most cases, the application does not need to use the application flags on Status-Acknowledge(Ack) messages, which derive from the response header indicators on the corresponding response. However, certain applications do require access to the response header flags on responses. For example, transaction-processing applications using TS profile 4 can receive the DR2 flag on responses, which appear as the **COMMIT** flag in the application flags.

Application flag usage on Status-Control (SC) messages is derived from the response header indicators in the corresponding data flow control or session control request unit. Applications may need to be aware of the response header flags for Status-Control messages. For example, LUSTAT request type 6 is a no-op used solely to enable response header flags to be sent when no other request is allowed. The local node delivers the request to the application as a Status-Control(LUSTAT) Request with the relevant application flags set. For summaries of valid request header usage for data flow control request units and of valid response header indicators for SC requests, see *SNA Format and Protocol Reference Manual: Architectural Logic* (IBM publication SC30-3112).

In the summary of the application flags in the table that follows, bits are numbered with bit 0 as the most significant bit in a byte and bit 7 as the least significant. An application flag is set if the relevant bit for the flag is 1 and not set if the bit is 0.

Flag 1 occurs in all messages.

The following table lists the meanings of the individual bits.

Bits in flag 1	**Meaning**
FMHI [bit 0, flag 1] Value: AF_FMH (0x80)	Function management header indicator. Set if a function management header is present in the message, or if the message is a function management data network services (FMD NS) request. Only valid on Data messages. This flag is always set for 3270 user alerts, which are sent on the system services control point (SSCP) connection. For more information, see 3270 User Alerts.

BCI [bit 1, flag 1] Value: AF_BC (0x40)	Begin chain indicator. Set if this message starts a chain. For more information, see Outbound Chaining and Inbound Chaining.
ECI [bit 2, flag 1] Value: AF_EC (0x20)	End chain indicator. Set if this message ends a chain. For more information, see Outbound Chaining and Inbound Chaining.
COMMIT [bit 3, flag 1] Value: AF_COMM (0x10)	Commit indicator. Set if chain carries DR2.
BBI [bit 4, flag 1] Value: AF_BB (0x08)	Begin bracket indicator. Set if chain carries begin bracket (BB). Note that this does not necessarily indicate that the bracket has been initiated. For more information, see Brackets.
EBI [bit 5, flag 1] Value: AF_EB (0x04)	End bracket indicator—set if chain carries end bracket (EB). Note that this does not indicate that the bracket has terminated. For more information, see Brackets .
CDI [bit 6, flag 1] Value: AF_CD (0x02)	Change direction indicator. Set if chain carries change direction (CD). For more information, see Direction.
SDI [bit 7, flag 1] Value: AF_SD (0x01)	System detected error indicator. Set if the local node detects an error in outbound data. For more information, see Outbound Data.

Flag 2 occurs in all messages except **Status-Control(STSN)**, where the indicators included in this byte are not applicable.

The meanings of the individual bits are listed in the following table.

Bits in flag 2	**Meaning**
CODE [bit 0, flag 2] Value: AF_CODE (0x80)	Alternate code indicator. Set if the alternate code set (usually ASCII) is used for this Data message. Note that function management headers are unaffected by the code selection indicator.

ENCRYP [bit 1, flag 2] Value: AF_ENCR (0x40)	Enciphered data indicator. Set to indicate that the information in the **Data** message is enciphered under session level cryptography protocols. You must provide the necessary support for data encryption. The Host Integration Server local node does not support cryptography.
ENPAD [bit 2, flag 2] Value: AF_ENPD (0x20)	Padded data indicator. Set in conjunction with the **ENCRYP** flag to indicate that the data was padded at the end to the next integral multiple of eight bytes before enciphering.
QRI [bit 3, flag 2] Value: AF_QRI (0x10)	Queued response indicator. Set if the response to this request is to be queued in the transmission control and data flow control layers. This flag is only significant for inbound messages.
CEI [bit 4, flag 2] Value: AF_CEI (0x08)	Chain ending indicator. Set on a message corresponding to an outbound SNA request with EC and begin basic information unit (BBIU). This flag is provided solely for the use of SNA server components. Your application should not attempt to use it.
BBIUI [bit 5, flag 2] Value: AF_BBIU (0x04)	Begin basic information unit indicator. Set on a message corresponding to an outbound SNA request with BBIU. This flag is provided for the use of SNA server components and for applications using segment delivery and outbound pacing together. Your application should not attempt to use it. (For more information, see Pacing and Chunking.)
EBIUI [bit 6, flag 2] Value: AF_EBIU (0x02)	End basic information unit indicator. Set on a message corresponding to an outbound SNA request with end basic information unit (EBIU). This flag is provided solely for the use of SNA server components. Your application should not attempt to use it.
RBI [bit 7, flag 2] Value: AF_RBI (0x01)	Real BID indicator. Set on **Status-Control(BID) Request** messages from the local node only. 0x01 indicates that the message is due to an SNA BID RU. 0x00 indicates that the message is due to an outbound function management data (FMD) RU with BB set.

SSCP Connection

The system services control point (SSCP) connection of the application to the local node provides access to the SSCP session between the Microsoft® Host Integration Server secondary logical unit (LU) and the host SSCP.

For simplicity, this section describes the SSCP connection as if an application only uses a single SNA server LU (and therefore a single SSCP connection). In practice, applications can use multiple LUs.

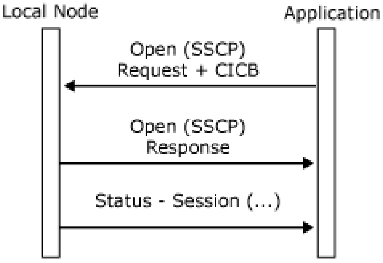
This section contains:

- Opening the SSCP Connection
- Closing the SSCP Connection
- Using the SSCP Session
- RTM Parameters
- 3270 User Alerts

Opening the SSCP Connection

An application gains access to the system services control point (SSCP) session by opening an SSCP connection to the local node. To do this, an application sends an Open(SSCP) Request message to the local node, which responds with an Open(SSCP) Response. The local node follows a positive **Open(SSCP) Response** with a Status-Session message reporting the current state of the SSCP session. (For more information, see Using the SSCP Session.)

The following figure shows the message flow. For a figure showing a more detailed message flow, including locality, partner, index (LPI) values used during initialization of both the SSCP and primary logical unit (PLU) sessions, see Opening the PLU Connection.



This section contains:

- LU Groups
- Resource Location for Open SSCP

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LU Groups

Note that Host Integration Server supports logical unit (LU) groups. An LU group consists of a number of LUs of the same type, such as 3270 display LUs or logical unit application (LUA) LUs. Any of the LUs in the group can be used for the same task.

If an application sends an Open(SSCP) Request specifying the name of a 3270 display LU group, the local node can select any LU within the group to be used by the application. LUA LU groups are used in the same way, except that the application can specify either the name of the group or the name of any LU within the group to access the group.

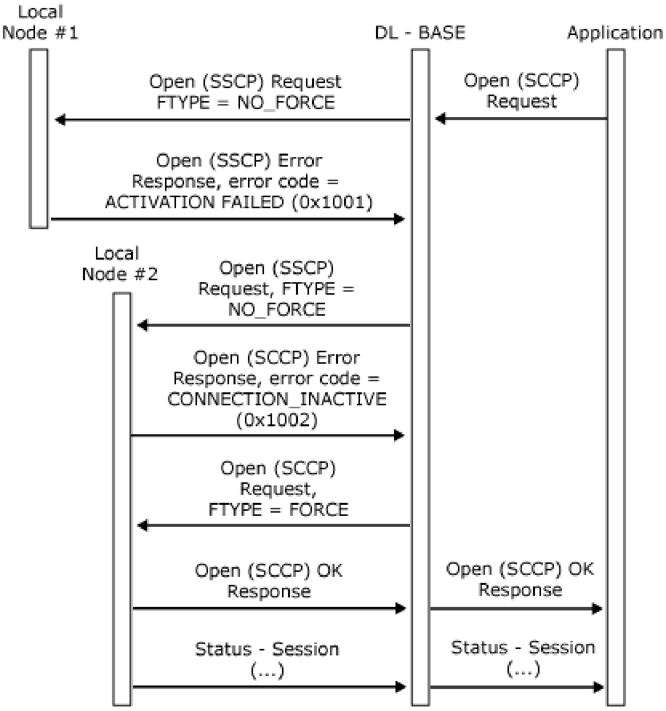
Resource Location for Open SSCP

When attempting to find a free logical unit (LU) across more than one local node, the application does not need to know which local node owns the LU. The DL-BASE is responsible for finding a suitable local node, using the mechanism described. The description is intended to assist in interpreting traces of the message flows involved, and is not needed to write an application

The open force type field in the Open(SSCP) Request specifies either a forced or nonforced Open. If the LU for which the Open is intended does not have an active system services control point (SSCP) session because its link is inactive, a forced Open instructs the local node to attempt to activate the link and the SSCP session. A nonforced Open succeeds only if the SSCP session is already active, and otherwise returns with an error code indicating the state of the LU's connection.

When the application issues the **Open(SSCP) Request**, it does not set the open force type field. The DL-BASE issues a nonforced Open to each node in turn until it finds an LU that already has an active SSCP session. If none of these Opens succeeds, the DL-BASE issues a forced Open to the node that returned the best error code—that is, the one most likely to be able to activate the session.

The sample message flows in the following figure show this process for two local nodes. The DL-BASE tries each in turn, using nonforced Opens. The error code from node #2 indicates that it is more likely to be able to activate the SSCP session than node #1, so the DL-BASE sends a forced Open to node #2. The application is aware only of the first request and its response.


Local Node #1
DL - BASE
Application
Open (SSCP) Request FTYPE = NO_FORCE
Open (SCCP) Request
Open (SSCP) Error Response, error code = ACTIVATION FAILED (0x1001)
Local Node #2
Open (SSCP) Request, FTYPE = NO_FORCE
Open (SCCP) Error Response, error code = CONNECTION_INACTIVE (0x1002)
Open (SCCP) Request, FTYPE = FORCE
Open (SCCP) OK Response
Open (SCCP) OK Response
Status - Session (...)
Status - Session (...)

To enable applications to restart after a disastrous failure (such as terminating the 3270 emulation program), the local node also accepts an Open(SSCP) Request from an application that has failed and has been restarted, providing the same source locality, partner, index (LPI) fields are used. In this case, a **TERM-SELF** message is sent to the host if the LU is bound.

The SNA server LU through which the application communicates is selected by the relationship between the APPL record and the LU or LU group record in the configuration file. The application specifies its name using the source name field on the **Open(SSCP) Request**. The local node fills in the LU or LU group number, selects an unused LU within the LU group (if the association is to an LU group), and informs the application of this LU number on the Open(SSCP) Response.

The **Open(SSCP) Request** specifies the following:

- The source application name.
- A resource identifier that can be used by the application to correlate the Open(PLU) Request that is sent to the application. (For more information, see Opening the PLU Connection.)
- A connection information control block, which specifies the response header usage, checks that the local node should perform for the LU. If the field for a code is set to 0x01, that receive check will be carried out by the data flow control layer of the local node on data arriving from the host. The corresponding send checks are unaffected and are always performed. The connection information control block is provided because these receive checks are optional in SNA. However, it is anticipated that most applications will require all these checks to be performed (all values set to 0x01).
- An indicator that specifies whether the application is to be treated as high or low priority. All SNA server 3270 LUs are marked as high priority (printers do not send significant data inbound). The effect of high priority is to enable data to be

progressed faster to the host when the link is busy.

- An indicator that specifies whether the application is an LUA. This determines whether the local node and the application will communicate using the LUA variant of the function management interface (FMI). (For more information, see FMI Concepts.)
- An indicator that specifies a nonforced or forced Open. This determines whether the local node will attempt to activate the SSCP session if it is not currently active.

The Open(SSCP) Request can fail for one of several reasons, which can be determined from the error codes on the Open(SSCP) Response sent to the application, as detailed in the following list:

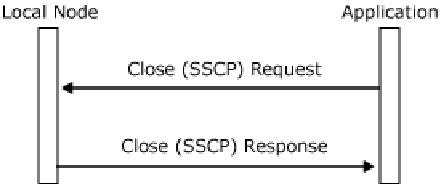
- The local node may still be initializing (retrieving information from the configuration file). In this case, the application can retry immediately.
- The configuration file may not have an entry for the application, or the application record in the configuration file may not point to an LU or LU group record.
- For a nonforced Open, the SSCP session may be inactive.

Closing the SSCP Connection

To close the system services control point (SSCP) connection, an application sends a Close(SSCP) Request to the local node, which responds with a Close(SSCP) Response. The **Close(SSCP) Request** is unconditional. The **Close(SSCP) Response** always reports that the connection was successfully closed. The **Close(SSCP) Response** is provided so that applications can determine when outstanding data and status messages on the session have been delivered.

If the logical unit (LU) is bound, the local node sends a **TERM-SELF** message to the SSCP on behalf of the application to elicit an **UNBIND**. An application that needs to be unbound can issue **Close(PLU)**. (For more information, see Closing the PLU Connection.) Normally, the SSCP connection can be maintained while the application task is active, even if it is idle.

Closing the connection invalidates the locality, partner, index (LPI) pair for the connection, but does not alter the state of the SSCP session. The following figure shows the message flow.



Using the SSCP Session

When the application has opened a system services control point (SSCP) connection, it has access to the SSCP session and can send data to the host SSCP.

This section contains:

- SSCP Session Characteristics
- SSCP Session Status

SSCP Session Characteristics

For SNA type 2.1 nodes, the system services control point (SSCP) session uses function management (FM) profile 0 and Transmission Service profile (TS profile) 1. This combination of profiles provides the following session characteristics:

- The primary and secondary half-sessions both use immediate request mode.
- The primary and secondary half-sessions both use immediate response mode.
- Only definite-response single request unit chains are allowed.
- The maximum request unit size is limited to 256 bytes.
- Data flow control request units are not supported.
- Pacing is not supported.
- Identifiers are used (rather than sequence numbers) on the normal flows.

This implies that the SSCP connection has the following characteristics:

- All Data messages have the acknowledgment required (ACKRQD) field set.
- All Data messages have the begin chain indicator (BCI) and end chain indicator (ECI) application flags set.
- Status-Control messages do not flow on the connection.
- Status-Session messages from the local node to the application only report changes in the activation state of the session.
- The chaining, bracket, confirmation, and recovery protocols (described in PLU Connection) do not apply.

Using the SSCP connection, the application can send and receive **Data** messages corresponding to function management data network services (FMD NS) (session services) requests and FMD data requests. Examples of FMD NS (session services) requests are:

- **INIT-SELF.** Requests from the secondary to the host SSCP requesting that the SSCP assist in the initiation of a session to the host PLU, effectively requesting a **BIND**. (For more information, see Opening the PLU Connection.)
- **TERM-SELF.** Requests from the secondary to the host SSCP requesting that the PLU-SLU session be terminated with an **UNBIND**. (For more information, see Closing the PLU Connection.)
- **Character-coded requests.** Requests such as logon, logoff, or test commands from the secondary display, or a logon prompt from the host application.
- **NOTIFY.** Requests used by the secondary to notify the host SSCP that a device is available after a **BIND** was rejected with sense code 0x0845, for example, where a device emulator supports logical power-off.

The local node sends a **NOTIFY** request to the SSCP on behalf of the LU whenever the application's SSCP connection state changes while the LU is active. A **NOTIFY** (vector key 0x0C with byte 5 set to 0x03), which can act as secondary LU, is sent in the following cases:

- When an Open(SSCP) Request is received when the LU is already active.
- When an ACTLU request is accepted when the SSCP connection is already opened.

A **NOTIFY** (vector key 0x0C with byte 5 set to 0x01), which cannot currently act as secondary LU, is sent in the following cases:

- When an ACTLU is received when the SSCP connection is not open.
- When a Close(SSCP) Request is received when the PLU session is not bound.
- When an **UNBIND** request is received when the SSCP connection is not open.
- When the long response including the **NOTIFY** vector is used for ACTLU requests.

These **NOTIFY** messages can be used by the host in conjunction with the negative response 0x0845 that the local node gives to a **BIND** received when the SSCP connection is not open. (For more information, see Opening the PLU Connection.)

SSCP Session Status

While the system services control point (SSCP) connection is open, the local node reports the initial state and any subsequent changes of state of the SSCP session to the application using Status-Session messages. There are four distinct **Status-Session** status codes that can occur for the SSCP connection:

- **No-Session.** The SSCP session between the SNA server logical unit (LU) and the host SSCP is not active because the SNA server physical unit (PU) or LU is not activated. The **Status-Session** carries a qualifying status code to indicate why the SSCP session is inactive. The application cannot use the SSCP connection to send data to the host SSCP. The qualifiers are:
    - **PU-INACTIVE.** Activate PU (ACTPU) has not been received or Deactivate PU (DACTPU) has been received.
    - **PU-ACTIVE.** ACTPU(COLD) has been received from the SSCP.
    - **PU-REACTIVATED.** ACTPU(COLD) has been received while the PU was active. (The application is not informed if ACTPU(ERP) is received while the PU is active.)
    - **LU-INACTIVE.** ACTLU has not been received, or DACTLU has been received.
- **Link-Error.** The SSCP session between the SNA server LU and the host SSCP is not active, due to a data link control (DLC) error. The **Status-Session** carries a qualifying status code that gives the error code reported by the DLC. The application cannot use the SSCP connection to send data to the host SSCP.

  Note that this session state is reported when the local node is informed that the locality containing the Host Integration Server Synchronous Data Link Control (SDLC) link service has been lost due to a path failure. The qualifier 0x0D is used. The link service will close the link when it is informed of the path error so the application can treat this as an outage.
- **LU-Active.** The SSCP session is active due to the receipt of ACTLU. The application can use the SSCP connection to send data to the host SSCP.
- **LU-Reactivated.** The SSCP session has been reactivated due to the receipt of an ACTLU from the host SSCP. The SSCP connection is still active, but data may have been lost.

For more information, see Status-Session Codes.

RTM Parameters

The Status-RTM message is sent to the application by the local node to indicate the Response Time Monitor (RTM) parameters being used by the host. The host can specify the following parameters:

- Whether RTM measurement is active or inactive.
- Whether local display of RTM data by the application is permitted.
- The definition by which response times are to be measured:
    - Until the first character of a response is written to the screen.
    - Until the keyboard is unlocked.
    - Until the application is allowed to send data. Change direction (CD) or end bracket (EB) is received.
- The boundaries by which response times are to be classified into time bands.
- The initial values of the counters, which indicate how many responses have been received in each time band (as defined by the boundaries).

The local node is responsible for interpreting the response times reported to it by the application, and for sending RTM statistics to the host when required. The application is responsible for measuring the response times and reporting them to the local node. (The application reports response times to the local node using the Status-Acknowledge message. For more information about measuring and reporting response times, see Response Time Monitor Data.)

If the application does not need to provide a local display of RTM data, it only needs to determine whether RTM measurement is active. If active, it needs to determine the definition by which response times are measured. It can ignore the other parameters. If RTM measurement is not active, the application need not measure and report response times.

If the application needs to provide a local display of RTM data, it should use the information from the Status-RTM message to ensure that the local interpretation of response times matches the interpretation used by the host. In particular, it should not display RTM data at all if the **Status-RTM** message indicates that local display is not permitted (or if the **permission to view RTM data** field in the 3270 user configuration record indicates that it is not permitted). The application is responsible for maintaining its own RTM statistics for local display, that is, for classifying the response times according to the boundaries specified by the host and maintaining counts of responses in each category. Although the local node maintains these statistics for sending to the host when required, it does not report them to the application.

> **Note** RTM statistics are maintained for a specific logical unit (LU), not for a specific application's use of that LU. This means that when the **Status-RTM** message is received at start of day, the counters can be nonzero to include a previous use of the LU. The counters are only reset when the host requests the local node to reset them or when the local node sends unsolicited RTM data to the host.

3270 User Alerts

The Host Integration Server 3270 emulation program can send 3270 user alerts to the local node on the system services control point (SSCP) connection. This enables the local node to route each alert to the appropriate host for the 3270 session on which it was sent.

To send a 3270 user alert, the application should send it as a Data message on the SSCP connection. The local node will recognize it as a 3270 user alert if both of the following are true:

- The function management header indicator (FMHI) bit in the application flag is set.
- The first three bytes of the data are 0x41038D, indicating a Network Management Vector Transport (NMVT).

The local node sends the alert to the appropriate host for the 3270 session on which it was received. If a relative time subvector is present (0x42) with increment type 0xEF (sequence), the local node sets the sequence number in each message (starting at one from power-up and incrementing by one for each message sent). Host Integration Server 2004 allows sequence number values up to 2^16. Apart from this, the local node does not alter the contents of the alert.

> **Note** There can be some delay before the application receives a response to the alert. The response is sent on the SSCP connection in the same way as other data on this connection. The application must not send further data on the SSCP connection (including further alerts) until it has received a response to this alert.

PLU Connection

The primary logical unit (PLU) connection of the application to the local node provides access to the PLU session between the Microsoft® Host Integration Server's logical unit (LU) and a PLU in the host.

This section describes how an application opens and closes its PLU connection, and the use of the PLU connection.

For simplicity, this section describes the PLU connection as if an application uses only a single SNA server LU (and therefore a single PLU connection). In practice, applications can use multiple LUs.

This section contains:

- Opening the PLU Connection
- Closing the PLU Connection
- Using the PLU Session
- Outbound Chaining
- Inbound Chaining
- Segment Delivery
- Brackets
- Direction
- Pacing and Chunking
- Confirmation and Rejection of Data
- Shutdown and Quiesce
- Recovery
- Application-Initiated Termination
- LUSTATs
- Response Time Monitor Data

Opening the PLU Connection

The opening of the primary logical unit (PLU) connection is closely associated with the establishment of the PLU session. The local node opens the PLU connection when it receives a **BIND** command from the host for a logical unit (LU) for which an application has previously opened a system services control point (SSCP) connection. Possible sequences are:

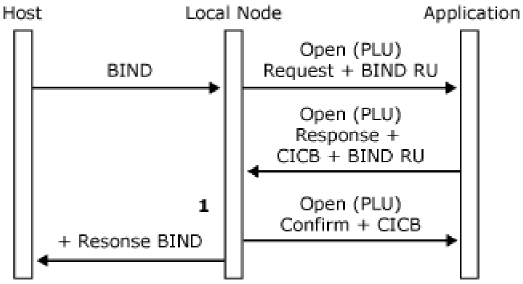
- An application opens its SSCP connection and sends a character-coded logon request or **INIT-SELF** request to the host SSCP. A host PLU subsequently sends a **BIND** request to the SNA server LU, and the local node opens the PLU connection.
- A host PLU sends an unsolicited **BIND** command to the SNA server LU. If the SSCP connection for the LU is open, the local node opens the PLU connection. If the local node is supporting **NOTIFY**, the host can be configured to send a **BIND** when it receives the **NOTIFY** message sent by the local node when the application opens its SSCP connection. (For more information, see SSCP Connection.)
- A host PLU sends a **BIND** command to the SNA server LU. If the SSCP connection for the LU is not open, the local node returns a negative response to the **BIND** request. The sense code used is 0x0845 (**NOTIFY** will be sent). The local node does not open the PLU connection. In this case, the local node sends **NOTIFY** when the SSCP connection is opened. (For more information, see SSCP Connection.)

To successfully open the PLU connection, the local node sends an Open(PLU) Request to the application. The application responds with an Open(PLU) OK Response. Finally the local node sends an Open(PLU) OK Confirm to the application. This exchange of messages opens the PLU connection and establishes the PLU session. It should be noted that a successful PLU opening sequence is a three-way handshake, in comparison to the opening of the SSCP connection, which is a two-way handshake.

The **Open(PLU) Request** is delivered to the application using the SSCP connection for the LU. The **Open(PLU) Request** contains the application name and open resource identifier to allow applications to correlate the PLU and SSCP connections.

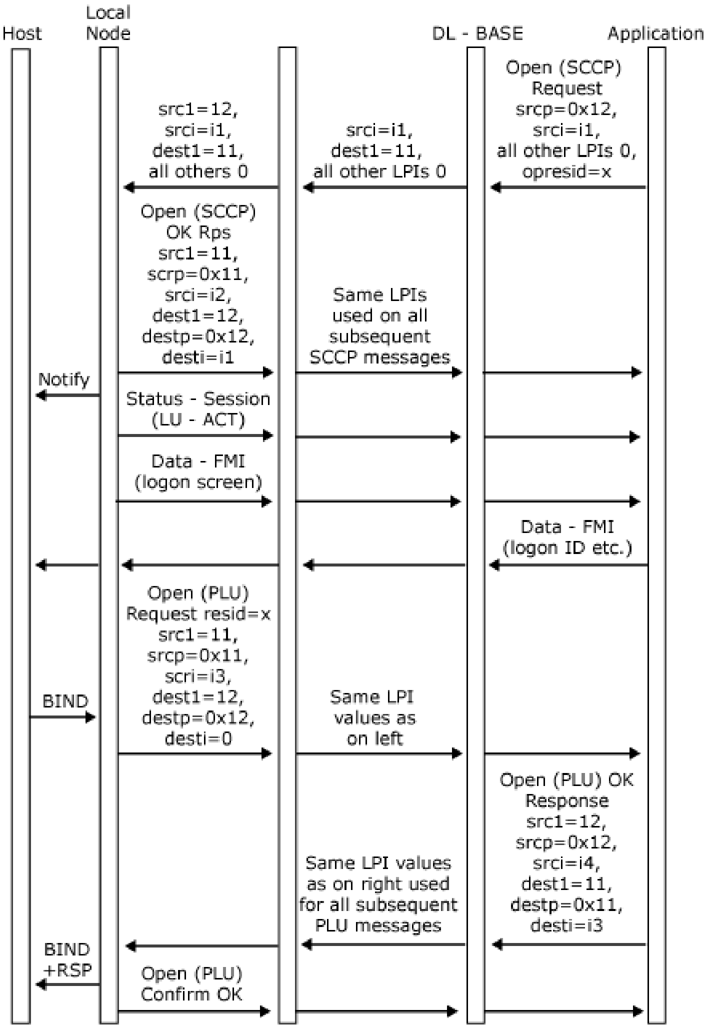
The **Open(PLU) Request** indicates the logical unit that the **BIND** request was directed to, references the resource identifier supplied in the Open(SSCP) Request for that LU, and carries the actual **BIND** request/response unit (RU) received from the host. (For more information, see Open(PLU).) It also carries the maximum RU sizes, chunk sizes (if appropriate), and pacing windows for the PLU session, to enable the application to determine the initial credit if it needs to be involved in outbound pacing. (For more information, see Pacing and Chunking.)

The message flow for a successful opening of the PLU connection (on receipt of a nonnegotiable **BIND**) is shown in the following figure. Note that the **BIND** parameters are verified (at [1]) only when the application has supplied the **BIND** check table index as part of the connection information control block (CICB).



The following figure shows the message sequence for the initiation of both the SSCP and PLU sessions, including details of where the Locality Partner Index (LPI) values are assigned. (The application's source P value of 0x12 indicates that it is a 3270 emulator. For more information about how the source LPI values are set, see Open(SSCP) Request.) The message flow shown assumes that the connection to the host is already established and that both the configuration and the **BIND** are valid.

After this message sequence, there are two valid sets of LPI values, one for the SSCP session and one for the PLU session. The application can access either session at any time until **UNBIND** and can use the LPI values to distinguish between received data on the two sessions.


Host
Local Node
DL - BASE
Application
Open (SCCP) Request srcp=0x12, srci=i1, all other LPIs 0, opresid=x
srci=i1, dest1=11, all other LPIs 0
src1=12, srci=i1, dest1=11, all others 0
Open (SCCP) OK Rps src1=11, scrp=0x11, srci=i2, dest1=12, destp=0x12, desti=i1
Same LPIs used on all subsequent SCCP messages
Notify
Status - Session (LU - ACT)
Data - FMI (logon screen)
Data - FMI (logon ID etc.)
Open (PLU) Request resid=x src1=11, srcp=0x11, scri=i3, dest1=12, destp=0x12, desti=0
BIND
Same LPI values as on left
Open (PLU) OK Response src1=12, srcp=0x12, srci=i4, dest1=11, destp=0x11, desti=i3
Same LPI values as on right used for all subsequent PLU messages
BIND +RSP
Open (PLU) Confirm OK

This section contains:

- BIND Checking

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BIND Checking

The Open(PLU) OK Response contains the connection information control block (CICB), which enables the application to customize certain characteristics of the connection and contains information used in **BIND** verification. Note that the local node verifies the **BIND** parameters carried on the **Open(PLU) OK Response**. It does not maintain a copy of the original **BIND** request/response unit (RU) from the host. If the **BIND** is negotiable, the application is permitted to modify the parameters in the **BIND** RU, but if it is nonnegotiable the application should return the **BIND** RU unmodified. A negotiable **BIND** flag is provided in the Open(PLU) Request.

Although many characteristics of the PLU session are determined by the **BIND** parameters, the application can select certain characteristics by specifying fields in the CICB. For more information, see the following table. More detailed information about CICB usage and the effect on the PLU session of selecting various CICB options is given in context in the topics of this section that deal with PLU session characteristics such as chaining and pacing.

The **BIND** is verified using a **BIND** check table entry (whose index is specified in the CICB). The entries in this correspond to the various fields in the **BIND**. The **BIND** check table entries are stored in the configuration file. For example, the **BIND** check table entry can specify that the **BIND** be accepted if the secondary chain response protocol is either "definite response" or "definite or exception response" (byte 5 bits 2 and 3 = B10 or B11). This would be appropriate if the application did not want to send Request Exception (RQE) chains.

Connection information control block usage is shown in the following table.

Field	**Explanation**
Segment delivery option	A value of 0x00 indicates that the local node should perform outbound segment assembly and only deliver complete RUs. A value of 0x01 indicates that the application wants the local node to deliver RU segments. For more information, see Segment Delivery.
Application pacing option	A value of 0x00 indicates that the application requires the local node to handle pacing. A value of 0x01 indicates that the application needs to be involved with outbound pacing through Status-Resource messages. For more information, see Pacing and Chunking.
Application cancel option	A value of 0x00 indicates that the local node should automatically generate CANCEL. A value of 0x01 indicates that the application will generate CANCEL. For more information, see Inbound Chaining.
Application transaction numbers option	A value of 0x00 indicates that the application does not support transaction numbers. A value of 0x01 indicates that the application does support transaction numbers. For more information, see Recovery.
BIND check index	Gives the index of the **BIND** check table entry against which the BIND parameters should be verified. One of the following values should be used: • 0x01 —3270 printer session • 0x02 —3270 display session • 0x10 —LUA (LU type 0) application

The **Open(PLU) Confirm** from the local node to the application indicates whether the **BIND** verification was successful, and if so, supplies the bind information control block (BICB). The BICB summarizes the session **BIND** parameters in a format suitable for high-level languages and effectively defines the characteristics of the PLU session. The application not negotiating the **BIND** should usually not require to examine the **BIND** on the Open(PLU) Request and should use the BICB on the Open(PLU) OK Confirm.

The following table summarizes the fields in the BICB and their correspondence to the parameters in the **BIND** RU. For more detailed information, see the IBM manual *Systems Network Architecture: Formats,* (GA27-3136).

Position on Open(PLU) OK Confirm	**Position in Bind RU [byte, bit]**	**Description**
dataru[0]	[2,]	Function management (FM) profile
dataru[1]	[3,]	Transmission Service profile
dataru[2]	[4, 0]	Primary chaining use
dataru[3]	[4, 1]	Primary request control mode
dataru[4]	[4,2-3]	Primary chain response protocol
dataru[5]	[4, 4]	Primary two-phase commit
dataru[6]	[4, 6]	Primary compression indicator
dataru[7]	[4, 7]	Primary send End Bracket (EB) indicator

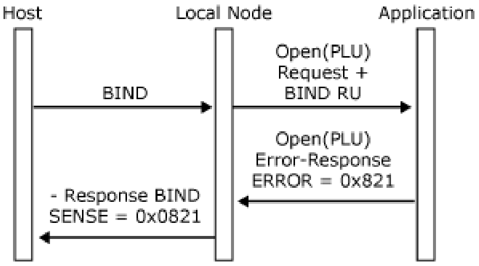
dataru[8]	[5, 0]	Secondary chaining use
dataru[9]	[5, 1]	Secondary request control mode
dataru[10]	[5,2-3]	Secondary chain response protocol
dataru[11]	[5, 4]	Secondary two-phase commit
dataru[12]	[5, 6]	Secondary compression indicator
dataru[13]	[5, 7]	Secondary send EB indicator
dataru[14]	[6, 1]	FM header usage
dataru[15]	[6, 2]	Bracket usage1
dataru[16]	[6, 2]	Bracket reset state2
dataru[17]	[6, 3]	Bracket termination rule
dataru[18]	[6, 4]	Alternate code set indicator
dataru[19]	[6, 5]	Sequence number availability
dataru[20]	[7,0-1]	Normal-flow send/receive mode
dataru[21]	[7, 7]	Half-duplex flip-flop reset
dataru[22]	[8,2-7]	Secondary pacing send window
dataru[23]	[9,2-7]	Secondary pacing receive window
dataru[24-25]*	[10,]	Secondary send maximum request unit size
dataru[26-27]*	[11,]	Primary send maximum request unit size
dataru[28]	[14,1-7]	LU-LU session type
dataru[29]	[27,]	PLU name size
dataru[30-37]	[28,]	PLU name in Extended Binary Coded Decimal Interchange Code (EBCDIC)
dataru[38]	[15,0-3]	Session type 1: PS Function Management Header (FMH) type
dataru[39]	[15,4-7]	PS data stream profile
dataru[40]	[16, 0]	Number of outstanding destinations
dataru[41]	[16, 1]	Compacted data indicator
dataru[42]	[16, 2]	Peripheral Device Information Record (PDIR) allowed indicator
dataru[43]	[15, 0]	Session type 2 or 3: query support
dataru[44]	[24,1-7]	Dynamic screen size
dataru[45]	[20,]	Basic row size
dataru[46]	[21,]	Basic column size
dataru[47]	[22,]	Alternate row size
dataru[48]	[23,]	Alternate column size

Note 1 0x00 = Brackets not used. 0x01 = Brackets used.

Note 2 0x01 = Bracket reset state is BETB (between-brackets). 0x02 = Bracket reset state is INB (in-bracket).

Note These values are of type INTEGER (all others are of type CHAR).

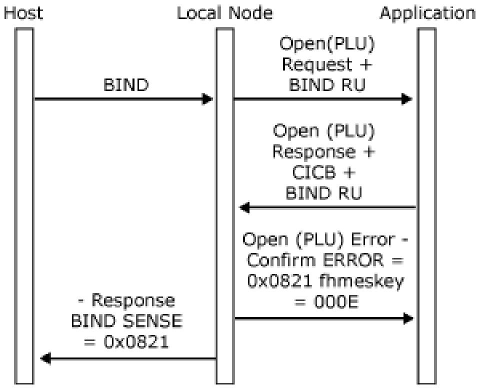
The opening PLU sequence can fail if the application rejects the Open(PLU) Request (for example, if the **BIND** parameters are unacceptable on a nonnegotiable **BIND**) by sending Open(PLU) Error Response and appropriate sense codes. The local node sends to the host a negative response to the **BIND** request containing the supplied sense codes. The PLU connection is considered to be closed after an **Open(PLU) Error Response**, and the local node does not generate an **Open(PLU) Confirm**. The following figure shows a failure to open the PLU connection (for a nonnegotiable **BIND**), due to the application rejecting the **Open(PLU) Request**.



- The opening PLU sequence can also fail if the **BIND** verification against the **BIND** check table entry specified by the application fails. In this case, the local node does the following: Sends to the host a negative response to the **BIND** request with appropriate sense codes.

- Sends to the application an Open(PLU) Error Confirm with the first word of the sense codes as the first error code and the index of the **BIND** parameter in error as the second error code.

The PLU connection is considered to be closed after the **Open(PLU) Error Confirm**. The following figure shows failure to open the PLU connection due to **BIND** verification failure. Note that error code 2 gives the index in the RU of the **BIND** parameter in error.


Host
Local Node
Application
BIND
Open(PLU) Request + BIND RU
Open (PLU) Response + CICB + BIND RU
Open (PLU) Error - Confirm ERROR = 0x0821 fhmeskey = 000E
- Response BIND SENSE = 0x0821

Closing the PLU Connection

Either the application or the local node can terminate the primary logical unit (PLU) connection. The criteria for closing are:

- The local node closes the PLU connection if it receives an **UNBIND** request from the host PLU, which terminates the PLU session. If the **UNBIND** type is **BIND forthcoming** (0x02), the local node sets the **BIND**-forthcoming indicator in the Close(PLU) Request, so that the application can reserve any necessary resources.
- The local node closes the PLU connection if it receives a Deactivate Logical Unit (DACTLU) or Deactivate Physical Unit (DACTPU) request from the system services control point (SSCP).
- The local node closes the PLU connection if it receives an outage notification from data link control.
- The local node closes the PLU connection if it detects a critical error in a message from the application, putting the application in a critically failed state. In this case, the local node sends a **TERM-SELF** request to the host to elicit an **UNBIND**.
- The application should close the PLU connection for logical power-off conditions. For example, if its resources are temporarily unavailable, or when the user finishes using the session.

When the local node issues a Close(PLU) Request, the application can determine the reason from the **Close** control field. There may be an associated status message on either the PLU connection (a Status-Acknowledge(Nack-2)) or the SSCP connection (a Status-Session message if the LU has been deactivated).

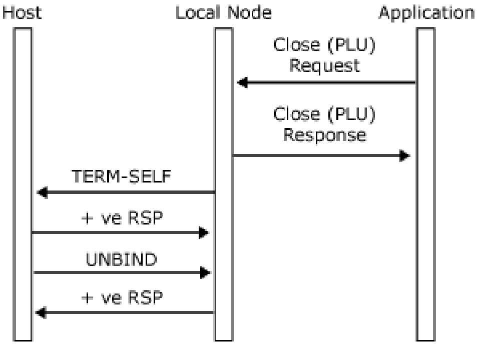
Whether the local node or the application closes the connection, the message is the same. The initiator of the **Close** sequence sends a **Close(PLU) Request** to its partner, which responds with a **Close(PLU) Response**. The **Close(PLU) Request** is unconditional. The **Close(PLU) Response** always reports that the connection was successfully closed.

The **Close(PLU) Response** is provided so that the initiator of the **Close** sequence can determine when outstanding data and status messages have been delivered. To avoid possible race conditions, the application should discard all messages it receives on the PLU connection after issuing a **Close(PLU) Request**, including any **Close(PLU) Request** messages from the local node, until it receives the **Close(PLU) Response**.

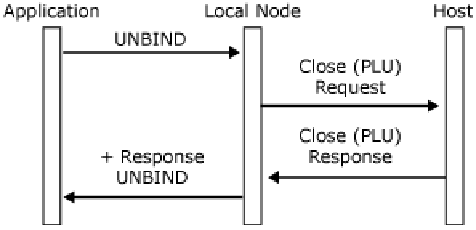
Note that, if the application sends a Close(SSCP) Request while the PLU session is active, the local node will close the PLU connection (as if **Close(PLU) Request** had been sent) as well as the SSCP connection.

The message sequence for an application-initiated **Close** is shown in the following figure. The local node sends a **TERM-SELF** request to the host to elicit an **UNBIND**.

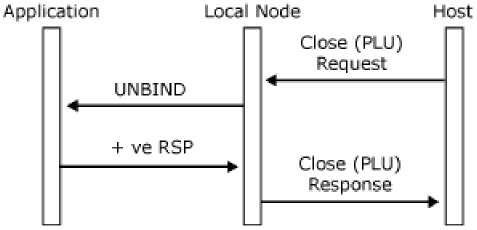
If the host generates an **UNBIND** automatically on receipt of a **TERM-SELF**, the application can view **Close(PLU)** as equivalent to the termination of the PLU-SLU session.



The message flow for a local node-initiated **Close** after receiving an **UNBIND** request from the host is shown in the following figure.



When an application is using the logical unit application (LUA) variant of the FMI, issuing a Close(PLU) Request causes the node to immediately unbind the PLU session by sending an **UNBIND** request to the PLU. The **Close(PLU) Response** is returned to the application on receipt of the **UNBIND** response, as shown in the following figure.


Application
Local Node
Host
Close (PLU) Request
UNBIND
+ ve RSP
Close (PLU) Response

Using the PLU Session

When the primary logical unit (PLU) connection is open, the application has access to the PLU session and can communicate with the host PLU.

This section contains:

- PLU Session Characteristics
- PLU Session Status

PLU Session Characteristics

The local node provides support on the primary logical unit (PLU) session for function management (FM) profiles 2, 3, 4, and 7 and Transmission Service profiles (TS profiles) 2, 3, 4, and 7. Support of these profiles means that the local node supports LU-LU session types 0, 1, 2, and 3. Using the PLU connection, the application can send and receive any FM data that is valid for these LU-LU types.

The protocols appropriate to a particular session are determined by the parameters in the **BIND** request that establishes the session. The **BIND** parameters are reported to the application in the bind information control block (BICB) on the Open(PLU) OK Confirm message. It is the application's responsibility to conform to the session protocols reported in the BICB.

Due to the wide range of **BIND** parameters allowable on a session and the options available to an application in the CICB on the Open(PLU) OK Response, this section does not attempt a complete description of the protocols for a particular session. The remaining topics in this section describe the general protocol characteristics of the PLU session, such as chaining, brackets, and so on.

Most of the protocol descriptions in the remainder of this section are accompanied by figures to illustrate the important features. The figures show:

- The relevant response header flags in SNA requests/responses.
- The sequence number of SNA requests/responses.
- Any sense data (shown as "SENSE=...") on SNA responses or **Data** messages.
- The acknowledgment required (ACKRQD) field in Data and Status-Control messages.
- The relevant application flags in **Data** and **Status-Control** messages. (For more information, see Application Flags.)
- The message key field in **Data** messages.
- Any error codes (shown as "ERROR=...") in Status-Acknowledge or **Status-Control** messages.

For simplicity, it is assumed that all messages are function management data flowing on the same PLU session that:

- Uses half-duplex flip-flop protocols.
- Uses brackets, with reset state of between-bracket.
- Does not use the PLU CICB segment delivery option. (For more information, see Segment Delivery).

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PLU Session Status

While the primary logical unit (PLU) connection is open, the local node reports any changes of state to the application through Status-Session messages. There is only one **Status-Session** status code that can occur on the PLU connection, which is listed in the following table.

Status code	**Description**
BETB	The PLU session has made the transition from the in-bracket state to the between-bracket state. (For more information, see Brackets.)

Status-Session Codes describes the **Status-Session** status codes.

Outbound Chaining

The local node checks that outbound chains of requests conform to the correct SNA usage, to the chaining usage for the session, and to the current state of the session. The local node will accept valid outbound chains of data from the host if one of the following is true:

- Data traffic is active on a full-duplex session.
- The session is in a state where it can receive data.
- The session is between brackets with neither half-session currently sending, or the session is in contention for a half-duplex contention session. (For more information, see Brackets.)
- The session is waiting for the host to initiate a recovery procedure. For example, the local node has sent a negative response to an outbound chain. (For more information, see Recovery.)

The local node sends a Data message to the application for each outbound request, but note the effects of the application specifying the segment delivery option in the connection information control block. (For more information, see Segment Delivery.) If the application does not specify segment delivery, the begin chain indicator (BCI) and end chain indicator (ECI) application flags in the message header reflect the chaining indicators in the request header of the request.

An outbound chain can terminate in several ways:

- The chain is received complete and without error. All the requests in the chain have been passed to the application as **Data** messages and have been acknowledged where applicable.
- The application detects an error in a Data message while receiving the chain. The application should send a Status-Acknowledge(Nack-1) with associated sense data to the local node, which sends a negative response plus the sense data to the host for the request corresponding to the **Data** message in error. The local node will not purge the remainder of the chain, so the application will see End Chain (EC). Alternatively, the host can terminate the chain with a CANCEL, which is delivered to the application as a **Status-Control(CANCEL)** with ACKRQD set.
- The local node detects an error in a request and presents the application with a system detected error **Data** message to report the premature termination of the chain. This message carries the system detected error indicator (SDI) and ECI application flags, the sense codes for the error, and the ACKRQD indicator. It does not carry user data. When the application responds with Status-Acknowledge(Ack), the local node generates a negative response to the chain using the appropriate sense code. The application can use the reported sense codes to generate diagnostic information for the user. (For example, a 3270 emulator would generate **PROG** check codes.) The local node will purge the remainder of the chain, so the application may not see EC. Alternatively, the host can terminate the chain with a **CANCEL**, which is delivered to the application as a **Status-Control(CANCEL)** with ACKRQD set.
- The host can cancel the chain while sending, by sending the **CANCEL** request. The local node sends a **Status-Control(CANCEL)** message to the application, which the application must acknowledge.

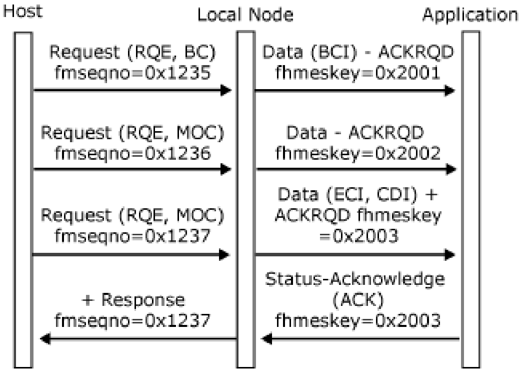
If an error occurs while receiving a chain, and the session uses half-duplex flip-flop protocols, the application must assume an error-recovery-pending state. (For more information, see Recovery.)

For a session using half-duplex flip-flop protocols, if the application flags in the last Data message of the chain have the CDI (change direction) flag set:

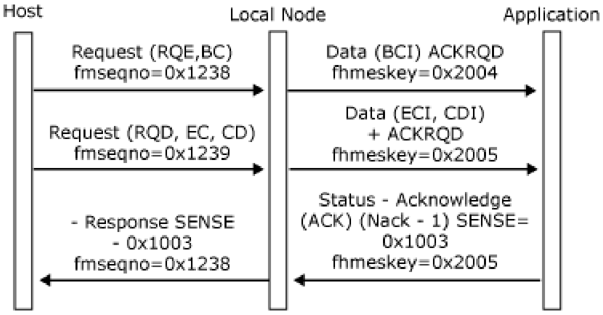
- If the chain was received without error, the application has direction.
- If the application rejected any message in the chain, the host retains direction.

The following four figures illustrate outbound chaining protocols between the local node and the application and how those protocols relate to the underlying SNA protocols.

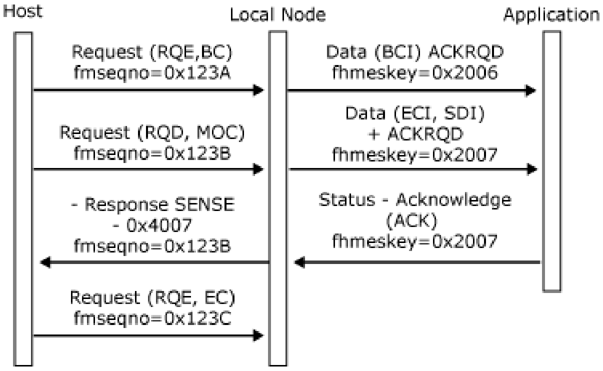
In the first figure, a complete outbound chain is received without error and accepted by the application. Note that after sending **Status-Acknowledge(Ack)**, the application has direction.


Host
Local Node
Application
Request (RQE, BC) fmseqno=0x1235
Data (BCI) - ACKRQD fhmeskey=0x2001
Request (RQE, MOC) fmseqno=0x1236
Data - ACKRQD fhmeskey=0x2002
Request (RQE, MOC) fmseqno=0x1237
Data (ECI, CDI) + ACKRQD fhmeskey =0x2003
+ Response fmseqno=0x1237
Status-Acknowledge (ACK) fhmeskey=0x2003

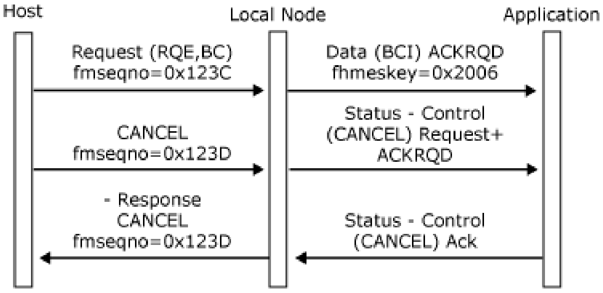
In the following figure, a complete outbound chain is received without error, but is rejected by the application. Note that even though the chain carried CD, the application does not have direction.


Host
Local Node
Application
Request (RQE,BC) fmseqno=0x1238
Data (BCI) ACKRQD fhmeskey=0x2004
Request (RQD, EC, CD) fmseqno=0x1239
Data (ECI, CDI) + ACKRQD fhmeskey=0x2005
- Response SENSE - 0x1003 fmseqno=0x1238
Status - Acknowledge (ACK) (Nack - 1) SENSE= 0x1003 fhmeskey=0x2005

In the following figure, the local node detects the invalid use of RQD without EC and converts the request to a **Data** message with the SDI application flag set, plus ACKRQD and appropriate sense codes. The application's **Status-Acknowledge(Ack)** drives the negative response to the host. This example assumes that the receive check 4007 has been specified in the CICB on the **Open (SSCP)**.


Host
Local Node
Application
Request (RQE,BC) fmseqno=0x123A
Data (BCI) ACKRQD fhmeskey=0x2006
Request (RQD, MOC) fmseqno=0x123B
Data (ECI, SDI) + ACKRQD fhmeskey=0x2007
- Response SENSE - 0x4007 fmseqno=0x123B
Status - Acknowledge (ACK) fhmeskey=0x2007
Request (RQE, EC) fmseqno=0x123C

In the following figure, the host cancels the outbound chain.


Host
Local Node
Application
Request (RQE,BC) fmseqno=0x123C
Data (BCI) ACKRQD fhmeskey=0x2006
CANCEL fmseqno=0x123D
Status - Control (CANCEL) Request+ ACKRQD
- Response CANCEL fmseqno=0x123D
Status - Control (CANCEL) Ack

Inbound Chaining

The division of application data into Data messages and the control of inbound chaining are the responsibility of the application.

The secondary maximum send request unit size for the session is a parameter in the **BIND** from the host and is available in the bind information control block (BICB) on the Open(PLU) OK Confirm message. The application should ensure that each inbound **Data** message corresponds to a single request unit. It does not contain more data than the maximum request unit size given in the BICB.

The application should use the begin chain indicator (BCI) and end chain indicator (ECI) application flags in the **Data** message headers to control chaining. (For more information, see Application Flags.) The chain is the unit of recovery, and if recoverable errors occur in the chain, the application should assume responsibility for recovery. (For more information, see Recovery.)

An inbound chain can terminate in the following ways:

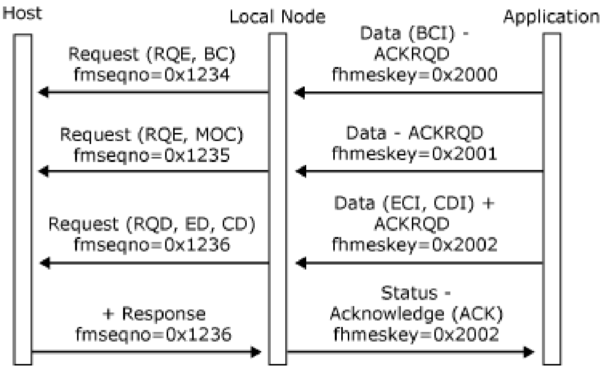
- The complete chain is sent without errors. All the **Data** messages in the chain have been passed to the host. If the session allows the secondary to send definite-response chains, and the application sets the **ACKRQD** field in the last **Data** message of the chain, the application receives a Status-Acknowledge(Ack) from the local node when the host supplies a response.
- The local node detects a critical error in the format of a **Data** message from the application or in the state of the session. The local node rejects the **Data** message with a Status-Acknowledge(Nack-2) containing an error code and closes the PLU connection. Note that the local node will generate an inbound **CANCEL** request before closing the PLU connection. The local node will send a **TERM-SELF** request to the host to elicit an **UNBIND**.
- The host sends a negative response to a request in the chain. The local node sends a Status-Acknowledge(Nack-1) message to the application with the sense codes and sequence number from the negative response. If the host rejects a request that does not carry the ECI application flag, and the application does not specify the application cancel option in the PLU CICB, the local node also generates an inbound CANCEL request. When the application specifies application cancel, it must send EC or **Status-Control(CANCEL)** to terminate the chain. Any subsequent inbound chains are rejected with a noncritical **Status-Acknowledge(Nack-2)**, sense code 0x2002 or 0x2004 (chaining or direction). When the application receives the **Status-Acknowledge(Nack-1)** message, it should stop sending data after this chain for half-duplex flip-flop sessions because the direction has passed to the host. (For more information, see Direction.)
- The application cancels the chain while sending, by sending a **Status-Control(CANCEL)** message to the local node. The local node sends a CANCEL request to the host and sends a **Status-Control(CANCEL)** Acknowledge to the application on receiving a positive response from the host. Responses from the host to requests sent before the **CANCEL** will generate appropriate **Status-Acknowledge** messages to the application if the original Data messages had the **ACKRQD** field set.
- The application closes the PLU connection while sending the chain. The local node sends a **Close(PLU) Response** to the application. Responses from the host to requests sent before the **Close(PLU)** message will not generate **Status-Acknowledge** messages to the application. Note that the local node will also generate an inbound **CANCEL** request and a **TERM-SELF** request to elicit an **UNBIND**.

If the local node detects a noncritical error in the format of a **Data** message from the application or the state of the session, it does not close the PLU connection. Instead, it rejects the **Data** message in error with a **Status-Acknowledge(Nack-2)** containing an appropriate error code. No data is sent to the host.

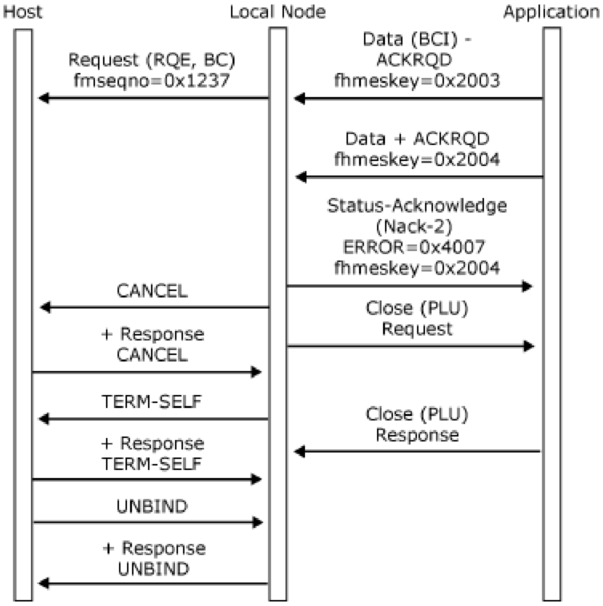
If an inbound chain terminates with an error, when the session uses half-duplex protocols, the application must assume a receive state. (For more information, see Recovery.)

The following six figures illustrate inbound chaining protocols between the local node and the application, and how those protocols relate to the underlying SNA protocols.

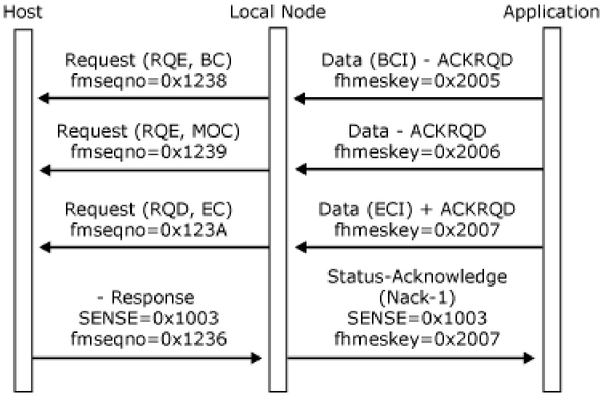
In the first figure, a complete inbound chain is sent without error and accepted by the host. Note that after receiving **Status-Acknowledge(Ack)** the application relinquishes direction to the host.



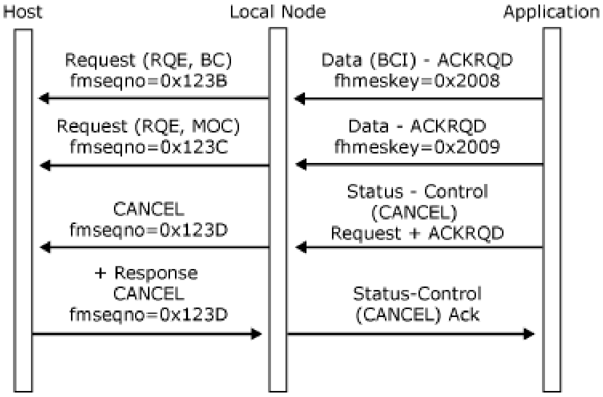
In the following figure, the local node detects a critical error in the format of the second **Data** message in the chain (**ACKRQD** without the ECI application flag), sends a **Status-Acknowledge(Nack-2)** to the application with the appropriate error code, and closes the PLU connection. Note that the local node only generates the **CANCEL** if the session's function management (FM) profile supports **CANCEL**.


Host
Local Node
Application
Request (RQE, BC)
fmseqno=0x1237
Data (BCI) -
ACKRQD
fhmeskey=0x2003
Data + ACKRQD
fhmeskey=0x2004
Status-Acknowledge
(Nack-2)
ERROR=0x4007
fhmeskey=0x2004
CANCEL
Close (PLU)
Request
+ Response
CANCEL
TERM-SELF
Close (PLU)
Response
+ Response
TERM-SELF
UNBIND
+ Response
UNBIND

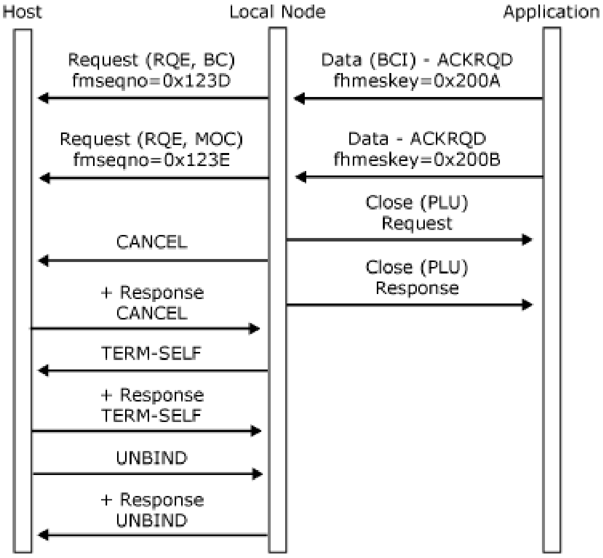
In the following figure, a complete inbound chain is sent without error, but is rejected by the host. After the negative response, the application must enter receive state, pending error recovery. (For more information, see Recovery.)


Host
Local Node
Application
Request (RQE, BC)
fmseqno=0x1238
Data (BCI) - ACKRQD
fhmeskey=0x2005
Request (RQE, MOC)
fmseqno=0x1239
Data - ACKRQD
fhmeskey=0x2006
Request (RQD, EC)
fmseqno=0x123A
Data (ECI) + ACKRQD
fhmeskey=0x2007
- Response
SENSE=0x1003
fmseqno=0x1236
Status-Acknowledge
(Nack-1)
SENSE=0x1003
fhmeskey=0x2007

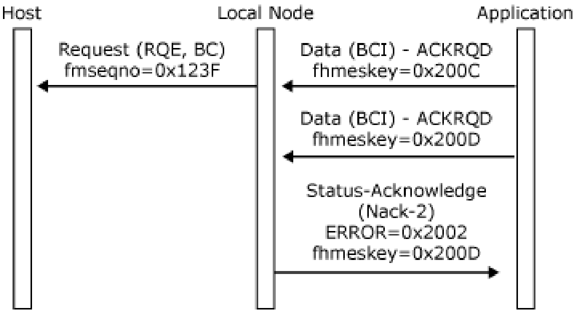
In the following figure, the application cancels the chain by sending **Status-Control(CANCEL)**. Note that the application still has direction and can start a new chain.


Host
Local Node
Application
Request (RQE, BC)
fmseqno=0x123B
Data (BCI) - ACKRQD
fhmeskey=0x2008
Request (RQE, MOC)
fmseqno=0x123C
Data - ACKRQD
fhmeskey=0x2009
CANCEL
fmseqno=0x123D
Status - Control
(CANCEL)
Request + ACKRQD
+ Response
CANCEL
fmseqno=0x123D
Status-Control
(CANCEL) Ack

In the following figure, the application closes the PLU session while sending the chain. The local node only generates the **CANCEL** if the session's FM profile supports **CANCEL**.


Host
Local Node
Application
Request (RQE, BC) fmseqno=0x123D
Data (BCI) - ACKRQD fhmeskey=0x200A
Request (RQE, MOC) fmseqno=0x123E
Data - ACKRQD fhmeskey=0x200B
Close (PLU) Request
CANCEL
Close (PLU) Response
+ Response CANCEL
TERM-SELF
+ Response TERM-SELF
UNBIND
+ Response UNBIND

In the following figure, the local node detects a noncritical error in the format of the second **Data** message in the chain and sends a **Status-Acknowledge(Nack-2)** to the application with the appropriate error code.


Host
Local Node
Application
Request (RQE, BC) fmseqno=0x123F
Data (BCI) - ACKRQD fhmeskey=0x200C
Data (BCI) - ACKRQD fhmeskey=0x200D
Status-Acknowledge (Nack-2) ERROR=0x2002 fhmeskey=0x200D

Segment Delivery

If the maximum request/response unit (RU) size for a session (supplied in the **BIND** parameters) allows RUs that are larger than the maximum size of a data link control transmission unit, for example, a Synchronous Data Link Control (SDLC) frame, the local node's path control is responsible for assembling outbound segments into RUs and segmenting inbound RUs where required.

However, certain IBM products (for example, SNA models of the 3270 controllers) do not perform outbound segment assembly, to improve perceived response times at display terminals by displaying each segment as soon as it is received. This feature is referred to as window shading.

The local node allows an application to specify a segment delivery option in the connection information control block (CICB) on the Open(PLU) OK Response. If an application specifies this option, the local node's path control does not assemble outbound segments into complete RUs, and the local node delivers the segments to the application in Data messages. This enables an application emulating a 3270 device to reproduce the perceived response characteristics of the IBM device. In cases where throughput is high, such as 3270 file transfer, segment delivery can give improved performance compared to RU delivery.

Note that there is no comparable feature for inbound data. The application must present **Data** messages containing complete RUs to the local node. Also, there is no support for segment delivery on the system services control point (SSCP) session and connection (where the maximum RU size is limited to 256 bytes).

The local node supports the segment delivery option in such a way that the constraints placed on an application receiving data in either form are identical. If complete RUs are required, the local node rebuilds the RUs from segments in path control. If segments are required, the local node handles all segmentation indicators and modifies processing within its SNA layers to cater for segmented RUs.

All **Data** messages delivered to the application contain application flags, whereas only the first segment in an RU contains a response header (RH). The local node delays the end chain (EC) and change direction (CD) indicators if they occur in the RH of the RU's first segment, and sets the corresponding ECI and CDI application flags in the **Data** message corresponding to the last segment of the RU. Therefore, the **Data** messages corresponding to RU segments have application flags set as if they corresponded to whole RUs. This considerably simplifies the handling of chaining, bracket, and half-duplex protocols for an application using the segment delivery option.

> **Note** EB is not delayed until end basic information unit (EBIU), because the application should use the Status-Session between-brackets message to determine when to enter the between-brackets state.

Brackets

This section primarily describes the bracket protocols between the local node and an application for a session supporting half-duplex flip-flop with brackets.

The local node enforces no bracket protocols for full-duplex sessions. Therefore, messages with begin bracket (BB) are not presented as **Status-Control(BID)** messages, and there are no **Status-Session(BETB)** messages.

The management of this protocol for a generalized application is complex, and there is a significant amount of code in the local node to simplify the application's perception of the protocol. An application is only aware of two states:

- In-bracket
- Between-bracket

The local node, in addition to the states of in-bracket and between-bracket, maintains transient states with a large state transition matrix, or finite-state machine, governing the half-session's state at a particular time.

This section contains:

- Bracket Initiation
- Bracket Termination

Bracket Initiation

While a session is in the between-bracket state, contention exists. Either the application or the host primary logical unit (PLU) can attempt to initiate a bracket, as follows:

- The application initiates a bracket by sending a Data message with the begin bracket indicator (BBI) application flag and **ACKRQD** set while in the between-bracket state. The local node sends a request corresponding to the **Data** message to the host PLU. The application has successfully initiated a bracket and is in the in-bracket state. Flip-flop protocols are now in force until the bracket is terminated.
- The application initiates a bracket by sending a **Status-Control(LUSTAT)** with the BBI application flag set while in the between-bracket state. The local node sends an **LUSTAT** request to the host PLU. The application has successfully initiated a bracket and is in the in-bracket state. Flip-flop protocols are now in force until the bracket is terminated.
- The host PLU sends a **BID** request while in the between-bracket state. The local node sends a **Status-Control(BID)** with **ACKRQD** to the application. (For more information, see Status-Control Message.) The application replies with a **Status-Control(BID) Acknowledge**, to indicate that it is willing to accept a bracket. The local node sends a positive response to the **BID** request. The host PLU has successfully initiated a bracket, and the application's state is in-bracket, with flip-flop protocols applying until the bracket is terminated.
- The host PLU sends data in an RU carrying the BB indicator in the RH while in the between-bracket state. The local node presents this method of initiating a bracket in the same way as if the host PLU had initiated the bracket with **BID**. The local node sends a **Status-Control(BID)** with **ACKRQD** to the application. The application replies with a **Status-Control(BID) Acknowledge** to indicate that it is willing to accept the bracket. The local node sends the Data message corresponding to the RU to the application and sends a positive response to the data RU. The host PLU has successfully initiated a bracket, and the application's state is in-bracket, with flip-flop protocols applying until the bracket is terminated.
- The host PLU sends an **LUSTAT** request carrying the BB indicator in the RH. The local node presents this method of initiating a bracket in the same way as if the host PLU had initiated the bracket with **BID**. The local node sends a **Status-Control(BID)** with **ACKRQD** to the application. The application replies with a **Status-Control(BID) Acknowledge** to indicate that it is willing to accept the bracket. The local node sends a **Status-Control(LUSTAT)** to the application, which requires an acknowledgment. The host PLU has successfully initiated a bracket, and the application's state is in-bracket, with flip-flop protocols applying until the bracket is terminated.
- The host attempts to initiate a bracket using a **BID** request or an RU carrying BB, which the local node sends to the application as a **Status-Control(BID)**, but the application cannot accept the bracket. The application should send a negative **Status-Control(BID)** response with an appropriate sense code. The local node sends a negative response to the BID carrying the sense code supplied by the application. The application's state is still between-bracket. The application should use one of the following sense codes:
  - 0x081B if it has already committed resources for an inbound transfer. For example, a terminal operator has begun typing.
  - 0x0814 if it currently cannot begin a bracket but will notify the host when resources become available. For example, a 3270 printer is being used for local copy in between-bracket printer sharing mode. At a later stage when the resources become available, the application should temporarily reserve the resources and send a **Status-Control(RTR)** to the local node. If the host rejects the **RTR**, the local node returns a **Status-Control(RTR) Negative-Acknowledge-1** response, and the application can release the resources. Otherwise, the host attempts to initiate a bracket that the application must now accept.
- If the application has successfully initiated a bracket, a bracket race may occur due to the host PLU attempting to initiate a bracket. The application gets a **Status-Control(BID) Request**, which it should reject with 0x080B or 0x0813. The application retains direction after race negative responses. (For more information, see Recovery.) The application's bracket state remains as in-bracket.

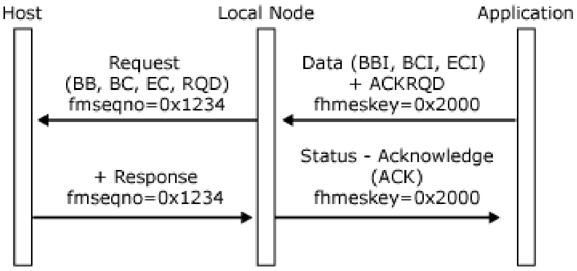
The application needs to be aware of one further complication in bracket initiation. All the cases relate to sessions whose bracket reset state is between-bracket. A state of contention exists, and either half-session can attempt to begin a bracket.

However, the **BIND** parameters for the session can specify a bracket reset state of in-bracket. If the bracket reset state is in-bracket, one half-session is considered to have already successfully initiated a bracket. Flip-flop protocols will then apply until a **Status-Session(BETB)** is received, at which time the session reverts to a contention state and bracket initiation proceeds as described earlier.

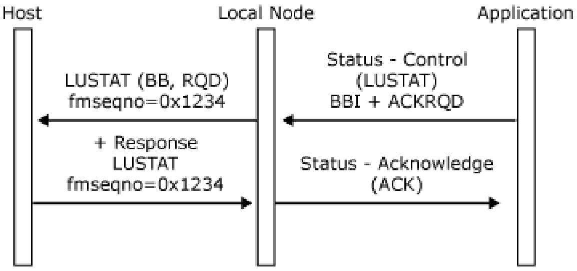
The application must set its bracket state when the PLU connection is opened (on receipt of the Open(PLU) OK Confirm message) and reset it each time the session is reset (after receipt of a **Status-Control(CLEAR) Request**). The appropriate bracket reset state for the session is supplied to the application in the BICB on the Open(PLU) OK Confirm message.

The following six figures illustrate bracket initiation protocols between the local node and the application and how those protocols relate to the underlying SNA protocols.

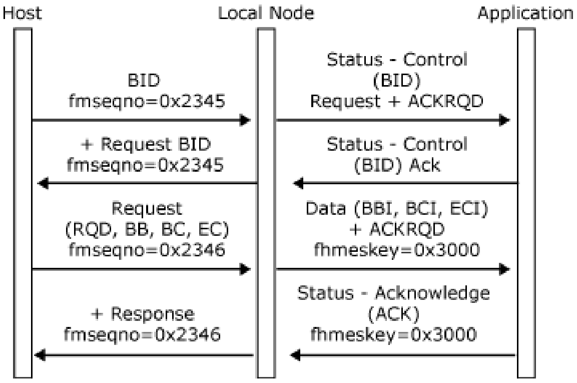
In the first figure, the application initiates a bracket by sending an inbound chain with the BBI application flag set when its state is between-bracket. The application's state is in-bracket until it receives a **Status-Session(BETB)**. (If the application can send RQE chains, a bracket can be opened by sending an RQE chain.)


Host
Local Node
Application
Request
(BB, BC, EC, RQD)
fmseqno=0x1234
Data (BBI, BCI, ECI)
+ ACKRQD
fhmeskey=0x2000
Status - Acknowledge
(ACK)
fhmeskey=0x2000
+ Response
fmseqno=0x1234

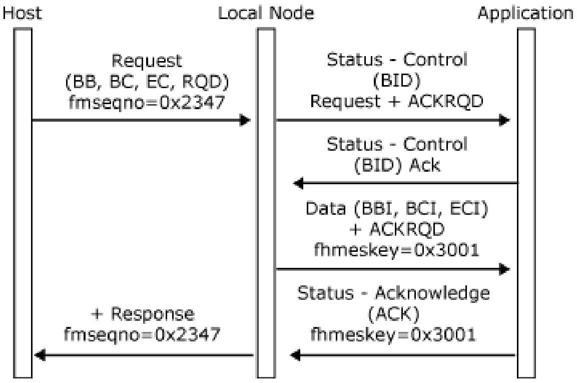
In the following figure, the application initiates a bracket by sending a **Status-Control(LUSTAT)** with the begin bracket indicator (BBI) application flag set when its state is between-bracket. The application's state is in-bracket until it receives a **Status-Session(BETB)**. The **LUSTAT** can be sent **NOACKRQD** (RQE) if required.


Host
Local Node
Application
LUSTAT (BB, RQD)
fmseqno=0x1234
Status - Control
(LUSTAT)
BBI + ACKRQD
+ Response
LUSTAT
fmseqno=0x1234
Status - Acknowledge
(ACK)

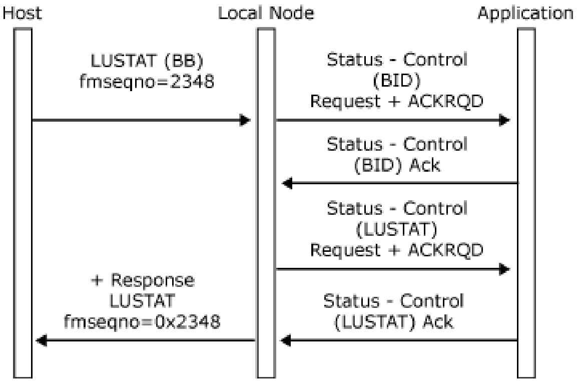
In the following figure, the host initiates a bracket by sending **BID**, which the application accepts. The application's state is in-bracket and the host can send.


Host
Local Node
Application
BID
fmseqno=0x2345
Status - Control
(BID)
Request + ACKRQD
+ Request BID
fmseqno=0x2345
Status - Control
(BID) Ack
Request
(RQD, BB, BC, EC)
fmseqno=0x2346
Data (BBI, BCI, ECI)
+ ACKRQD
fhmeskey=0x3000
+ Response
fmseqno=0x2346
Status - Acknowledge
(ACK)
fhmeskey=0x3000

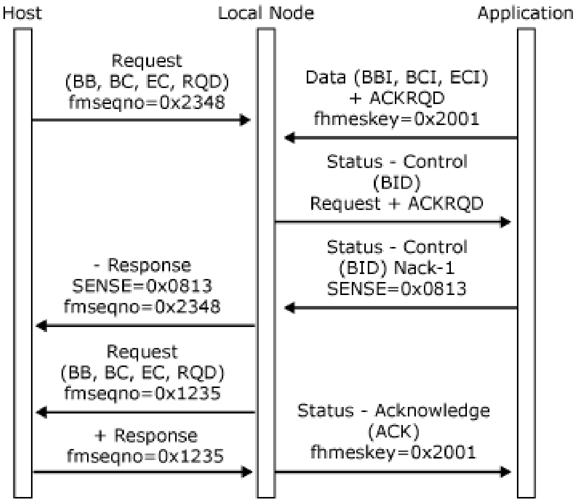
In the following figure, the host PLU initiates a bracket by sending a request with begin bracket (BB), which the application accepts. The application's state is in-bracket, and the host can send.


Host
Local Node
Application
Request
(BB, BC, EC, RQD)
fmseqno=0x2347
Status - Control
(BID)
Request + ACKRQD
Status - Control
(BID) Ack
Data (BBI, BCI, ECI)
+ ACKRQD
fhmeskey=0x3001
+ Response
fmseqno=0x2347
Status - Acknowledge
(ACK)
fhmeskey=0x3001

In the following figure, the host initiates a bracket by sending an **LUSTAT** with BB, which the application accepts. The application's state is in-bracket, and the host can send.


Host
Local Node
Application
LUSTAT (BB)
fmseqno=2348
Status - Control
(BID)
Request + ACKRQD
Status - Control
(BID) Ack
Status - Control
(LUSTAT)
Request + ACKRQD
+ Response
LUSTAT
fmseqno=0x2348
Status - Control
(LUSTAT) Ack

In the following figure, the host and application both attempt to initiate a bracket in between-bracket state. The application rejects the host bids with sense code 0x0813, and the local node delivers the application's data. After sending the data, the application's state is in-bracket, and the application can send.


Host
Local Node
Application
Request
(BB, BC, EC, RQD)
fmseqno=0x2348
Data (BBI, BCI, ECI)
+ ACKRQD
fhmeskey=0x2001
Status - Control
(BID)
Request + ACKRQD
Status - Control
(BID) Nack-1
SENSE=0x0813
- Response
SENSE=0x0813
fmseqno=0x2348
Request
(BB, BC, EC, RQD)
fmseqno=0x1235
Status - Acknowledge
(ACK)
fhmeskey=0x2001
+ Response
fmseqno=0x1235

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Bracket Termination

The local node supports bracket termination rule one (conditional) and bracket termination rule two (unconditional), as specified in the **BIND** request. Some sessions only allow bracket termination by one session partner. This is a **BIND** option, supplied in the bind information control block (BICB) on Open(PLU) OK Confirm), and it is the application's responsibility to determine if (and when) it should request bracket termination.

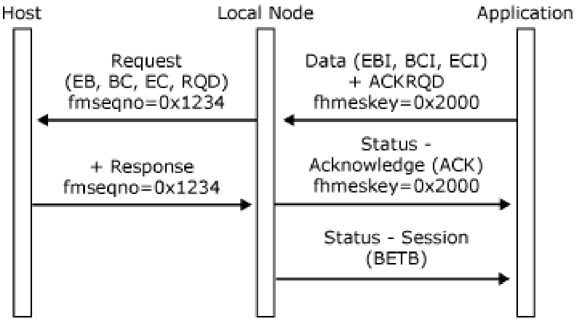
If an application is allowed by its **BIND** to terminate brackets, it does so by setting the End Bracket Indicator (EBI) application flag in an inbound Data or **Status-Control(LUSTAT/CHASE/QC/CANCEL)** message. The bracket is only terminated when the application receives a Status-Session (BETB) from the local node.

If the host terminates a bracket successfully, the local node sends a **Status-Session(BETB)** to the application. Note that the EBI application flag on outbound messages does not indicate bracket termination, but indicates that the corresponding request/response unit (RU) carried End Bracket (EB). The bracket is only terminated when the application receives **Status-Session(BETB)**.

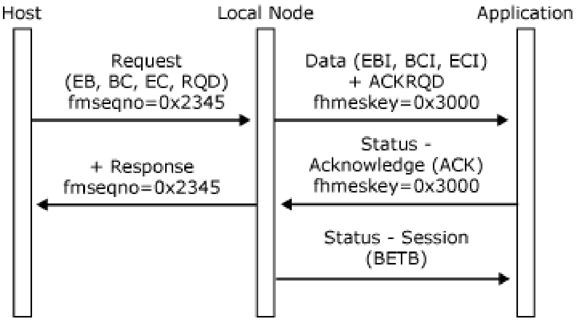
Note that if the application queues data, it should also queue **Status-Session(BETB)** messages. They must not be processed as expedited.

The following two figures illustrate bracket termination protocols between the local node and the application and how those protocols relate to the underlying SNA protocols.

In the following figure, the application successfully terminates a bracket by sending an EBI data chain when the application's state is in-bracket, which the host accepts. The local node sends a **Status-Session(BETB)** to indicate that the application's state is now between-bracket.


Host
Local Node
Application
Request
(EB, BC, EC, RQD)
fmseqno=0x1234
Data (EBI, BCI, ECI)
+ ACKRQD
fhmeskey=0x2000
+ Response
fmseqno=0x1234
Status -
Acknowledge (ACK)
fhmeskey=0x2000
Status - Session
(BETB)

In the following figure, the host successfully terminates a bracket by sending an EBI data chain when the application's state is in-bracket, which the application accepts. The local node sends a **Status-Session(BETB)** to indicate that the application's state is now between-bracket.


Host
Local Node
Application
Request
(EB, BC, EC, RQD)
fmseqno=0x2345
Data (EBI, BCI, ECI)
+ ACKRQD
fhmeskey=0x3000
+ Response
fmseqno=0x2345
Status -
Acknowledge (ACK)
fhmeskey=0x3000
Status - Session
(BETB)

Direction

When an function management interface (FMI) application is communicating on its primary logical unit (PLU) connection with a normal flow request mode other than full-duplex (that is, half-duplex flip-flop or half-duplex contention), it must obey the SNA direction protocol. These two modes are treated separately.

This section contains:

- Half-Duplex Flip-Flop Direction
- Half-Duplex Contention

Half-Duplex Flip-Flop Direction

The **BIND** used to establish the session carries information about the initial state of the bracket and direction machines. This can be specified in the **BIND** if either of the following conditions are satisfied:

- Brackets are not used.
- Brackets reset state is in-bracket.

If neither of the conditions hold, the initial direction state is contention.

When the direction is specified in the **BIND**, the application should assume the direction state specified in the half-duplex reset state as soon as data can flow. This field can be obtained indirectly by using a **BIND** check index that only accepts a particular direction, or directly by reading the **HDXRSET** field in the bind information control block (BICB) on the Open(PLU) OK Confirm message or by reading the **BIND** on the Open(PLU) Request. For more information about opening the PLU connection, see Opening the PLU Connection.

When in contention state, either the PLU or the application can initiate a bracket. (For more information, see Brackets.) The successful initiator of the bracket obtains direction unless direction is relinquished when opening the bracket by sending Begin Bracket (BB), Begin Chain (BC), End Chain (EC), or Change Direction (CD). Because the secondary is assumed to be the contention winner, the application can assume send state from contention sending BB and rejecting any subsequent **Status-Control(BID) Request** from the local node before receiving **Status-Session(BETB)**. When the application accepts a S**tatus-Control(BID) Request** in contention state, it must assume receive state.

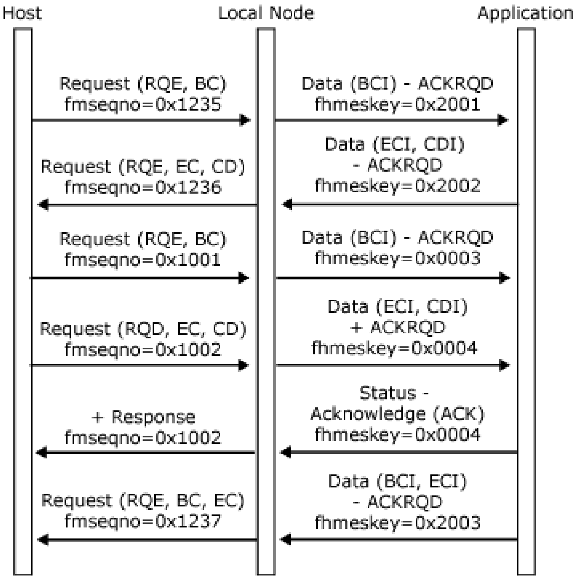
Half-duplex flip-flop direction can change through the following actions:

- Sending or receiving data with the change direction (CD) indicator in the RH, and the corresponding change direction indicator (CDI) flag on the **DATAFMI** and Status-Control messages. Note that CD is only used at the end of a chain (and for applications receiving segments that will be delivered with ECI, EBIUI). Also note that CD is valid on the following normal flow **Status-Control** requests: **LUSTAT**, **CANCEL**, **CHASE** and **QC**.
- Receiving a negative response when the application should assume receive state (error recovery pending state). For more information, see Recovery.
- If the application rejects data from the host carrying CDI, it must remain in receive state.

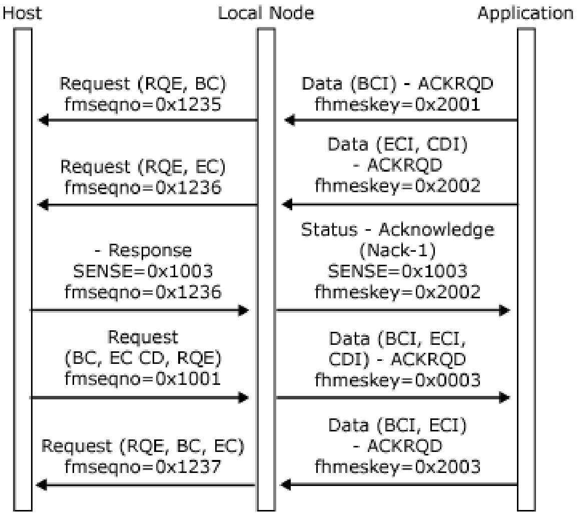
Providing the FM profile is correct (3, 4, or 7), the application can request direction from the host using a **Status Control(SIGNAL) Request** with CODE1 set to 0x0001. CODE2 is set to a user-defined value.

The following three figures illustrate the direction protocol for applications using the half-duplex flip-flop mode.

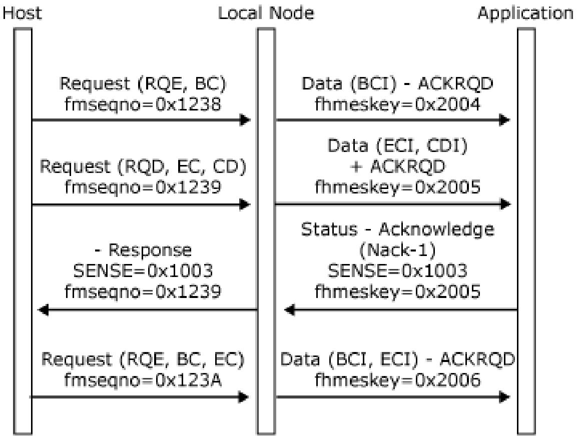
In the first figure, the application issues and receives the CD without error.


Host
Local Node
Application
Request (RQE, BC)
fmseqno=0x1235
Data (BCI) - ACKRQD
fhmeskey=0x2001
Request (RQE, EC, CD)
fmseqno=0x1236
Data (ECI, CDI)
- ACKRQD
fhmeskey=0x2002
Request (RQE, BC)
fmseqno=0x1001
Data (BCI) - ACKRQD
fhmeskey=0x0003
Request (RQD, EC, CD)
fmseqno=0x1002
Data (ECI, CDI)
+ ACKRQD
fhmeskey=0x0004
+ Response
fmseqno=0x1002
Status -
Acknowledge (ACK)
fhmeskey=0x0004
Request (RQE, BC, EC)
fmseqno=0x1237
Data (BCI, ECI)
- ACKRQD
fhmeskey=0x2003

In the following figure, the host sends a negative response to inbound data. The application assumes receive state, and then the host sends CD to give the application direction.


Host
Local Node
Application
Request (RQE, BC)
fmseqno=0x1235
Data (BCI) - ACKRQD
fhmeskey=0x2001
Request (RQE, EC)
fmseqno=0x1236
Data (ECI, CDI)
- ACKRQD
fhmeskey=0x2002
- Response
SENSE=0x1003
fmseqno=0x1236
Status - Acknowledge
(Nack-1)
SENSE=0x1003
fhmeskey=0x2002
Request
(BC, EC CD, RQE)
fmseqno=0x1001
Data (BCI, ECI,
CDI) - ACKRQD
fhmeskey=0x0003
Request (RQE, BC, EC)
fmseqno=0x1237
Data (BCI, ECI)
- ACKRQD
fhmeskey=0x2003

In the following figure, a complete outbound chain is received without error, but is rejected by the application. Note that even though the chain carried CD, the application does not have direction.


Host
Local Node
Application
Request (RQE, BC)
fmseqno=0x1238
Data (BCI) - ACKRQD
fhmeskey=0x2004
Request (RQD, EC, CD)
fmseqno=0x1239
Data (ECI, CDI)
+ ACKRQD
fhmeskey=0x2005
- Response
SENSE=0x1003
fmseqno=0x1239
Status - Acknowledge
(Nack-1)
SENSE=0x1003
fhmeskey=0x2005
Request (RQE, BC, EC)
fmseqno=0x123A
Data (BCI, ECI) - ACKRQD
fhmeskey=0x2006

Half-Duplex Contention

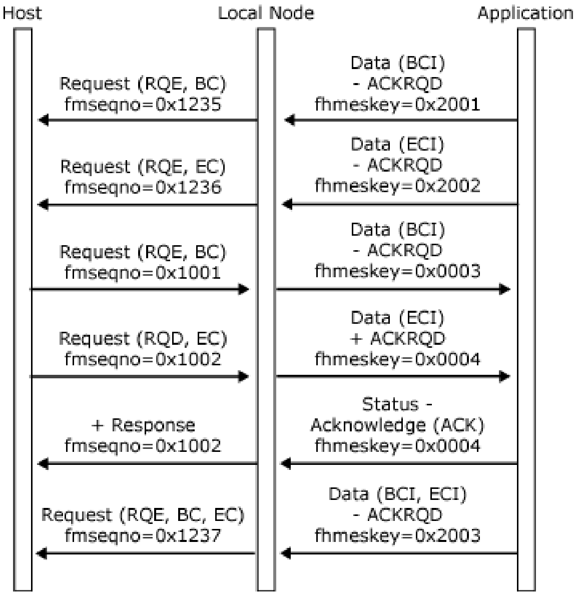
For half-duplex contention, the initial direction state is contention. Half-duplex protocol operates during a chain (only one partner can send), but the direction state normally returns to contention at the end of each chain. The change direction indicator (CDI) in the response header (RH) is thus not required. However, if the CDI is used, direction is reserved for the receiving half-session. Therefore, if the application receives change direction (CD), it should assume send state and not expect to receive data. Conversely, if the application sends CD, it cannot send again until it has received a chain from the host.

In the event of an error being discovered by either half-session, the application must assume receive state, because the host is responsible for recovery.

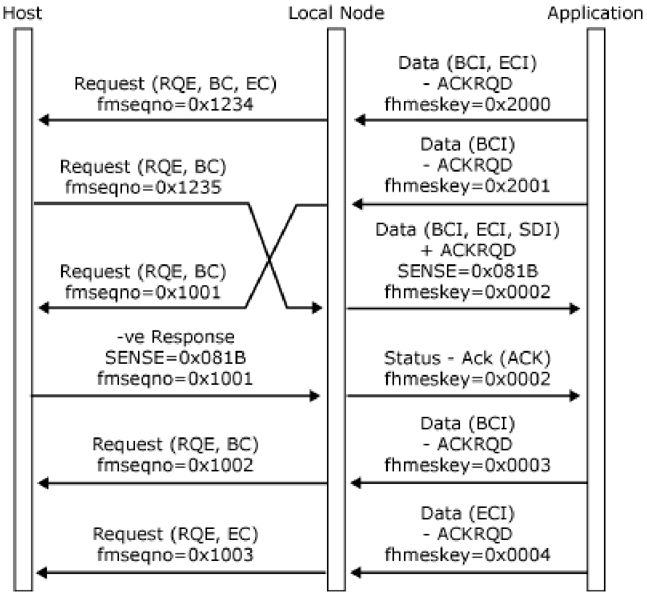
If both half-sessions attempt to start a chain when the direction state is contention, the race is resolved in favor of the secondary application using a sense code of 0x081B. However, the possible window between the local node and the application means that the local node cannot determine when outbound Request Exception (RQE) data is received by the application. Therefore, if the local node receives data from the application while it determines that the half-duplex contention state is receive, it will reject it with a noncritical NACK-2 (0x2004 direction).

The following two figures illustrate the direction protocol for applications using half-duplex contention mode. The three figures in the previous topic would also be valid although CD does not need to be specified.

In the following figure, the application issues and receives data using half-duplex contention protocol without error.


Host
Local Node
Application
Data (BCI)
- ACKRQD
fhmeskey=0x2001
Request (RQE, BC)
fmseqno=0x1235
Data (ECI)
- ACKRQD
fhmeskey=0x2002
Request (RQE, EC)
fmseqno=0x1236
Request (RQE, BC)
fmseqno=0x1001
Data (BCI)
- ACKRQD
fhmeskey=0x0003
Request (RQD, EC)
fmseqno=0x1002
Data (ECI)
+ ACKRQD
fhmeskey=0x0004
Status -
Acknowledge (ACK)
fhmeskey=0x0004
+ Response
fmseqno=0x1002
Data (BCI, ECI)
- ACKRQD
fhmeskey=0x2003
Request (RQE, BC, EC)
fmseqno=0x1237

In the following figure, the half-duplex contention race is resolved in favor of the application.


Host
Local Node
Application
Data (BCI, ECI)
- ACKRQD
fhmeskey=0x2000
Request (RQE, BC, EC)
fmseqno=0x1234
Data (BCI)
- ACKRQD
fhmeskey=0x2001
Request (RQE, BC)
fmseqno=0x1235
Request (RQE, BC)
fmseqno=0x1001
Data (BCI, ECI, SDI)
+ ACKRQD
SENSE=0x081B
fhmeskey=0x0002
-ve Response
SENSE=0x081B
fmseqno=0x1001
Status - Ack (ACK)
fhmeskey=0x0002
Data (BCI)
- ACKRQD
fhmeskey=0x0003
Request (RQE, BC)
fmseqno=0x1002
Data (ECI)
- ACKRQD
fhmeskey=0x0004
Request (RQE, EC)
fmseqno=0x1003

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Pacing and Chunking

The local node supports session pacing inbound and outbound, according to the pacing values in the **BIND** parameters for the session. The application can be involved in outbound pacing through the use of the Status-Resource message. Inbound pacing is handled transparently by the local node and need not concern the application.

This section contains:

- Outbound Pacing
- Chunking

Outbound Pacing

If the application has enough resources to handle outbound data as fast as the network can provide it (for example, a screen), or if a higher level protocol (for example, immediate request mode) constrains the data flow, the application need not be involved in pacing, and it is possible for the local node to handle outbound pacing transparently.

However, certain types of applications may require involvement in outbound pacing. If the application has limited resources (for example, a printer), the application should specify the application pacing option in the connection information control block (CICB) on the Open(PLU) OK Response. (For more information, see Opening the PLU Connection.) The application should also provide the local node with information about the state of these resources initially on the **Open(PLU) OK Response** and periodically using **Status-Resource** messages.

To assist the application in calculating the initial credit field in the **Open(PLU) OK Response**, the local node delivers the pacing window sizes and the primary and secondary maximum request/response unit (RU) sizes on the Open(PLU) Request. The initial credit must be at least as large as the primary to secondary pacing window size. Otherwise, the **BIND** will be rejected and the application will be sent an Open(PLU) Error Confirm message. The local node fills in a suggested initial credit value of one more than the pacing window (to try to avoid stop-start situations).

Note that the local node will also reject the **BIND** if the application specifies that it needs to be involved in pacing (of whatever initial credit), but the **BIND** specifies that there is no outbound pacing.

Only function management data (FMD) requests are part of the credit scheme, so the application must maintain space within its buffer for one Status-Control request per RU in addition to the number of RUs specified by the initial credit count. (A **Status-Control** message takes up 36 bytes.)

Each unit of credit that the application delivers to the local node allows the local node to give the application a single RU (or a single chunk if chunking is being used). Note that if the application is receiving segments, this may correspond to several **DATAFMI** messages. The application can count RUs for the purpose of outbound flow control by using the begin basic information unit (BBIU) and end basic information unit (EBIU) flags.

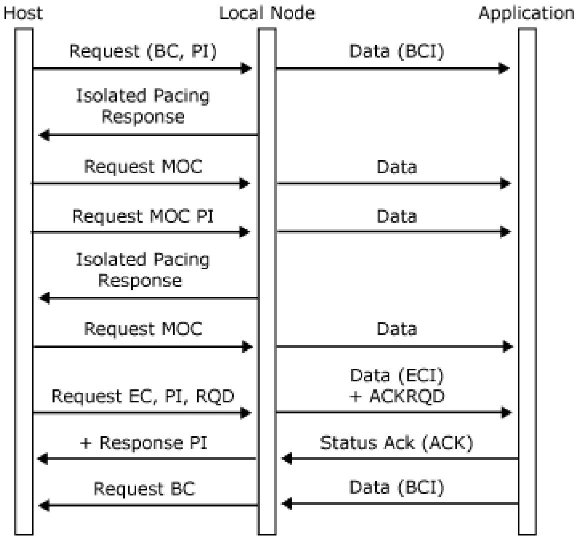
The application should maintain a credit-used count, which it should report to the local node on Status-Resource messages. The application needs to take the following actions:

- On processing (not receiving) **DATAFMI** messages with EBIU set (corresponding to FMD requests), increment the credit-used count by one.
- On processing **Status-Control** messages and all other messages from the local node, do not increment the credit-used count.
- Periodically report the current credit-used count on a **Status-Resource** message.
- Report the credit-used count when its buffer becomes empty (whatever the last message processed was), unless the credit-used count is zero.
- When the credit-used count is reported to the local node, reset it to zero.

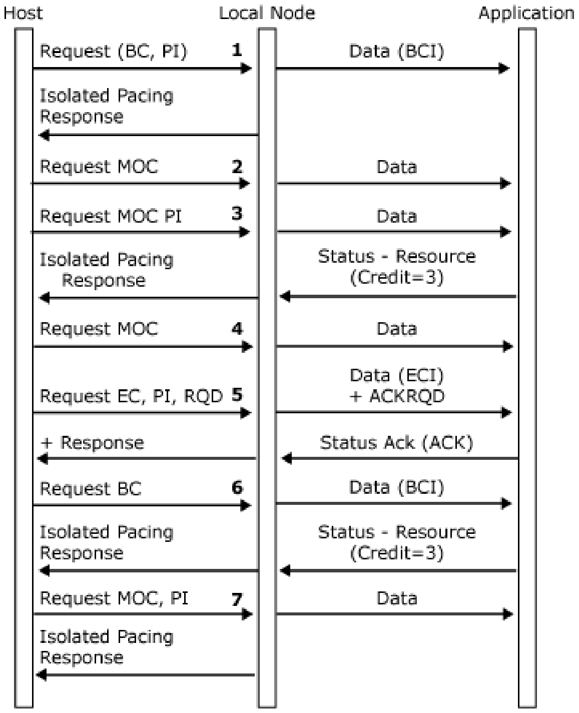
The frequency at which the application provides Status-Resource messages is not architected. However, the local node will only send the application as many Data messages as it has received credit for. When the application's credit-used count reaches the initial credit value, the local node will not send any more data. The application should attempt to send a **Status-Resource** message before this happens, because if the local node cannot send a **Data** message to the application and the host is still sending requests, the local node may not be able to send a pacing response to the host when required, with a consequent degradation of performance.

If the pacing window is small, such as one or two, the application should send a **Status-Resource** after processing each **DATAFMI** message to enable the local node to send the suitable pacing response.

The following figure shows the local node handling outbound pacing when the application is not involved (APPLPAC = 0x00). The pacing window is assumed to be two.


Host
Local Node
Application
Request (BC, PI)
Data (BCI)
Isolated Pacing Response
Request MOC
Data
Request MOC PI
Data
Isolated Pacing Response
Request MOC
Data
Request EC, PI, RQD
Data (ECI) + ACKRQD
+ Response PI
Status Ack (ACK)
Request BC
Data (BCI)

The following figure shows the local node and the application handling outbound pacing with the outbound pacing window assumed to be two and the initial credit from the local node to the application assumed to be four. Note that the local node can send an isolated pacing response (IPR) to the host to get another window full of data as soon as the application has sufficient credit for the rest of the present window and the next window.


Host
Local Node
Application
Request (BC, PI)
1
Data (BCI)
Isolated Pacing Response
Request MOC
2
Data
Request MOC PI
3
Data
Isolated Pacing Response
Status - Resource (Credit=3)
Request MOC
4
Data
Request EC, PI, RQD
5
Data (ECI) + ACKRQD
+ Response
Status Ack (ACK)
Request BC
6
Data (BCI)
Isolated Pacing Response
Status - Resource (Credit=3)
Request MOC, PI
7
Data
Isolated Pacing Response

Chunking

Chunking can be thought of as similar to segmentation. (For more information, see Segment Delivery.) The distinction is that segmentation is determined by the communications link between the local node and the remote system, whereas chunking is determined by the communications link between the application and the local node.

The application indicates on the Open(SSCP) Request whether it supports chunking, and, if so, the chunk size in bytes that it wants to use. The local node then uses the request/response unit (RU) size, the chunk size, and the segment size (if applicable) to determine whether chunking is necessary. It then specifies the chunk sizes used for inbound and outbound flow (which need not be the same) on the Open(PLU) Request. These values are specified in units of elements. (For more information, see Messages.) A value of zero for either of these sizes indicates that chunking is not necessary because the chunk size is not the limiting factor. Note that in chunking data, an RU will not be split in the middle of an element. This avoids data copying.

For example, assume that the local node is using an RU size of 8 kilobytes (KB) and segments of 2 KB, and the application's **Open(SSCP) Request** specifies segment delivery and a chunk size of 4 KB. Chunking will be used on inbound data flow (because the chunk size is smaller than the RU size), but is not necessary on outbound data flow (because data will be delivered in segments that are smaller than the chunk size).

If chunking is being used in either direction, all credit values specify the number of chunks that can be sent in that direction, not the number of RUs. Note that the segment delivery option is included on the **Open(SSCP) Request** to enable the local node to calculate the initial chunk credit values on the corresponding PLU connection. The application must also set this option on the **Open(PLU) Response**. If the **Open(SSCP) Request** and the **Open(PLU) Response** have different settings of this option, the setting from the **Open(PLU) Response** will be used. This can mean that the initial credit value used is not appropriate.

If session-level pacing is being used, the local node links this to the chunking credit. In particular, if the application withholds credit, the local node will delay sending a pacing response to the host, thereby applying back pressure to the host. This linkage is handled by the local node and need not concern the application.

Application flags on chunks of RUs are handled in the same way as those on segments. (For more information, see Application Flags and Segment Delivery.) In particular:

- FMHI, BCI, COMMIT, BBI, EBI, CODE, ENCRYP, ENPAD, QRI, and CEI are only set on the first chunk of an RU.
- ECI and CDI are only set on the last chunk of an RU.
- BBIUI is always set on the first chunk of an RU.
- EBIUI is always set on the last chunk of an RU.

Note that EBI is set on the first chunk of the last RU in a bracket and not on the last chunk as might be expected. This is the same behavior as for segment delivery. The application should use the **Status-Session(BETB)** message, not the EBI flag, to determine when a bracket has ended.

Chunks are identified using the segmentation flags BBIUI and EBIUI, and therefore the application cannot distinguish between chunks and segments if both segmentation and chunking are being used outbound. However, there is generally no need for the distinction. The application can perform window shading by displaying each unit of data as it is received, whether the unit of data is a segment or a chunk. (For more information, see Segment Delivery.)

> **Note** Previous versions of this document indicated this as a future feature. The support is enabled in Microsoft Host Integration Server 2004. Applications can test the product version returned on a call to sepdgetinfo for version 1.2 or later before using the chunking system.

In some cases, the RU size used by the local node may be too large for the length of the path between the local node and an FMI application, for example, when using a 16 megabyte (MB) token-ring link, which can support 16 kilobyte (KB) frames. The local node allows an FMI application to specify that data transfer should be in smaller units, called chunks.

Confirmation and Rejection of Data

The following topics describe conditions under which inbound and outbound data is confirmed or rejected.

This section contains:

- Confirmation and Rejection of Inbound Data
- Confirmation and Rejection of Outbound Data

Confirmation and Rejection of Inbound Data

For every SNA chain of data sent or received for which responses are outstanding, such as Request Exception (RQE) or Definite Response Required (RQD), the local node maintains a correlation table entry. If the table entries become depleted, the local node will terminate the session using the most table entries. A Status-Error message (code 0x46) and a Close(PLU) Request are sent to the application, and a **TERM-SELF** message is sent to the host. Table entry shortages (inbound) can be avoided by sending change direction (CD) (for half-duplex) data, or data **ACKRQD,** or any **Status-Control(CHASE)**, or **Status-Control(LUSTAT)** with **ACKRQD**. Outbound shortages can be avoided by sending courtesy acknowledge messages as described in Opening the PLU Connection.

The local node sends chains of data to the host with their chain response mode specified as follows:

1. Definite

   If the application sends a **Data** message to the local node with the **ACKRQD** field set, and the **BIND** parameters specified that the secondary uses definite or definite/exception response mode.

2. Exception

   If the application sends a **Data** message to the local node without the **ACKRQD** field set, and the **BIND** parameters specified that the secondary uses exception or definite/exception response mode.

3. No-Response

   If the application sends a **Data** message to the local node without the **ACKRQD** field set, and the **BIND** parameters specified that the secondary uses no-response mode.

If the setting of **ACKRQD** on a Data message from the application does not reflect the chain response mode specified in the **BIND** parameters, the local node returns a Status-Acknowledge(Nack-2) indicating a noncritical error code. For example, if the application specifies **ACKRQD** but the **BIND** parameters do not permit the local node to send definite response chains.

In case 1, the application receives an acknowledgment to all function management data (FMD) chains it sends to the local node:

- Positive responses from the host are returned to the application as Status-Acknowledge(Ack) messages.
- Negative responses from the host are returned as Status-Acknowledge(Nack-1) messages carrying the SNA sense codes.
- Errors detected by the local node when attempting to send the message are returned as Status-Acknowledge(Nack-2) messages carrying the equivalent error code.

In case 2, the application only receives an acknowledgment of an FMD chain it sends to the local node for:

- Negative responses from the host, which are returned as **Status-Acknowledge(Nack-1)** messages carrying the SNA sense codes.
- Errors detected by the local node when attempting to send the message, which are returned as **Status-Acknowledge(Nack-2)** messages carrying the equivalent error code.

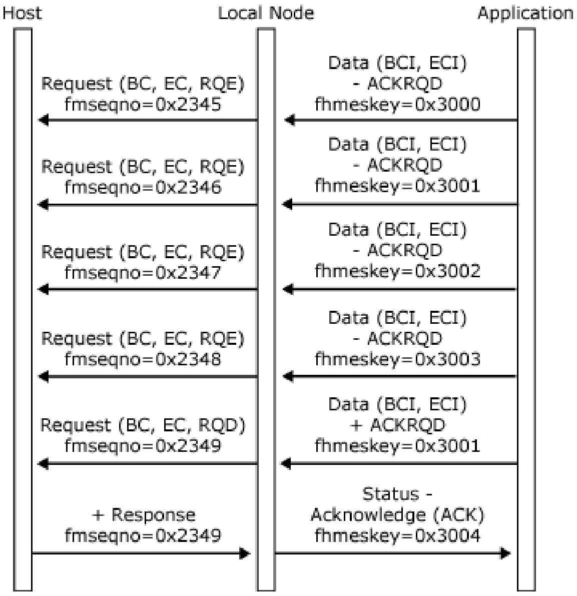
In case 3, the application only receives an acknowledgment of an FMD chain it sends to the local node when the node detects an error in the message and sends the application a **Status-Acknowledge(Nack-2)**. The only dissent that the host can make is to send a subsequent LUSTAT 0x400A (no response not supported) with the sequence number of the request in the sense qualifier field. This is presented to the application as a **Status-Control(LUSTAT)** as usual.

Whenever an application receives a **Status-Acknowledge(Ack)** or **Status-Acknowledge(Nack-1)**, it implicitly confirms receipt by the partner half-session in the host of all previously sent chains.

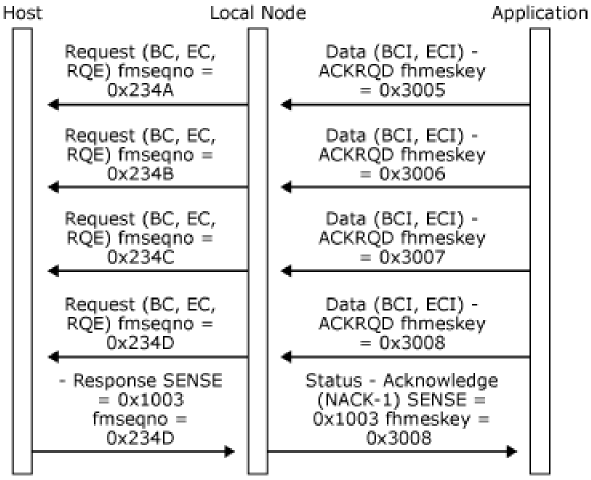
In case 2, the application does not usually receive such responses from the host to chains it has sent, and in case 3, the application never receives such responses. Therefore, to get the host to confirm receipt of all previously sent chains, the application should issue a **Status-Control(CHASE) Request** with ACKRQD set. This causes the local node to generate an SNA **CHASE** request to the host. The receipt of the response to this CHASE confirms that the host has received this **CHASE** request and all previous chains sent by the application. The local node issues a **Status-Control(CHASE) Acknowledge** to notify the application that this is so.

The following three figures illustrate the inbound data confirmation and rejection protocols between the local node and the application, and how those protocols relate to the underlying SNA protocols.

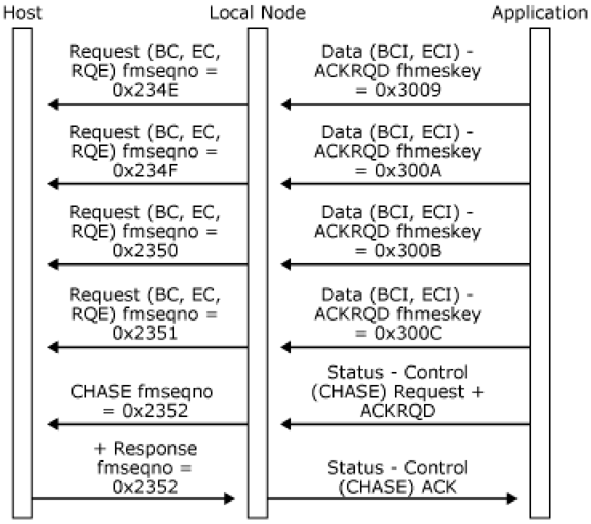
In the first figure, an application sets the **ACKRQD** field in an inbound data chain to get the host to confirm receipt of the chain and all previously sent chains.


Host
Local Node
Application
Request (BC, EC, RQE) fmseqno=0x2345
Data (BCI, ECI) - ACKRQD fhmeskey=0x3000
Request (BC, EC, RQE) fmseqno=0x2346
Data (BCI, ECI) - ACKRQD fhmeskey=0x3001
Request (BC, EC, RQE) fmseqno=0x2347
Data (BCI, ECI) - ACKRQD fhmeskey=0x3002
Request (BC, EC, RQE) fmseqno=0x2348
Data (BCI, ECI) - ACKRQD fhmeskey=0x3003
Request (BC, EC, RQD) fmseqno=0x2349
Data (BCI, ECI) + ACKRQD fhmeskey=0x3001
+ Response fmseqno=0x2349
Status - Acknowledge (ACK) fhmeskey=0x3004

In the following figure, the **Status-Acknowledge(Nack-1)** rejects the last chain, but confirms receipt by the host of all previously sent data chains.


Host
Local Node
Application
Request (BC, EC, RQE) fmseqno = 0x234A
Data (BCI, ECI) - ACKRQD fhmeskey = 0x3005
Request (BC, EC, RQE) fmseqno = 0x234B
Data (BCI, ECI) - ACKRQD fhmeskey = 0x3006
Request (BC, EC, RQE) fmseqno = 0x234C
Data (BCI, ECI) - ACKRQD fhmeskey = 0x3007
Request (BC, EC, RQE) fmseqno = 0x234D
Data (BCI, ECI) - ACKRQD fhmeskey = 0x3008
- Response SENSE = 0x1003 fmseqno = 0x234D
Status - Acknowledge (NACK-1) SENSE = 0x1003 fhmeskey = 0x3008

In the following figure, the application uses a **Status-Control(CHASE)** to get the host to confirm receipt of the corresponding **CHASE** request and all previously sent chains.


Host
Local Node
Application
Request (BC, EC, RQE) fmseqno = 0x234E
Data (BCI, ECI) - ACKRQD fhmeskey = 0x3009
Request (BC, EC, RQE) fmseqno = 0x234F
Data (BCI, ECI) - ACKRQD fhmeskey = 0x300A
Request (BC, EC, RQE) fmseqno = 0x2350
Data (BCI, ECI) - ACKRQD fhmeskey = 0x300B
Request (BC, EC, RQE) fmseqno = 0x2351
Data (BCI, ECI) - ACKRQD fhmeskey = 0x300C
CHASE fmseqno = 0x2352
Status - Control (CHASE) Request + ACKRQD
+ Response fmseqno = 0x2352
Status - Control (CHASE) ACK

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Confirmation and Rejection of Outbound Data

The local node sends chains of data from the host to the application with their **ACKRQD** field set as follows:

- **ACKRQD** set

  If the corresponding SNA request was received specifying definite response, and the **BIND** parameters specify that the primary uses definite or definite/exception chain response mode.

1. **ACKRQD** not set, response mode

   If the corresponding SNA request was received specifying exception response, and the **BIND** parameters specify that the primary uses exception or definite/exception chain response mode.

2. **ACKRQD** not set, no-response mode

   If the corresponding SNA request was received specifying no response, and the **BIND** parameters specify that the primary uses no-response chain response mode.

In case 1, the application should always send an acknowledgment as follows:

- If the application accepts the data, it should return a Status-Acknowledge(Ack) message.
- If the application wants to reject the data, it should return a **Status-Acknowledge(Nack-1)** message carrying the appropriate SNA sense codes.

In case 2, the application should only send an acknowledgment in the following cases:

- If the application wants to reject the data, it should return a **Status-Acknowledge(Nack-1)** message carrying the appropriate SNA sense codes.
- The application can send a courtesy acknowledgement to a Request Exception (RQE) message to clear up correlation data within the local node. (For more information, see Outbound Data.)

In case 3, the application should not send acknowledgments. However, the sending of a **Status-Acknowledge(Ack)** or **Status-Acknowledge(Nack-1)** by the application has no effect. It is discarded.

Whenever an application sends a **Status-Acknowledge(Ack)** or **Status-Acknowledge(Nack-1)** to a received Data message, it implicitly confirms receipt of this and all previously received Data messages.

In case 2, the host can issue a **CHASE** request. The local node sends a **Status-Control(CHASE) Request** with **ACKRQD** set to the application. When the application is in a position to confirm receipt of all outstanding data, it should issue a **Status-Control(CHASE) Acknowledge** message, which the local node converts into a positive response to **CHASE** for the host.

In cases 1 and 2, if the local node detects an error in a received request, it converts the request into a special Data message, which it passes to the application. Regardless of the chain response mode specified for the secondary in the **BIND** parameters, this **Data** message has the following characteristics:

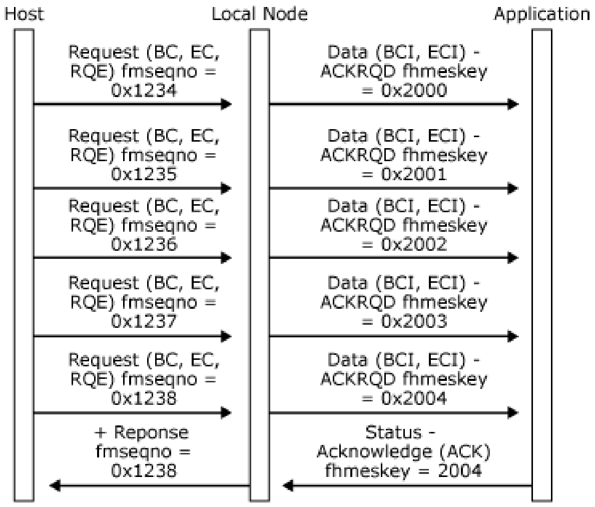
- **ACKRQD** is set. The application must confirm receipt using a Status-Acknowledge(Ack) message.
- The Sense Data Indicator (SDI) application flag is set to indicate that this is a special Data message used to inform the application of an error detected by the local node.
- The End Chain Indicator (ECI) application flag is set to indicate that the received chain has now terminated.
- The first four bytes of the buffer element hold the SNA sense codes detected by the local node that caused the termination.

This mechanism enables:

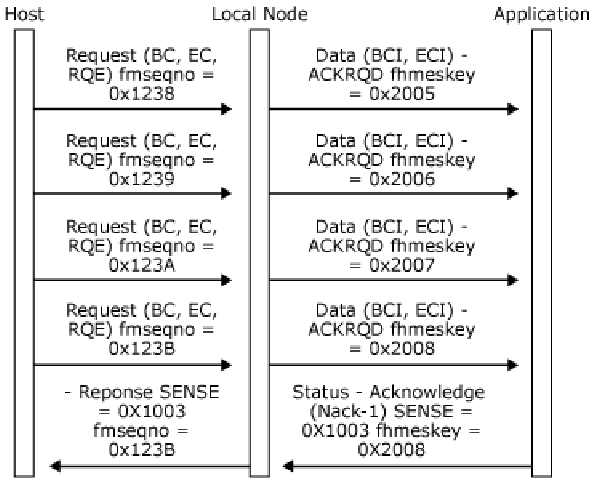
- The application to reject any previously received **Data** messages.
- The local node to inform the application of any errors it detects in received requests.
- The local node to send negative responses in the correct order.

The following three figures illustrate the outbound data confirmation and rejection protocols between the local node and the application and how those protocols relate to the underlying SNA protocols.

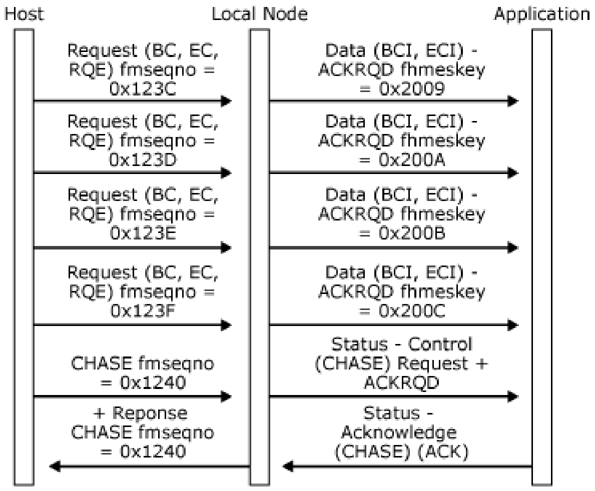
In the first figure, the host sends a definite response chain to get the application to confirm receipt of the RQD request and all previously sent RQE chains.


Host
Local Node
Application
Request (BC, EC, RQE) fmseqno = 0x1234
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2000
Request (BC, EC, RQE) fmseqno = 0x1235
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2001
Request (BC, EC, RQE) fmseqno = 0x1236
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2002
Request (BC, EC, RQE) fmseqno = 0x1237
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2003
Request (BC, EC, RQE) fmseqno = 0x1238
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2004
+ Reponse fmseqno = 0x1238
Status - Acknowledge (ACK) fhmeskey = 2004

In the following figure, a **Status-Acknowledge(Nack-1)** from the application rejects the last chain and confirms receipt of all previously sent data chains.


Host
Local Node
Application
Request (BC, EC, RQE) fmseqno = 0x1238
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2005
Request (BC, EC, RQE) fmseqno = 0x1239
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2006
Request (BC, EC, RQE) fmseqno = 0x123A
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2007
Request (BC, EC, RQE) fmseqno = 0x123B
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2008
- Reponse SENSE = 0X1003 fmseqno = 0x123B
Status - Acknowledge (Nack-1) SENSE = 0X1003 fhmeskey = 0X2008

In the following figure, the host sends a **CHASE** request to get the application to confirm receipt of the **CHASE** and all previously sent chains.


Host
Local Node
Application
Request (BC, EC, RQE) fmseqno = 0x123C
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2009
Request (BC, EC, RQE) fmseqno = 0x123D
Data (BCI, ECI) - ACKRQD fhmeskey = 0x200A
Request (BC, EC, RQE) fmseqno = 0x123E
Data (BCI, ECI) - ACKRQD fhmeskey = 0x200B
Request (BC, EC, RQE) fmseqno = 0x123F
Data (BCI, ECI) - ACKRQD fhmeskey = 0x200C
CHASE fmseqno = 0x1240
Status - Control (CHASE) Request + ACKRQD
+ Reponse CHASE fmseqno = 0x1240
Status - Acknowledge (CHASE) (ACK)

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Shutdown and Quiesce

Both shutdown and quiesce protocols involve a half-session entering a quiesced state, in which it cannot send any more normal flow requests, but must continue to receive and respond to requests from its session partner. The essential differences are that shutdown can only be initiated by the host and only requires that the secondary quiesce as soon as is convenient (usually at the end of a bracket). Quiesce can be initiated by both the host and the application and requires that the recipient quiesce at the end of the chain.

If the application has been quiesced but still attempts to send inbound Data messages, they will be rejected with Status-Acknowledge(Nack-2) messages. The application can, however, continue to generate status messages.

This section contains:

- Shutdown
- Quiesce

Shutdown

The shutdown protocol provides a means for the host application to stop the application from sending any further normal flow requests. This protocol is used when the host application wants to end the session in an orderly manner and is only available for sessions using function management (FM) profile 3 or 4.

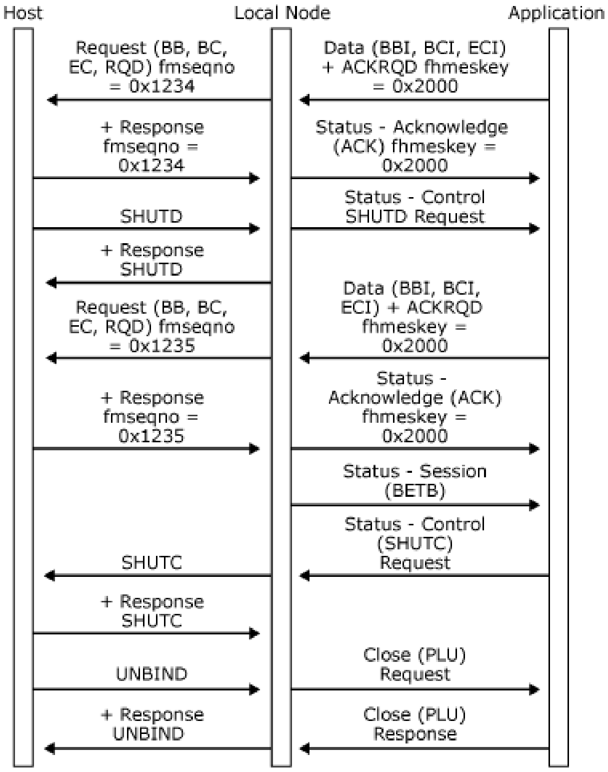
If the local node receives a **SHUTD** request from the host, it issues a **Status-Control(SHUTD) Request** (without **ACKRQD**) to request the application to enter a quiesced state at a convenient time. The application determines what is convenient. For example, it could be after a **Status-Session(BETB)** has been received.

When the application decides it is ready to quiesce, it should issue a **Status-Control(SHUTC) Request** (again without **ACKRQD**) to indicate this transition. The local node will notify the host of this change by sending a **SHUTC** request. The host can continue sending normal flow outbound requests and can subsequently take one of the following actions:

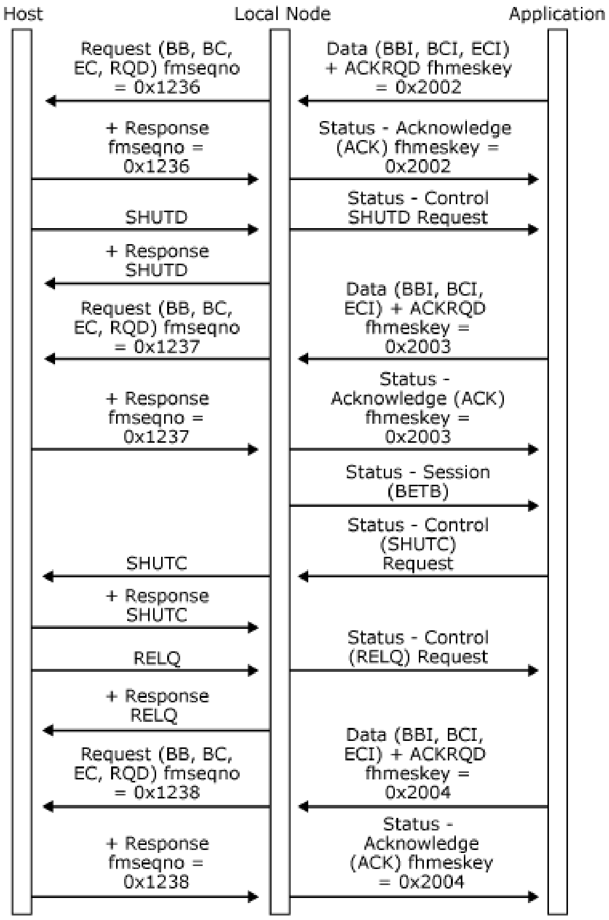
- The host terminates the primary logical unit (PLU) session by sending an **UNBIND** request. The local node closes the PLU connection by sending a Close(PLU) Request to the application. The system services control point (SSCP) session remains active.
- The host abandons the shutdown procedure by sending an **RELQ** request. The local node sends a **Status-Control(RELQ) Request** (with **ACKRQD**) to the application to indicate that it can now resume sending on the PLU session. **RELQ** is only supported on sessions using FM profile 4.
- The host resets the session by sending **CLEAR**, a Transmission Service profile (TS profile) 3 or 4. One of the effects of this is to release the quiesced state. (For more information, see Recovery.)

The following two figures illustrate the shutdown protocols between the local node and the application and how those protocols relate to the underlying SNA protocols.

In the following figure, the host sends **SHUTD** while the application is sending in the in-bracket state. The application completes the bracket, sends **Status-Control(SHUTC) Request**, and the host terminates the PLU session by sending **UNBIND**. The local node closes the PLU connection.


Host
Local Node
Application
Request (BB, BC, EC, RQD) fmseqno = 0x1234
Data (BBI, BCI, ECI) + ACKRQD fhmeskey = 0x2000
+ Response fmseqno = 0x1234
Status - Acknowledge (ACK) fhmeskey = 0x2000
SHUTD
Status - Control SHUTD Request
+ Response SHUTD
Request (BB, BC, EC, RQD) fmseqno = 0x1235
Data (BBI, BCI, ECI) + ACKRQD fhmeskey = 0x2000
+ Response fmseqno = 0x1235
Status - Acknowledge (ACK) fhmeskey = 0x2000
Status - Session (BETB)
SHUTC
Status - Control (SHUTC) Request
+ Response SHUTC
UNBIND
Close (PLU) Request
+ Response UNBIND
Close (PLU) Response

In the following figure, the host sends **SHUTD** while the application is sending in the in-bracket state. The application completes the bracket, sends **Status-Control(SHUTC) Request**, and then the host releases the application from the quiesced state by sending **RELQ**. The local node sends a **Status-Control(RELQ) Request** to the application, which initiates a new bracket.


Host
Local Node
Application
Request (BB, BC, EC, RQD) fmseqno = 0x1236
Data (BBI, BCI, ECI) + ACKRQD fhmeskey = 0x2002
+ Response fmseqno = 0x1236
Status - Acknowledge (ACK) fhmeskey = 0x2002
SHUTD
Status - Control SHUTD Request
+ Response SHUTD
Request (BB, BC, EC, RQD) fmseqno = 0x1237
Data (BBI, BCI, ECI) + ACKRQD fhmeskey = 0x2003
+ Response fmseqno = 0x1237
Status - Acknowledge (ACK) fhmeskey = 0x2003
Status - Session (BETB)
SHUTC
Status - Control (SHUTC) Request
+ Response SHUTC
RELQ
Status - Control (RELQ) Request
+ Response RELQ
Request (BB, BC, EC, RQD) fmseqno = 0x1238
Data (BBI, BCI, ECI) + ACKRQD fhmeskey = 0x2004
+ Response fmseqno = 0x1238
Status - Acknowledge (ACK) fhmeskey = 0x2004

Quiesce

The quiesce protocol is only supported on sessions using function management (FM) profile 4. The quiesce protocol can be initiated by either half-session.

When an application wants to quiesce its partner half-session in the host, it sends a **Status-Control(QEC) Request** to the local node. The node generates a **QEC** request to the host, which asks the host to quiesce after completing the current outbound chain.

If the host quiesces, it sends a **QC** request, which the local node presents to the application as a **Status-Control(QC) Request** (with **ACKRQD**). The host remains in a quiesced state until the application sends a **Status-Control(RELQ) Request**. The local node sends the **RELQ** request to the host, and the host resumes communications on the primary logical unit (PLU) session.

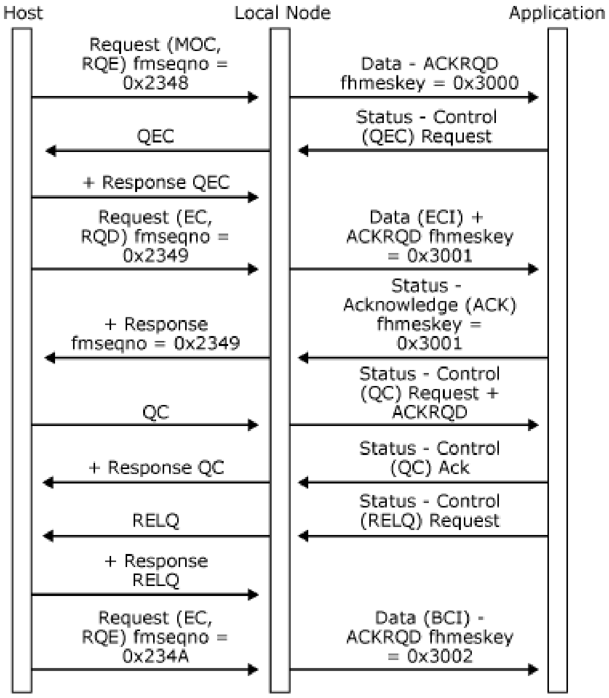
If the attempt to quiesce the host fails, the host responds with a negative **QEC** response, which the local node presents to the application as a **Status-Control(QEC) Negative-Acknowledge-1**.

Conversely, a **Status-Control(QEC) Request** (without **ACKRQD**) is presented to the application if a **QEC** request is received from the host. In this direction, **QEC** cannot be rejected. The local node will always force the application to quiesce after presenting it with a **Status-Control(QEC) Request** by rejecting further attempts to send inbound data. When the application has quiesced, it should send a **Status-Control(QC) Request** to the local node, which sends a **QC** request to the host. The application can subsequently be released by an **RELQ** request from the host, which the local node presents to the application as a **Status-Control(RELQ) Request**.

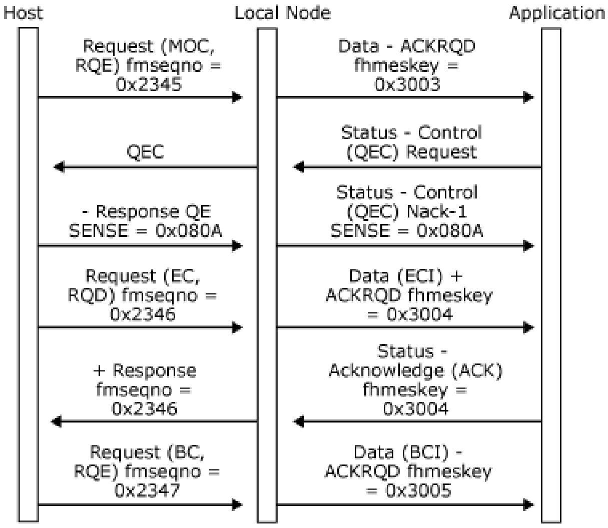
The receipt of a **CLEAR** or **UNBIND–BIND** sequence, **Close(PLU)–Open(PLU)**, causes the quiesced state to be released.

The following three figures illustrate the quiesce protocols between the local node and the application and how those protocols relate to the underlying SNA protocols.

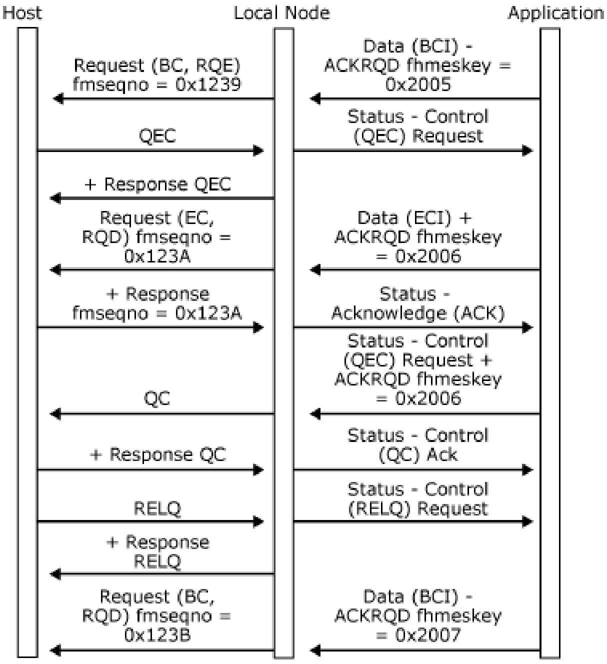
In the first figure, the application quiesces the host and then releases the quiesce.


Host
Local Node
Application
Request (MOC, RQE) fmseqno = 0x2348
Data - ACKRQD fhmeskey = 0x3000
QEC
Status - Control (QEC) Request
+ Response QEC
Request (EC, RQD) fmseqno = 0x2349
Data (ECI) + ACKRQD fhmeskey = 0x3001
+ Response fmseqno = 0x2349
Status - Acknowledge (ACK) fhmeskey = 0x3001
QC
Status - Control (QC) Request + ACKRQD
+ Response QC
Status - Control (QC) Ack
RELQ
Status - Control (RELQ) Request
+ Response RELQ
Request (EC, RQE) fmseqno = 0x234A
Data (BCI) - ACKRQD fhmeskey = 0x3002

In the following figure, the application attempts to quiesce the host, but the host rejects the quiesce and continues with the next chain.


Host
Local Node
Application
Request (MOC, RQE) fmseqno = 0x2345
Data - ACKRQD fhmeskey = 0x3003
QEC
Status - Control (QEC) Request
- Response QE SENSE = 0x080A
Status - Control (QEC) Nack-1 SENSE = 0x080A
Request (EC, RQD) fmseqno = 0x2346
Data (ECI) + ACKRQD fhmeskey = 0x3004
+ Response fmseqno = 0x2346
Status - Acknowledge (ACK) fhmeskey = 0x3004
Request (BC, RQE) fmseqno = 0x2347
Data (BCI) - ACKRQD fhmeskey = 0x3005

In the following figure, the host sends **QEC** while the application is sending a chain. The application completes the chain and sends a **Status-Control(QC) Request**. The host releases the quiesce by sending **RELQ**, and the local node sends a **Status-Control(RELQ) Request** to the application, which then initiates a new chain.


Host
Local Node
Application
Request (BC, RQE) fmseqno = 0x1239
Data (BCI) - ACKRQD fhmeskey = 0x2005
QEC
Status - Control (QEC) Request
+ Response QEC
Request (EC, RQD) fmseqno = 0x123A
Data (ECI) + ACKRQD fhmeskey = 0x2006
+ Response fmseqno = 0x123A
Status - Acknowledge (ACK)
Status - Control (QEC) Request + ACKRQD fhmeskey = 0x2006
QC
+ Response QC
Status - Control (QC) Ack
RELQ
Status - Control (RELQ) Request
+ Response RELQ
Request (BC, RQD) fmseqno = 0x123B
Data (BCI) - ACKRQD fhmeskey = 0x2007

Recovery

This section covers a variety of issues pertaining to error recovery:

- Application CANCEL
- Direction after Receiving a Negative Response
- Direction after Sending a Negative Response
- Critical Failure
- RQR and CLEAR
- STSN
- Link Service Failure
- Local Node Failure
- Client Failure

Application CANCEL

One of the parameters on the Open(PLU) OK Response, which the application sends to the local node, specifies whether the application generates **CANCEL** (or **EC**) to terminate an inbound chain that has received a negative response. If this option is not selected, the local node generates a **CANCEL** request when it receives a negative response from the host to an incomplete chain.

Direction after Receiving a Negative Response

Within the local node, error recovery for a half-duplex application (as specified by byte 7 bit 2 of the **BIND**) is assumed to be the responsibility of the host. However, the application must be aware that an error recovery state has been entered to obey the direction protocol.

When an application using half-duplex protocols (flip-flop or contention) receives a negative response to an inbound chain that it sent that does not refer to a race, it must assume receive state. The sense codes used for race conditions that do not require the transition to receive state are listed in the following table.

Sense code	Description
0x080B	Bracket race error
0x081B	Receiver in transmit mode

Direction after Sending a Negative Response

When an application using half-duplex flip-flop protocol sends a negative response to an outbound chain (or sends a Status-Acknowledge(Ack) to a **DATAFMI** message with **SDI** set) that does not refer to a race, the application must assume an error recovery pending state. The sense codes used for race conditions that do not require the transition to error recovery pending state are listed in the following table.

Sense code	Description
0x080B	Bracket race error
0x0813	Bracket bid reject (no RTR forthcoming)
0x0814	Bracket bid reject (RTR forthcoming)
0x081B	Receiver in transmit mode

The application must therefore examine the sense code on an **SDI** message to detect such races.

Error recovery pending state differs from receive state only in one respect: The application can convey sense information to the host using **Status-Control(LUSTAT).** (For more information, see LUSTATs.) The **LUSTAT** must not have the change direction (CD) or end bracket (EB) flags set. (The host already has direction, and the bracket must not be terminated prematurely by the application.) Host Integration Server also enables the function management interface (FMI) application to send **Status-Control(LUSTAT)** in receive state.

An application using the half-duplex contention protocol does not have an error recovery pending state, and must enter contention state whenever it sends a negative response.

> **Note** If the chain is canceled by the host with CD on the **CANCEL** , the application must assume send state.

Critical Failure

When an application makes a protocol error in sending data, the local node rejects the data using a Status-Acknowledge(Nack-2) with a sense code indicating the reason for failure. This message has a critical failure flag that indicates whether the local node has marked the session as unrecoverable. The sense codes are listed in FMI Status, Error, and Sense Codes.

If the error is noncritical, the application can proceed as if the message that caused the error had not been sent. If the error is critical, the local node issues a Close(PLU) Request to the application (providing that the primary logical unit (PLU) connection is open), which means that the application cannot communicate on the PLU-SLU session until an **UNBIND–BIND** sequence is received from the host. The local node also sends a **TERM-SELF** request to the host to elicit an **UNBIND**. Therefore, the application does not need to issue a **LOGOFF** request on the system services control point (SSCP) session.

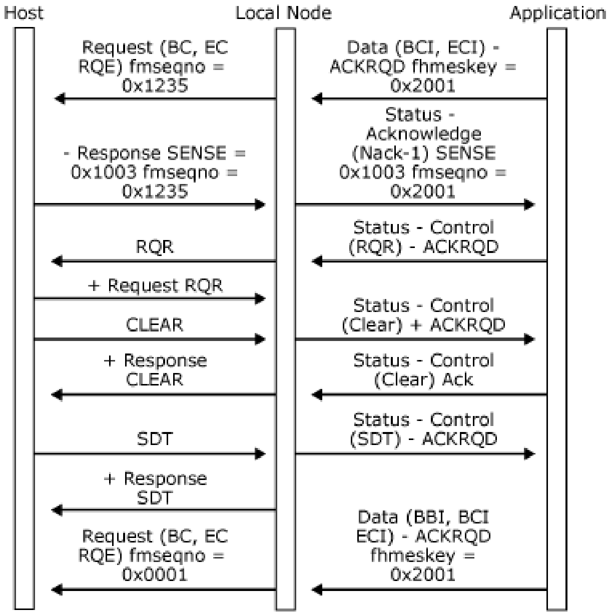
RQR and CLEAR

An application using Transmission Service profile (TS profile) 4 can request the session to be recovered by sending **Status-Control(RQR)**. The local node presents this to the host as an **RQR** request. Note that, if the application has received a critical Status-Acknowledge(Nack-2), this option cannot be taken because the local node will send a Close(PLU) Request immediately following the **Status-Acknowledge(Nack-2)** to the application, and the primary logical unit (PLU) connection will no longer be valid. The **RQR** message requests the host to reset the session by sending a **CLEAR** request, as shown in the following figure.

The receipt of **CLEAR** causes the application to reset its session state to that following the **BIND**, the **Open(PLU)**.

Another way for the application to deal with error conditions is to ask for an **UNBIND** by sending **Status-Control(RSHUTD)**. (For more information, see Application-Initiated Termination.) Note that this may not require the host to supply a new **BIND**, depending on the host configuration. A new SSCP request may be required (such as **LOGON**).

In the following figure, the application requests recovery by issuing **Status-Control(RQR)**. The host sends **CLEAR**, and the application must reset its session to state that it was following the **BIND (Open(PLU))**. In this case, the application is now between brackets and awaiting start data traffic (SDT).


Host
Local Node
Application
Request (BC, EC RQE) fmseqno = 0x1235
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2001
Status - Acknowledge (Nack-1) SENSE 0x1003 fmseqno = 0x2001
- Response SENSE = 0x1003 fmseqno = 0x1235
RQR
Status - Control (RQR) - ACKRQD
+ Request RQR
CLEAR
Status - Control (Clear) + ACKRQD
+ Response CLEAR
Status - Control (Clear) Ack
SDT
Status - Control (SDT) - ACKRQD
+ Response SDT
Request (BC, EC RQE) fmseqno = 0x0001
Data (BBI, BCI ECI) - ACKRQD fhmeskey = 0x2001

STSN

Set and test sequence numbers (STSN) are used on sessions with Transmission Service profile (TS profile) 4 for applications to maintain transaction processing sequence numbers between sessions. This enables both partners on the session to discover the amount of data lost after a **CLEAR** or **UNBIND–BIND** sequence.

The **STSN** message is the only one that can reset such transaction processing sequence numbers. **BIND**, **UNBIND**, and **CLEAR** do not affect them.

If the application wants to maintain such transaction numbers, it must specify the **APPLTRAN** option in the Open(PLU) OK Response. The host can send **STSN** after a **BIND** or **CLEAR** before sending **SDT** to set or test the application's transaction numbers. The local node resets its internal session sequence numbers to zero on receipt of **BIND** or **CLEAR**. When the local node receives an **STSN** specifying **SET** (or **SET** and **TEST**) for one half-session, it resets the corresponding internal session sequence number.

Unless both half-session actions are ignore (the action byte is 0x00), the **STSN** request is passed to the application (provided that it specified **APPLTRAN**), with the action byte and the two sequence numbers from the request, as a **Status-Control(STSN)**. (For more information, see Status-Resource.) The application must examine the action byte to determine whether the action is ignore, set, test, or set and test. The application must send a positive response (**Status-Control(STSN) Acknowledge**) to the **STSN**, with the sensed sequence numbers if required (sense or set and test). The local node is responsible for generating the correct result code for the **STSN RSP**.

Note that the application should perform the sense part of **STSN** first (by examining bits 0 and 2 of the action byte for the secondary-to-primary flow and primary-to-secondary flow respectively). The set part of the **STSN** is then performed (by examining bits 1 and 3 of the action byte).

The application should increment its transaction numbers when sending and receiving normal flow request/response units (RUs) from the host. (Note that **Status-Control** messages corresponding to normal flow data flow control (DFC) requests cause the transaction numbers to be incremented.) The sequence number is reported on **DATAFMI** messages and **Status-Acknowledge** messages. The application should be aware that, if a message from the host fails receive checks (and is converted to an **SDI** message), sub-network access protocol (SNAP)-2.1 will purge the remainder of the chain from the host, and the application may miss some sequence numbers. Therefore, the application should reset its primary-to-secondary transaction number from the next outbound data after processing an **SDI** message.

Note that the second application flag byte is not valid for **Status-Control(STSN)**. It is used for the **STSN** control byte.

Link Service Failure

When the server running a link service fails, the local node is informed of this. It treats the problem as a link outage with outage code 0x0D. This is reported to any active 3270 emulation sessions as a communications check code (−+z_nnn). The local node will attempt periodically to reconnect to the link service.

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Local Node Failure

If the local node fails, applications are informed of this by the path error return code from the Dynamic Access Module (DMOD) on the sbpurcvx call, or from the routing procedure. All connections that use the destination locality value for which the path error is reported are closed. The application must do the following:

- Clean up resources related to the closed connections, including resetting presentation spaces and displaying a communications check code
  (−+z_nnn) on the status line.
- Attempt to reestablish connection with a local node by reinitiating the resource location process.

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Client Failure

If the client computer fails, the local node terminates the application's PLU-SLU session (if it is active) by sending **TERM-SELF**. The system services control point (SSCP) and primary logical unit (PLU) connections are both marked as closed and cannot be reused without being reopened. Internally, the local node treats such a failure in the same way as the receipt of a Close(SSCP) Request from the application.

Application-Initiated Termination

An application on a session with function management (FM) profile 3 or 4 can request termination of the primary logical unit (PLU) session. It should only do so if it has previously ensured that it is in a state where the PLU session can be terminated, that is, between-chain and between-bracket. Terminating the PLU session does not affect the state of the system services control point (SSCP) session.

Note that an application can issue a character coded or field formatted **LOGOFF** command on the SSCP session or send a Close(PLU) Request to get the local node to send **TERM-SELF** on the application's behalf. All of these will elicit an **UNBIND**, either immediately or after session clean-up in the host.

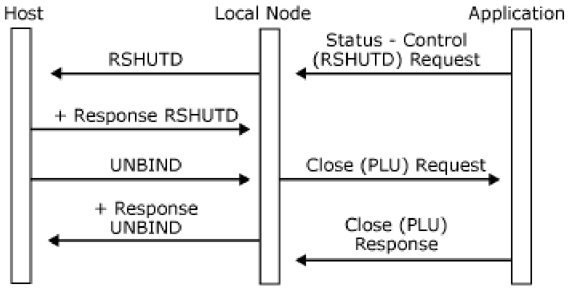
The application requests termination of the PLU session by sending a **Status-Control(RSHUTD) Request** to the local node, which generates an SNA **RSHUTD** request to the host.

After sending the **Status-Control(RSHUTD) Request**, the application must remain capable of accepting and responding to all outbound data it receives. The application can now expect one of two messages, depending on whether the state of the PLU session allows it to be terminated and whether the host wants to terminate the PLU session:

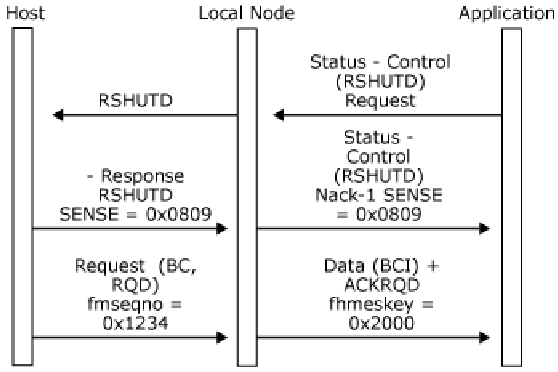
- If the state of the PLU session allows it to be terminated, and the host wants to terminate the PLU session, the host generates a positive response to the **RSHUTD** request, which can be followed by an **UNBIND** request. The local node closes the PLU connection. For more information, see Closing the PLU Connection.
- If the state of the PLU session does not allow it to be terminated (for example, if the session is in-bracket), or the host does not want to terminate the PLU session at this time, the host generates a negative response to the **RSHUTD** request, which the local node presents to the application as a **Status-Control(RSHUTD) Negative-Acknowledge-1** carrying the sense codes supplied on the negative response. This indicates that the request to terminate the PLU session has been rejected by the host, and communication on the PLU session continues unaffected.

The following two figures illustrate the application-initiated termination protocol between the local node and the application and how this protocol relates to the underlying SNA protocols.

In the first figure, the application requests termination of the PLU session, and the host sends **UNBIND**. The local node closes the PLU connection.


Host
Local Node
Application
Status - Control (RSHUTD) Request
RSHUTD
+ Response RSHUTD
UNBIND
Close (PLU) Request
+ Response UNBIND
Close (PLU) Response

In the following figure, the application requests termination of the PLU session, but the session is not in an appropriate state. The host sends a negative response to the **RSHUTD** request, which the local node presents as **Status-Control(RSHUTD) Negative-Acknowledge-1**. Communication continues on the PLU session.


Host
Local Node
Application
Status - Control (RSHUTD) Request
RSHUTD
Status - Control (RSHUTD) Nack-1 SENSE = 0x0809
- Response RSHUTD SENSE = 0x0809
Request (BC, RQD) fmseqno = 0x1234
Data (BCI) + ACKRQD fhmeskey = 0x2000

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

LUSTATs

The data flow control (DFC) logical unit status **LUSTAT** message is used within SNA to convey four bytes of sense data to the other session partner. It can also be used simply to send a response header (RH) to the other session partner (for example, to open a bracket). (For more information, see the figures in Bracket Initiation.) The message flows on the normal flow and so is subject to direction restrictions. However, it can be sent without end bracket (EB) or change direction (CD) on a half-duplex flip-flop session that is in error recovery pending state. (For more information, see Recovery.)

The local node allows the application to send **Status-Control(LUSTAT) Request** messages at any time that data traffic is active, except while sending data in chain. If the application is in a receiving state (using half-duplex protocol), the **LUSTAT** is queued up and used to provide the sense codes, which are filled into the next outbound request, and the SDI flag is set. The application can therefore present the sense codes for an error state without waiting for the next outbound data if required.

The first byte of sense data must be 0x08 to generate a **DATAFMI** message with **SDI** (to be converted to a negative response). Other **LUSTATs** are left queued on the session until they can be sent.

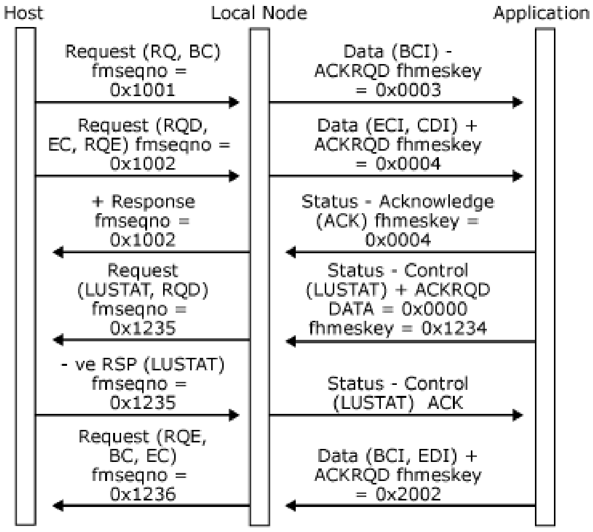
If multiple **Status-Control(LUSTAT)** messages are sent by the application while in a receive state, the local node queues them all. When outbound data has been delivered to the application with **SDI** set, as indicated earlier, and the application has converted it to a Status-Acknowledge(Ack), the local node sends the negative response and the remaining **LUSTATs** (which can now flow because the half-duplex flip-flop state is error recovery pending).

If the application intends to send multiple **Status-Control(LUSTAT)** messages to the host, it is possible that the host will attempt to initiate recovery before the last **LUSTAT** has been sent. In this case, the error recovery chain will be rejected by the next **LUSTAT**.

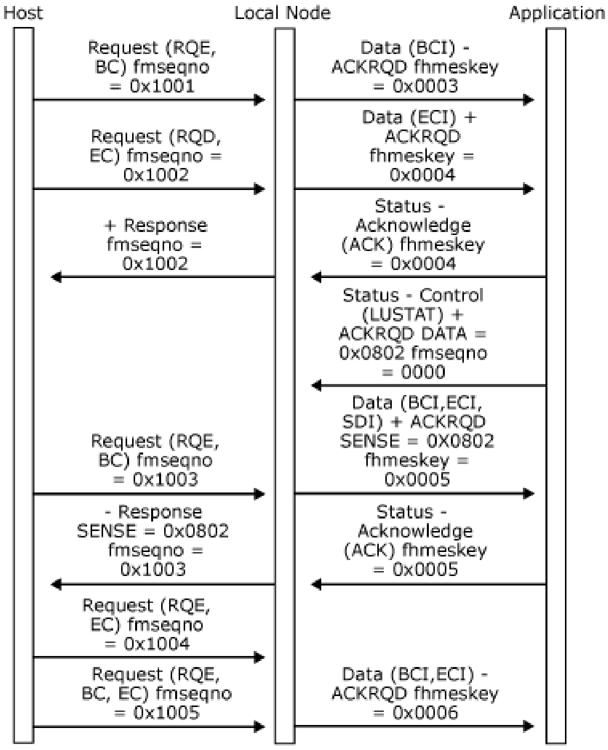
Note that the application can send **Status-Control(LUSTAT) Request** with or without **ACKRQD**. The local node will map these to **RQD** and **RQE LUSTATs** respectively.

The following three figures illustrate the use of **Status-Control(LUSTAT)** messages by an application using the half-duplex flip-flop mode.

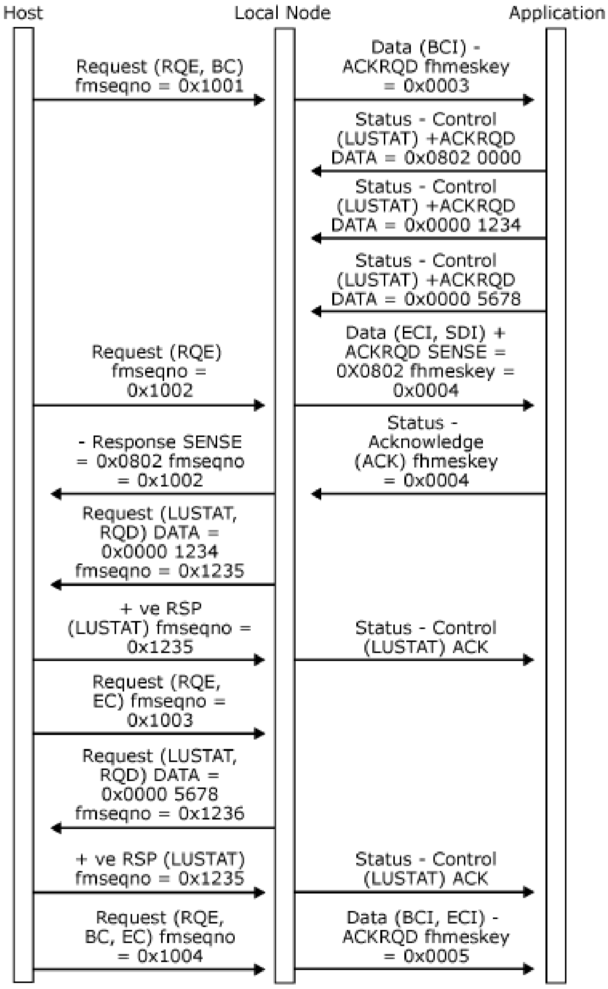
In the first figure, the application issues **Status-Control(LUSTAT)** when it has direction.


Host
Local Node
Application
Request (RQ, BC) fmseqno = 0x1001
Data (BCI) - ACKRQD fhmeskey = 0x0003
Request (RQD, EC, RQE) fmseqno = 0x1002
Data (ECI, CDI) + ACKRQD fhmeskey = 0x0004
+ Response fmseqno = 0x1002
Status - Acknowledge (ACK) fhmeskey = 0x0004
Request (LUSTAT, RQD) fmseqno = 0x1235
Status - Control (LUSTAT) + ACKRQD DATA = 0x0000 fhmeskey = 0x1234
- ve RSP (LUSTAT) fmseqno = 0x1235
Status - Control (LUSTAT) ACK
Request (RQE, BC, EC) fmseqno = 0x1236
Data (BCI, EDI) + ACKRQD fhmeskey = 0x2002

In the following figure, the application sends **Status-Control(LUSTAT)** request when receiving data between chain. Next, outbound data is delivered with **SDI** set, which gets converted to negative **RSP**.


Host
Local Node
Application
Request (RQE, BC) fmseqno = 0x1001
Data (BCI) - ACKRQD fhmeskey = 0x0003
Request (RQD, EC) fmseqno = 0x1002
Data (ECI) + ACKRQD fhmeskey = 0x0004
+ Response fmseqno = 0x1002
Status - Acknowledge (ACK) fhmeskey = 0x0004
Status - Control (LUSTAT) + ACKRQD DATA = 0x0802 fmseqno = 0000
Data (BCI,ECI, SDI) + ACKRQD SENSE = 0X0802 fhmeskey = 0x0005
Request (RQE, BC) fmseqno = 0x1003
- Response SENSE = 0x0802 fmseqno = 0x1003
Status - Acknowledge (ACK) fhmeskey = 0x0005
Request (RQE, EC) fmseqno = 0x1004
Request (RQE, BC, EC) fmseqno = 0x1005
Data (BCI,ECI) - ACKRQD fhmeskey = 0x0006

In the following figure, the application sends several **Status-Control(LUSTAT)** requests when receiving data in chain. Next, outbound data is delivered with **SDI** set which gets converted to negative response. Subsequent **LUSTATs** are sent to host.


Host
Local Node
Application
Request (RQE, BC) fmseqno = 0x1001
Data (BCI) - ACKRQD fhmeskey = 0x0003
Status - Control (LUSTAT) +ACKRQD DATA = 0x0802 0000
Status - Control (LUSTAT) +ACKRQD DATA = 0x0000 1234
Status - Control (LUSTAT) +ACKRQD DATA = 0x0000 5678
Request (RQE) fmseqno = 0x1002
Data (ECI, SDI) + ACKRQD SENSE = 0X0802 fhmeskey = 0x0004
- Response SENSE = 0x0802 fmseqno = 0x1002
Status - Acknowledge (ACK) fhmeskey = 0x0004
Request (LUSTAT, RQD) DATA = 0x0000 1234 fmseqno = 0x1235
+ ve RSP (LUSTAT) fmseqno = 0x1235
Status - Control (LUSTAT) ACK
Request (RQE, EC) fmseqno = 0x1003
Request (LUSTAT, RQD) DATA = 0x0000 5678 fmseqno = 0x1236
+ ve RSP (LUSTAT) fmseqno = 0x1235
Status - Control (LUSTAT) ACK
Request (RQE, BC, EC) fmseqno = 0x1004
Data (BCI, ECI) - ACKRQD fhmeskey = 0x0005

Response Time Monitor Data

For a 3270 display application, the local node maintains statistics on host response times—the time it takes the host to respond after the 3270 user presses ENTER or an AID key to send data to the host. These statistics can then be sent to the host for analysis.

The Status-RTM message, sent by the local node to the application, informs the application of the Response Time Monitor (RTM) parameters specified by the host. (For more information, see RTM Parameters.) These parameters specify whether RTM data is to be collected, whether the application is permitted to display RTM statistics locally, the time boundaries by which response times are to be grouped, and the definition of response time. The time can be measured until the first character of the host response reaches the screen, until the keyboard is unlocked, or until the user can send further data (change direction (CD) or end bracket (EB) received by the application).

If the host specifies that response times are to be measured for this session, the application is responsible for measuring response times and for reporting them to the local node. This involves:

- Starting a timer when the user presses the ENTER key or an AID key to send data to the host.
- Stopping the timer when the host's response to the inbound data is received, as defined by the RTM definition specified on the **Status-RTM** message.
- Reporting the response time to the host on the Status-Acknowledge(Ack) message, which acknowledges the host's response. One of the fields on this message specifies the last response time measured by the application, or specifies that no response time is to be reported.
- Optionally displaying the most recent response time as a last transaction time indicator (LTTI) on the 3270 emulation status line.

If the application wants to provide a local display of RTM data, it is responsible for maintaining its own response time statistics. It should use the same definition and boundaries as those specified on the Status-RTM message to ensure that the local data matches the data sent to the host by the local node. Note that the **Status-RTM** message can indicate that a local display of response times is not permitted. In this case, the application should not display either the response times or the LTTI.

Data Flow

The following topics describe data flows between the application and the local node.

This section contains:

- Outbound Data
- Inbound Data
- Inbound Data from LUA Applications

Outbound Data

This section describes the outbound data flows from the local node to the application. The overall structure of the protocols described applies to the system services control point (SSCP) and primary logical unit (PLU) connections, but certain features (such as the use of delayed request mode) are only applicable to the PLU connection.

The local node presents data originating at the host to the application on different connections, depending on the SNA session on which the data flows, as follows:

- Function management data network services (FMD NS) (session services) data and function management data (FMD) originating at the host SSCP and directed to the Host Integration Server logical unit (LU) is sent to the application on the SSCP connection.
- FMD data originating at the host PLU and directed to an SNA server LU is sent to the application on the PLU connection.

For all connections, only FMD requests are presented to the application as Data messages (with message-type = DATAFMI). DFC and session control requests are used to generate **Status-Control** messages. (For more information, see Status-Control Message.)

The local node performs the data flow control state changes required by the response header (RH) indicators in the request, before sending a **Data** message to the application.

The SNA request transmission header (TH) and RH indicators are not available to the application on outbound **Data** messages. Instead, the local node provides application flags in the **Data** message header that reflect the settings of a subset of the RH indicators, but are interpreted by the local node to shield the application from the more obscure aspects of chaining and bracket usage. For a description of the available flags and the way in which the local node uses them on outbound data, see Application Flags.

For outbound data, the first byte is RU[0] for standard function management interface (FMI), and TH[0] for the logical unit application (LUA) variant of FMI.

All Data messages from the local node to an application contain a message key. The local node maintains a unique message key sequence for each outbound data flow to an application. When the local node sends a **Data** message to an application on a particular connection, it places the next message key in the outbound sequence into the message header, sets the application flags, and sends the message to the application. This means that the message key uniquely identifies a **Data** message on a particular connection between the local node and the application. Note that the local node also places message keys on outbound **Status-Control Request** messages.

The acknowledgment protocol enforced by Host Integration Server reflects the chain response protocol and request mode in use on the SNA session, as follows:

- Outbound **RQD** requests generate Data messages with **ACKRQD** set in the message header.
- Outbound **RQE** requests generate **Data** messages without **ACKRQD** set.
- Outbound **RQN** requests generate **Data** messages without **ACKRQD** set.
- If the session uses primary immediate request mode, a **Data** message with **ACKRQD** set must be acknowledged by the application before further **Data** messages will be received.
- If the session uses primary delayed request mode, a **Data** message with **ACKRQD** set need not be immediately acknowledged by the application. **Data** messages will continue to be received.

Note that Host Integration Server enforces the equivalent of immediate response mode for the outbound data acknowledgment protocol for all connections. The application must send acknowledgments in order.

If the local node sets the **ACKRQD** field in the message header of a Data message to the application, it indicates that an acknowledgment to this **Data** message is required. The application acknowledges an outbound **Data** message by sending a **Status-Acknowledge** message to the local node on the same connection, which contains the same message key and sequence number fields as the **Data** message.

On receipt of a Status-Acknowledge(Ack), the local node correlates the message key with outstanding outbound messages and generates an SNA positive response to the appropriate SNA request.

The application should use the Status-Acknowledge(Nack-1) message as a negative acknowledgment. On receipt of a **Status-Acknowledge(Nack-1)**, the local node correlates the message with outstanding outbound messages and generates an SNA negative response plus sense data to the appropriate SNA request. The application supplies the sense data that should accompany the negative response as part of the **Status-Acknowledge(Nack-1)** message and must include the same message key, application flags, and sequence number fields as the **Data** message to which this is a negative acknowledgment.

Status-Control messages caused by expedited-flow requests can be sent at any time and do not affect the sending of positive or negative acknowledgment to normal flow outbound **Data** messages. The fact that they can occur between an outbound **Data** message and the matching **Status-Acknowledge** message is purely coincidental. For details about which **Status-Control** messages correspond to SNA requests, see Status-Control Message.

If errors are detected in the format of a normal flow request from the host or the request is inappropriate for the state of the session, the local node generates an error Data message for the application with the following characteristics:

- The SDI and ECI application flags are set.
- The sense code associated with the error occupies the first four bytes of the **Data** message. (For more information, see Status-Control Message.)
- **ACKRQD** is set.

The application should return a Status-Acknowledge(Ack), and the local node generates a negative response carrying the sense code appropriate to the detected error. This mechanism does the following:

- Informs the application of the detected error.
- Allows the application to respond to any previously received data before the local node sends the negative response to this Data message.

On sessions where the application is receiving a series of RQE chains, the local node will be retaining correlation information for each chain (in case the application wants to send negative responses to any of the chains). If the local node runs out of correlation table entries, it will attempt to allocate more entries and (if this fails) will be forced to terminate sessions. To prevent this, the application should provide **Status-Acknowledge(Ack)** messages for RQE data that it does not want to reject in this case. A response after five consecutive RQE chains should be sufficient. Such messages are referred to as courtesy acknowledgements and do not give rise to a response to the host, but merely free internal correlation data.

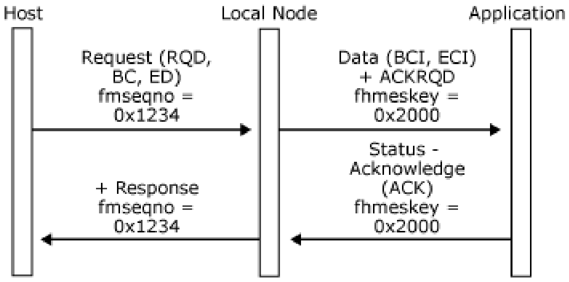
The following six figures illustrate the data acknowledgment protocol enforced between the local node and the application, and show the effects of the application generating positive and negative **Status-Acknowledg**e messages.

The figures show:

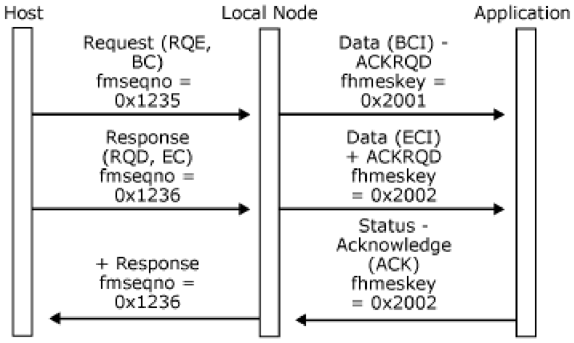
- The relevant RH flags in SNA requests/responses.
- The sequence number of SNA requests/responses.
- Any sense data (shown as "SENSE=...") on SNA requests/responses and **Status-Acknowledge** messages.
- The **ACKRQD** field in Data messages.
- The message key field in **Data** messages.

For simplicity, all messages are assumed to be FM data flowing on the same PLU session.

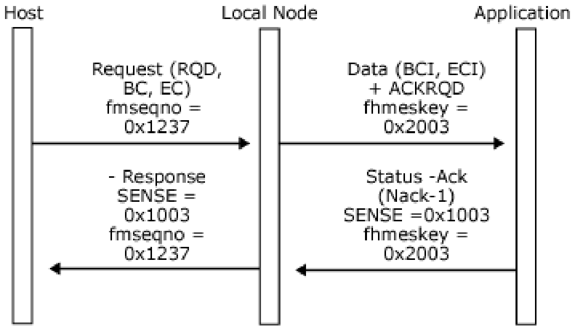
In the following figure, the application accepts a **Data** message corresponding to a definite-response RU.


Host
Local Node
Application
Request (RQD, BC, ED) fmseqno = 0x1234
Data (BCI, ECI) + ACKRQD fhmeskey = 0x2000
Status - Acknowledge (ACK) fhmeskey = 0x2000
+ Response fmseqno = 0x1234

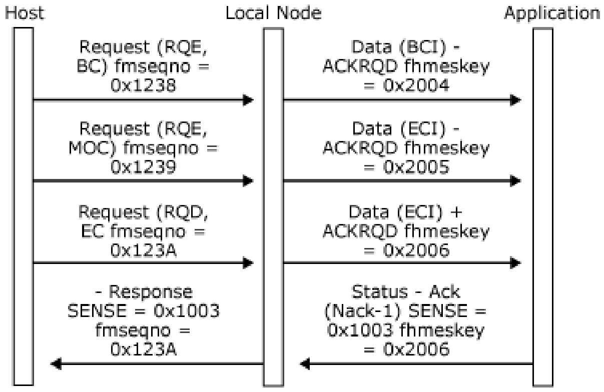
In the following figure, the application accepts a **Data** message corresponding to a multi-RU definite-response chain.


Host
Local Node
Application
Request (RQE, BC) fmseqno = 0x1235
Data (BCI) - ACKRQD fhmeskey = 0x2001
Response (RQD, EC) fmseqno = 0x1236
Data (ECI) + ACKRQD fhmeskey = 0x2002
Status - Acknowledge (ACK) fhmeskey = 0x2002
+ Response fmseqno = 0x1236

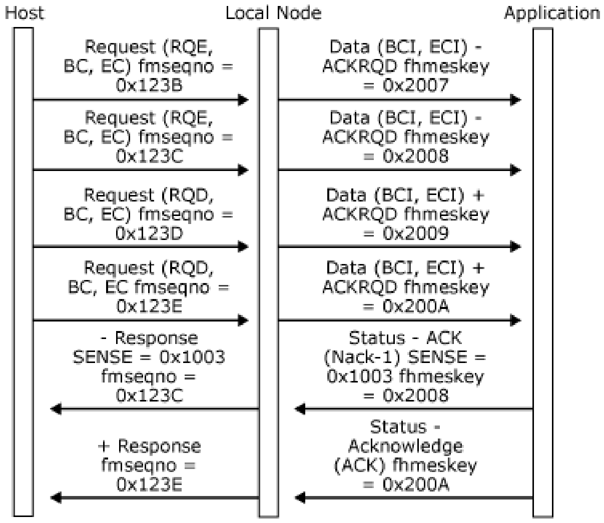
In the following figure, the application rejects a **Data** message corresponding to a definite-response chain.


Host
Local Node
Application
Request (RQD, BC, EC) fmseqno = 0x1237
Data (BCI, ECI) + ACKRQD fhmeskey = 0x2003
- Response SENSE = 0x1003 fmseqno = 0x1237
Status -Ack (Nack-1) SENSE =0x1003 fhmeskey = 0x2003

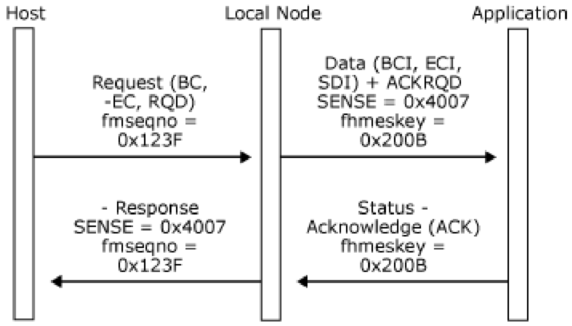
In the following figure, the application rejects a **Data** message corresponding to a multi-RU definite-response chain.


Host
Local Node
Application
Request (RQE, BC) fmseqno = 0x1238
Data (BCI) - ACKRQD fhmeskey = 0x2004
Request (RQE, MOC) fmseqno = 0x1239
Data (ECI) - ACKRQD fhmeskey = 0x2005
Request (RQD, EC fmseqno = 0x123A
Data (ECI) + ACKRQD fhmeskey = 0x2006
- Response SENSE = 0x1003 fmseqno = 0x123A
Status - Ack (Nack-1) SENSE = 0x1003 fhmeskey = 0x2006

In the following figure, the local node enforces immediate response mode. Responses must be sent in sequence. The application rejects the second exception-response chain and accepts the definite-response chain, which implies acceptance of the third exception-response chain.


Host
Local Node
Application
Request (RQE, BC, EC) fmseqno = 0x123B
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2007
Request (RQE, BC, EC) fmseqno = 0x123C
Data (BCI, ECI) - ACKRQD fhmeskey = 0x2008
Request (RQD, BC, EC) fmseqno = 0x123D
Data (BCI, ECI) + ACKRQD fhmeskey = 0x2009
Request (RQD, BC, EC fmseqno = 0x123E
Data (BCI, ECI) + ACKRQD fhmeskey = 0x200A
- Response SENSE = 0x1003 fmseqno = 0x123C
Status - ACK (Nack-1) SENSE = 0x1003 fhmeskey = 0x2008
+ Response fmseqno = 0x123E
Status - Acknowledge (ACK) fhmeskey = 0x200A

In the following figure, the local node detects a chaining error (RQD but not EC) in data destined for the application. (This example requires the receive check 0x4007 to be in force. For more information, see Opening the SSCP Connection.)


Host
Local Node
Application
Request (BC, -EC, RQD) fmseqno = 0x123F
Data (BCI, ECI, SDI) + ACKRQD SENSE = 0x4007 fhmeskey = 0x200B
- Response SENSE = 0x4007 fmseqno = 0x123F
Status - Acknowledge (ACK) fhmeskey = 0x200B

Inbound Data

This section describes inbound data flows from the application to the local node. The overall structure of the protocols described applies to the system services control point (SSCP) and primary logical unit (PLU) connections, but more complex aspects (such as the use of delayed request mode) are only applicable to the PLU connection.

The application can send inbound data on any of the connections, as follows:

- Function management data network services (FMD NS) (session services) and function management data (FMD) character-coded data intended for the host SSCP should be sent to the local node on the SSCP connection.
- FMD data intended for the host PLU should be sent to the local node on the PLU connection.

The application cannot use Data messages to send data flow control (DFC) or session control request messages to the host. Instead it must use **Status-Control** messages. (For details, see Status-Control Message.)

For all connections, the application must fill in certain key fields in the **Data** message's header. In particular it must:

- Set the message-type to **DATAFMI**.
- Allocate a new message key for inbound **Data** messages on this connection.
- Set the **ACKRQD** field if required.
- Set the application flags. (For more information, see Application Flags.)

The **nxtqptr**, **hdreptr** and **numelts** fields in the message header, and the **elteptr** and **startd** fields in the message elements are set up by the Host Integration Server buffer management routines. (For more information, see DL-BASE/DMOD Interface.) The application is responsible for setting the **endd** field.

If the application does not have access to these routines (for example, when the operating environment does not support intertask procedure calls and shared memory), all the fields in the header must be set by the application.

The transmission header (TH) and response header (RH) indicators are not available to the application on inbound Data messages. The application should set the appropriate application flags in the message header to control chaining, direction, and so on. For a description of the available application flags for inbound data and later topics in this section for a description of how the flags are used to control inbound data flows, see Application Flags.

For inbound data, the first byte is RU[0] for standard function management interface (FMI).

The message key supplied by the application in the inbound **Data** message header is used by the local node to indicate which **Data** message on this connection an outbound **Status-Acknowledge** refers to. The application should maintain a unique message key sequence for the inbound data flow on each connection it has with the local node, so that the application can use the message key to correlate inbound **Data** messages and outbound **Status-Acknowledge** messages on the connection. Note that the application must also provide a message key on **Status-Control Request** messages to differentiate between multiple **RQE LUSTAT** messages.

The inbound data acknowledgment protocol reflects the secondary chain response protocol and request mode in use on the session, as follows:

- Inbound Data messages with **ACKRQD** set in the header generate **RQD** requests.
- Inbound **Data** messages without **ACKRQD** set in the header generate **RQE** or **RQN** requests depending on the chain response protocol.
- The application should only set **ACKRQD** on **Data** messages that have the end chain indicator (ECI) application flag set.
- If the session specifies that the secondary uses immediate request mode, the application can still send further **Data** messages after sending data with **ACKRQD** set, even though it has not received a **Status-Acknowledge** message for that **Data** message. The messages are queued within the local node and are progressively sent as positive responses are received.
- If the session specifies that the secondary uses delayed request mode, after sending a **Data** message with **ACKRQD** set, the application can continue to send **Data** messages.

If the application sets the **ACKRQD** field in the message header of a Data message, it indicates that it requires an acknowledgment to this **Data** message. The local node acknowledges an inbound **Data** message by sending a **Status-Acknowledge** message to the application on the same connection and using the same message key as the **Data** message. (For an illustration, see the first figure at the end of this topic.)

The local node processes inbound **Data** messages from the application through its internal state computers, assigns the correct SNA sequence number or an identifier for this flow, and sends the data in a request to the host. The chain-response type of the request depends on whether **ACKRQD** was set in the **Data** message and the session parameters.

The local node maps a positive response from the host to a Status-Acknowledge(Ack) to the application. The application can use the message key in the **Status-Acknowledge** to correlate the acknowledgment with the original **Data** message. Therefore, receipt of a **Status-Acknowledge(Ack)** for a particular **Data** message implies that the local node has received a positive SNA response from the host to the inbound SNA request. (For an illustration, see the second figure at the end of this topic.)

Note that responses are absorbed on the SSCP-PU session.

Note that outbound Status-Acknowledge(Ack) messages contain application flags and a sequence number. The application flags reflect the RH indicators in the response. The sequence number is the SNA sequence number from the response, and provides a mechanism for applications using Transmission Service profile (TS profile) 4 to track the SNA secondary sequence number corresponding to a unit of work.

The local node maps a negative response from the host to a Status-Acknowledge(Nack-1) message to the application. The application can use the message key in the **Status-Acknowledge** to correlate the negative acknowledgment with the original **Data** message. The outbound **Status-Acknowledge(Nack-1)** message contains the SNA sense codes and sequence number from the negative response. (For an illustration, see the third and fourth figures at the end of this topic.)

If the local node detects an error in the format of an inbound **Data** message, or the **Data** message is not appropriate to the current state of the session, it sends a Status-Acknowledge(Nack-2) to the application containing an error code. (For a list of error codes, see Error and Sense Codes.) The local node does not send a request to the host corresponding to the **Data** message in error and does not advance the SNA sequence number for the session. The application can use any message key in its next inbound **Data** message (assuming the error does not cause a critical failure).

An example of a serious chaining error, where the application sends a **Data** message with **ACKRQD** but without ECI in the application flags, is shown in the last figure at the end of this topic. Note that after detecting this particular error, the local node marks the application's connection as critically failed, closes the connection, and sends a **TERM-SELF** request to the SSCP to elicit an **UNBIND**. (For more information, see Recovery.)

Inbound **Status-Control** messages, which cause the generation of expedited-flow requests, can be sent at any time and do not affect the sending of a positive or negative acknowledgment to inbound **Data** messages. For details about which **Status-Control** messages correspond to SNA expedited-flow requests, see Status-Control Message.

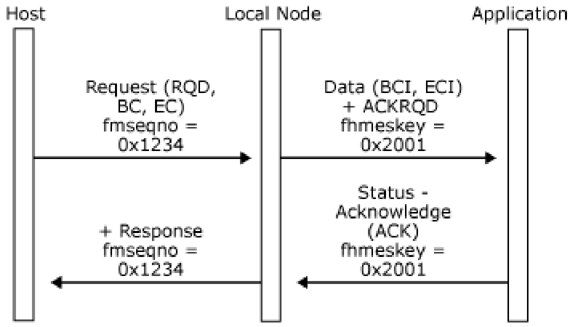
The following five figures illustrate examples of the inbound data acknowledgment protocols (and the underlying SNA protocols) for different chain-response types and secondary session request modes.

The figures show:

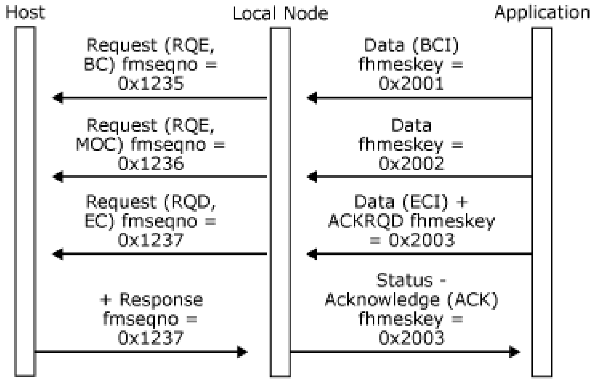
- The **ACKRQD** field on Data messages.
- The message key on **Data** messages.
- Any relevant application flags on **Data** messages.
- Error codes (shown as "ERROR=...") on **Data** messages.
- Relevant RH flags on SNA requests/responses.
- Sequence numbers on SNA requests/responses.
- Sense codes (shown as "SENSE=....") on SNA requests/responses.

For simplicity, all messages are assumed to be flowing on the same PLU session.

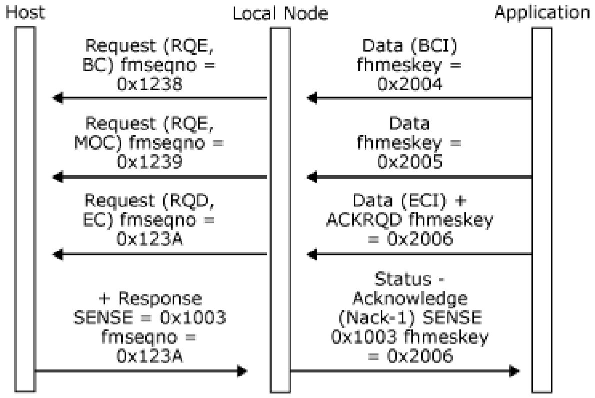
In the following figure, the application successfully sends a **Data** message.


Host
Local Node
Application
Request (RQD, BC, EC) fmseqno = 0x1234
Data (BCI, ECI) + ACKRQD fhmeskey = 0x2001
Status - Acknowledge (ACK) fhmeskey = 0x2001
+ Response fmseqno = 0x1234

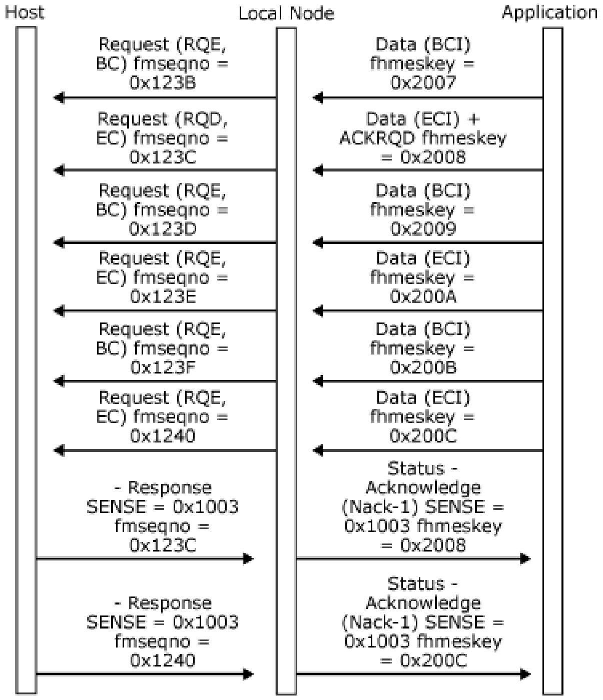
In the following figure, the application successfully sends a chain of **Data** messages.


Host
Local Node
Application
Request (RQE, BC) fmseqno = 0x1235
Data (BCI) fhmeskey = 0x2001
Request (RQE, MOC) fmseqno = 0x1236
Data fhmeskey = 0x2002
Request (RQD, EC) fmseqno = 0x1237
Data (ECI) + ACKRQD fhmeskey = 0x2003
+ Response fmseqno = 0x1237
Status - Acknowledge (ACK) fhmeskey = 0x2003

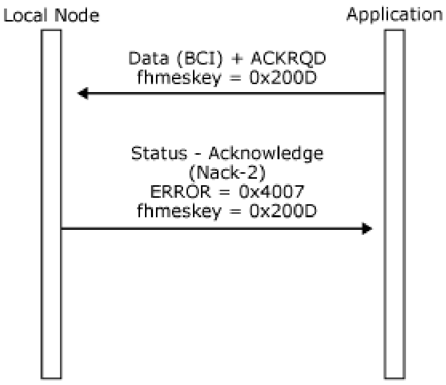
In the following figure, the host rejects a chain of **Data** messages.


Host
Local Node
Application
Request (RQE, BC) fmseqno = 0x1238
Data (BCI) fhmeskey = 0x2004
Request (RQE, MOC) fmseqno = 0x1239
Data fhmeskey = 0x2005
Request (RQD, EC) fmseqno = 0x123A
Data (ECI) + ACKRQD fhmeskey = 0x2006
+ Response SENSE = 0x1003 fmseqno = 0x123A
Status - Acknowledge (Nack-1) SENSE 0x1003 fhmeskey = 0x2006

In the following figure, the host rejects the first definite-response chain and rejects the third exception-response chain on a delayed request session. Note that the negative response to the third chain implies a positive response to the second chain.


Host
Local Node
Application
Request (RQE, BC) fmseqno = 0x123B
Data (BCI) fhmeskey = 0x2007
Request (RQD, EC) fmseqno = 0x123C
Data (ECI) + ACKRQD fhmeskey = 0x2008
Request (RQE, BC) fmseqno = 0x123D
Data (BCI) fhmeskey = 0x2009
Request (RQE, EC) fmseqno = 0x123E
Data (ECI) fhmeskey = 0x200A
Request (RQE, BC) fmseqno = 0x123F
Data (BCI) fhmeskey = 0x200B
Request (RQE, EC) fmseqno = 0x1240
Data (ECI) fhmeskey = 0x200C
- Response SENSE = 0x1003 fmseqno = 0x123C
Status - Acknowledge (Nack-1) SENSE = 0x1003 fhmeskey = 0x2008
- Response SENSE = 0x1003 fmseqno = 0x1240
Status - Acknowledge (Nack-1) SENSE = 0x1003 fhmeskey = 0x200C

In the following figure, the local node detects the application's invalid use of **ACKRQD** without the ECI application flag on a **Data** message. Note that no data is sent to the host. However, because the error is critical, the local node will send a **TERM-SELF** message to the SSCP.


Local Node
Application
Data (BCI) + ACKRQD
fhmeskey = 0x200D
Status - Acknowledge
(Nack-2)
ERROR = 0x4007
fhmeskey = 0x200D

Inbound Data from LUA Applications

The local node performs certain checks on data supplied by a client application before sending it to the host and rejects it with a Status-Acknowledge(Nack-2) message if the checks fail. It does not return any acknowledgment to the application if the data passes the checks (although the host may do so later).

If the client application is providing a logical unit application (LUA) API, the design of the API may require that an LUA verb sending data inbound to the application does not complete until the local node has checked the data. Because of this, the local node will always respond to a client application that uses the LUA variant of the function management interface (FMI), after it has completed its send checking of the inbound message. This allows the client application to complete processing of the LUA verb and return control to the LUA application program.

If the inbound message passed the local node's send checks and will be sent to the host, the local node sends a Status-Acknowledge(ACKLUA) message to the client application to indicate this. The client application can then complete the LUA verb processing with an OK return code. Note that the **Status-Acknowledge(ACKLUA)** message does not imply that the data was successfully sent to the host or that the host received it. It may later be followed by a Status-Acknowledge(Nack-1) message indicating that the host rejected the data.

If the inbound message fails the local nodes send checking, a Status-Acknowledge(Nack-2) message will be returned as for non-LUA client applications. The client application can then report this to the LUA application program by a non-OK return code to the LUA verb that sent the message.

If the client application is providing an LUA API, it should therefore wait for either **Status-Acknowledge(ACKLUA)** or **Status-Acknowledge(Nack-2)** to determine whether to return an OK or error return code to the LUA send verb. If this dependence on the local node's send checks is not required, the client application can ignore the **Status-Acknowledge(ACKLUA)** message.

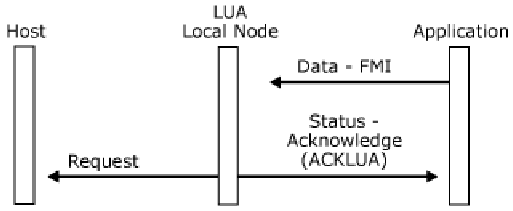
Note that there are certain race conditions in which the local node cannot complete its send checks before replying to the client application. In these cases, the local node returns a Status-Acknowledge(ACKLUA), but may subsequently send a Status-Acknowledge(Nack-2) if it detects an error during the remaining send checks. The client application may therefore receive a **Status-Acknowledge(ACKLUA)** followed by a **Status-Acknowledge(Nack-2)** for the same inbound message.

In the transmission header (TH) for the LUA variant of FMI, the expedited flow indicator (EFI), the destination-address field (DAF), and the origin-address field (OAF) are used. Other fields (including the sequence number field) are ignored. In the RH for the LUA variant of FMI, all fields except the queued-response indicator (QRI) and pacing indicator (PI) are used.

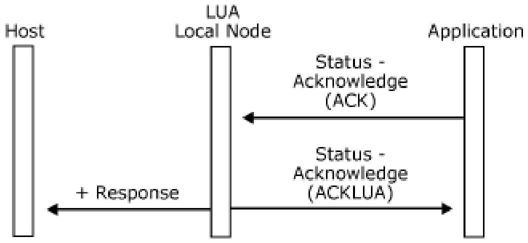
For inbound data, the first byte is TH[0] for the LUA variant of FMI.

The following three figures illustrate the **Status-Acknowledge(ACKLUA)** acknowledgment protocol for different messages that the application can send.

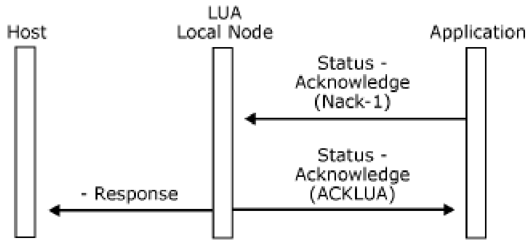
In the first figure, the application sends a **Data** message that passes the local node's send checks.



In the following figure, the application sends a **Status-Acknowledge(Ack)** message that passes the local node's send checks.



In the following figure, the application sends a **Status-Acknowledge(Nack-1)** message that passes the local node's send checks.


Host
LUA
Local Node
Application
Status -
Acknowledge
(Nack-1)
Status -
Acknowledge
(ACKLUA)
- Response

Status Messages

The local node uses status messages to provide the application with information about the state of its sessions and to give the application control, in association with the host system services control point (SSCP) and primary logical unit (PLU), over the progress of the session. The status messages are designed to allow the application to use all the protocols allowed in the function management (FM) and Transmission Service profiles (TS profiles) supported by the Microsoft® Host Integration Server local node.

Most applications only need to use a subset of the available status messages. For example, a 3270 device emulator would not require the status messages used in quiesce protocols.

This section contains:

- Status-Acknowledge Message
- Status-Control Message
- Status-Error Message
- Status-Resource Message
- Status-Session Message
- Status-RTM Message

Status-Acknowledge Message

Status-Acknowledge messages are the basic mechanism used to enforce inbound and outbound data acknowledgment protocols on all connections. For details about the use of **Status-Acknowledge** messages, see Outbound Data and Inbound Data.

For a 3270 emulation application, **Status-Acknowledge** messages sent from the application to the local node (acknowledging outbound data from the host) can also carry information about host response times. This allows the local node to maintain response time statistics for sending to the host when required. For details, see Response Time Monitor Data.

Status-Control Message

Status-Control messages provide access to session control and data flow control protocols on the primary logical unit (PLU) session using the PLU connection. They are not used on the other connections. **Status-Control** messages map directly to the equivalent SNA session control and data flow control request/response units (RUs).

All **Status-Control** messages that correspond to SNA requests on the normal flow with the exception of LUSTAT-sent Request Exception (RQE), and **Status-Control** messages corresponding to **CLEAR** and **STSN** request on the expedited flow, have the **ACKRQD** (acknowledgment required) field set. **Status-Control** messages that correspond to SNA requests on the expedited flow (with the exception of **CLEAR** and **STSN**) do not have the **ACKRQD** field set by the local node. However, the application can set **ACKRQD** when sending these **Status-Control** messages. The last figure in this topic summarizes which **Status-Control** requests always have **ACKRQD** set.

If a **Status-Control** request has **ACKRQD** set in the message header, the recipient must supply a **Status-Control** response (**Acknowledge, Negative-Acknowledge-1** or **Negative-Acknowledge-2**) before the sender sends further Data messages or further **Status-Control** requests on the flow. The sender can still send **Status-Control** responses, **Status-Acknowledge**, **Status-Error**, and **Status-Resource** messages on the flow. This applies to both normal and expedited flows and all request modes (including delayed-request mode). The message key received on the request must be returned on the response. (This is to allow multiple **RQE LUSTAT** messages to be outstanding.) The local node increments the message key on **Status-Control** requests and **DATAFMI** messages that it sends to the application on the PLU connection.

For the logical unit application (LUA) variant of the function management interface (FMI), the message key field is used in a different way, as follows:

- For inbound expedited flow requests, the local node sets the SNA sequence number to the value supplied by the application in the message key field. The application must ensure that this field is set to the correct sequence number.
- For inbound **Status-Control** responses, the local node sets the SNA sequence number to the value supplied by the application in the message key field. The application must ensure that this field is set to the sequence number of the request for which a response is being sent.

Except in the case of **Status-Control(LUSTAT)**, if a **Status-Control** request does not have **ACKRQD** set, the application should not reply, because a positive response has already been sent by the local node.

For example, if the application sends a **Status-Control(QC) Request** with **ACKRQD** set (corresponding to an SNA request on the normal flow), this blocks further data and **Status-Control** requests corresponding to the inbound normal flow until the **Status-Control(QC)** response is received. It does not block other messages on the normal flow, or messages on the expedited flow. For example, the application could still send **Status-Control(SIGNAL)**.

The receipt of the **Status-Control** response implies an acknowledgment to all outstanding messages (including **Data** messages) on the flow.

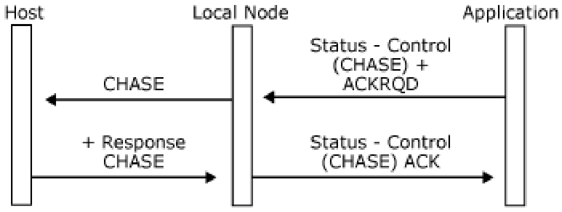
The use of **ACKRQD** on **Status-Control** messages effectively enforces definite-response and immediate request mode. This is appropriate for:

- **Status-Control** messages that correspond to the SNA requests **CLEAR** and **STSN** (because the expedited flow is **RQD**).
- **Status-Control** messages corresponding to all the **DFC** requests (which are **RQD**) except **LUSTAT** (which can be **RQE**).

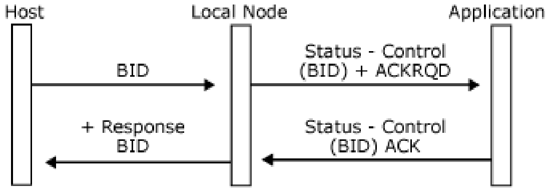
The application can set **ACKRQD** on **Status-Control** requests that correspond to SNA requests on the expedited flow, even where **ACKRQD** is not required. For example, when an application is signaling for direction (for example, a 3270 emulator with a terminal operator repeatedly pressing the ATTN key), it can generate multiple **Status-Control(SIGNAL) Request** messages, which would adversely affect the performance of other users. The application can set **ACKRQD** on the first **Status-Control(SIGNAL) Request** and ignore events that would cause further **Status-Control(SIGNAL) Request** messages until the **Status-Control(SIGNAL) Response** is received from the local node.

The message flows in the following six figures show outbound and inbound **Status-Control** sequences with and without **ACKRQD** and the corresponding SNA RUs.

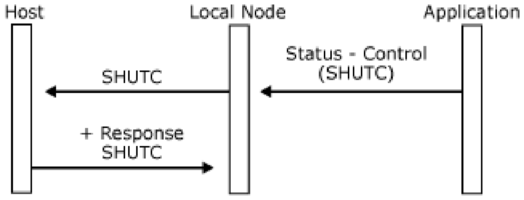
In the first figure, the application sends **Status-Control(CHASE)**.


Host
Local Node
Application
Status - Control (CHASE) + ACKRQD
CHASE
+ Response CHASE
Status - Control (CHASE) ACK

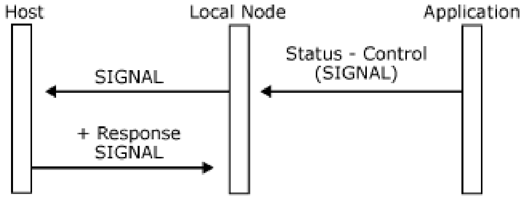
In the following figure, the host sends **BID** request.


Host
Local Node
Application
BID
Status - Control (BID) + ACKRQD
+ Response BID
Status - Control (BID) ACK

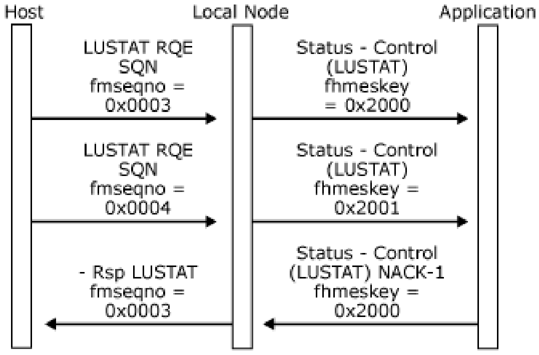
In the following figure, the application sends **Status-Control(SHUTC)**.


Host
Local Node
Application
Status - Control (SHUTC)
SHUTC
+ Response SHUTC

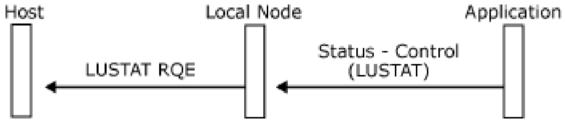
In the following figure, the host sends SNA **SIGNAL** request.


Host
Local Node
Application
Status - Control (SIGNAL)
SIGNAL
+ Response SIGNAL

In the following figure, the host sends multiple **RQE LUSTAT** requests, and the application rejects the first one.


Host
Local Node
Application
LUSTAT RQE SQN fmseqno = 0x0003
Status - Control (LUSTAT) fhmeskey = 0x2000
LUSTAT RQE SQN fmseqno = 0x0004
Status - Control (LUSTAT) fhmeskey = 0x2001
- Rsp LUSTAT fmseqno = 0x0003
Status - Control (LUSTAT) NACK-1 fhmeskey = 0x2000

In the following figure, the application sends **Status-Control(LUSTAT) NOACKRQD**.


Host
Local Node
Application
Status - Control (LUSTAT)
LUSTAT RQE

The following table summarizes the **Status-Control** requests supported by the local node and SNA session control (SC) and data flow control (DFC) requests. For each **Status-Control** request, the table gives:

- The SNA category of the corresponding SNA request (SC or DFC).
- The flow used by the corresponding SNA request (normal or expedited).
- The TS or FM profiles on which the corresponding SNA request is supported.
- The directions for which it is valid (NODE <–> APPL).

- Whether it requires **ACKRQD**. Note that the application can set ACKRQD on a Status-Control request that does not require it.
- The hexadecimal code used in the control-type field of the Status-Control message. (For more information, see FMI Message Formats.)

Status-Control	SNA RQ flow	TS profile	FM profile	Direction node–appl	ACKRQD	Code
CLEAR	SC,Exp	2,3,4	–	–>	ACKRQD	CCLEAR (0x01)
SDT	SC,Exp	3,4	–	–>	–	CSDT (0x02)
RQR	SC,Exp	4	–	<–	–	CRQR (0x03)
STSN	SC,Exp	4	–	–>	ACKRQD	CSTSN (0x04)
CANCEL	DFC,Norm	–	3,4,7	<–>	ACKRQD	CCANCEL (0x10)
LUSTAT	DFC,Norm	–	3,4,7	<–>	–	CLUSTAT (0x11)
SIGNAL	DFC,Exp	–	3,4,7	<–>	–	CSIGNAL (0x12)
RSHUTD	DFC,Exp	–	3,4,7	<–	–	CRSHUTD (0x13)
BID	DFC,Norm	–	3,4	–>	ACKRQD	CBID (0x14)
CHASE	DFC,Norm	–	3,4	<–>	ACKRQD	CCHASE (0x15)
SHUTC	DFC,Exp	–	3,4	<–	–	CSHUTC (0x16)
SHUTD	DFC,Exp	–	3,4	–>	–	CSHUTD (0x17)
RTR	DFC,Norm	–	3,4	<–	ACKRQD	CRTR (0x18)
QC	DFC,Norm	–	4	<–>	ACKRQD	CQC (0x20)
QEC	DFC,Exp	–	4	<–>	–	CQEC (0x21)
RELQ	DFC,Exp	–	4	<–>	–	CRELQ (0x22)

The requests in the following table are used only with LUA. (For more information, see FMI Concepts.)

Status-Control	SNA RQ flow	TS profile	FM profile	Direction node–appl	ACKRQD	Code
CRV	SC,Exp	3,4	–	–>	ACKRQD	CCRV (0x05)
BIS	DFC,Norm	–	18	<–>	ACKRQD	CBIS (0x19)
SBI	DFC,Exp	–	18	<–>	ACKRQD	CSBI (0x1A)

The use of particular **Status-Control** messages is described in following topics of this section, in the context of PLU session protocols such as chaining, brackets, recovery, and so on.

For the formats of **Status-Control** messages, see Status-Control.

This section contains:

- Status-Control (ACKLUA) Message

Status-Control (ACKLUA) Message

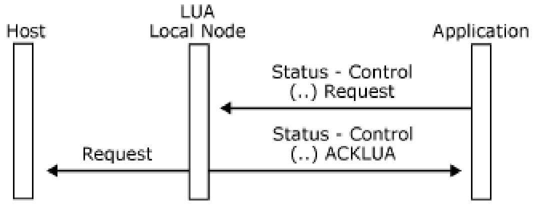
When a logical unit application (LUA) application sends a **Status-Control** message inbound to the local node, the LUA verb used to send the message cannot complete until the local node acknowledges the message. Because of this, the local node will always respond to the LUA application after it has completed its send checking of the inbound message. If the inbound message passes the local node's send checks, and the corresponding SNA message will be sent to the host, the local node sends a Status-Control(...) ACKLUA message to the application to indicate this. Note that the **ACKLUA** message does not imply that the SNA message was successfully sent to the host, or that the host received it.

The format of the **Status-Control(...) ACKLUA** message is explained in Status-Control(...) ACKLUA. Note that the use of the message key field in **Status-Control(...) ACKLUA** is different from other **Status-Control** messages. It contains the sequence number from the transmission header (TH) of the **Status-Control** message sent by the LUA application, not the message key.

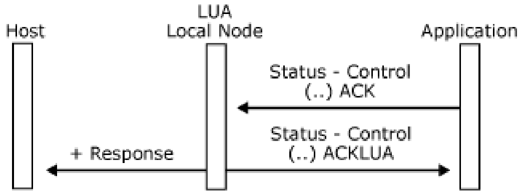
If the inbound message fails the local nodes send checking, a Status-Control(...) Negative-Acknowledge-2 message will be returned as for non-LUA applications. (This is then reported to the LUA application by a non-OK return code to the LUA verb that sent the message.)

The following three figures illustrate the **ACKLUA** acknowledgment protocol for different messages that the application can send.

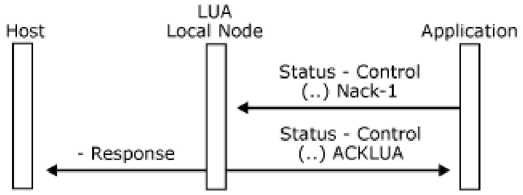
In the first figure, the application sends a **Status-Control(...) Request** message that passes the send checks of the local node.


LUA
Local Node
Host
Application
Status - Control
(..) Request
Status - Control
(..) ACKLUA
Request

In the following figure, the application sends a **Status-Control(...) Acknowledge** message that passes the send checks of the local node.


LUA
Local Node
Host
Application
Status - Control
(..) ACK
Status - Control
(..) ACKLUA
+ Response

In the following figure, the application sends a **Status-Control(...) Negative-Acknowledge-1** message that passes the send checks of the local node.


LUA
Local Node
Host
Application
Status - Control
(..) Nack-1
Status - Control
(..) ACKLUA
- Response

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Status-Error Message

Status-Error messages flow from the local node to the application to report request reject and response header (RH) usage error conditions for:

- Errors in outbound expedited data flow control (DFC) requests.
- Errors in outbound session control (SC) requests.
- Errors in inbound responses.

The **Status-Error** message contains four bytes of error code information that contain the appropriate SNA sense codes for the detected error. For a list of error codes, see Error and Sense Codes.

Status-Resource Message

Status-Resource messages flow between an application and the local node to enable the local node to pace the primary logical unit (PLU) session of the application. They provide the local node with an indication of the buffer resources available at the application to receive outbound messages. With this information, the local node can determine when to send a pacing response. (For more information, see Pacing and Chunking.)

> **Note** Flow control is an option. Inbound pacing is handled by the local node, transparently to the application, and outbound pacing can be handled similarly. This is appropriate when only a limited number of messages flows from end-to-end of the SNA session between definite responses, such as with a 3270 screen.

Status-Session Message

Status-Session messages always flow from the local node to the application and provide information about changes in the state of the session. There are separate **Status-Session** flows for each connection between the application and the local node.

The local node uses only one **Status-Session** message on the primary logical unit (PLU) connection. This is the **Status-Session(BETB)** message, used to report when the PLU session returns to the between-bracket state after the application or the PLU initiated a bracket. (For more information, see Brackets.)

The local node reports the activation and deactivation states of the system services control point (SSCP) session and PU-SSCP session using **Status-Session** messages. For example, it reports the receipt of an **ACTLU** request from the host SSCP using a **Status-Session (LU-Active)** message on the SSCP connection. (For more information, see SSCP Connection.)

By providing **Status-Session** messages rather than requiring the application to interpret the relevant information in the SNA request, the local node shields the application from decisions affecting conditional state transitions and from the necessity for a detailed understanding of SNA protocols.

A **Status-Session** message contains a status code, and for some status codes, an additional status code that qualifies the meaning of the primary status code. For example, the Link-Error status code, which occurs on the SSCP connection, is qualified by a status code that reports the link outage code supplied by the data link control layer of the local node. Applications such as 3270 device emulators use the qualifying status codes to display communications check codes (−+z_nnn) on the status line of the display.

The **Status-Session** codes are summarized in Status-Session Codes.

Status-RTM Message

The Status-RTM message is used by the local node to inform the application of the Response Time Monitor (RTM) parameters being used by the host. It flows from the local node to the application on the system services control point (SSCP) connection and is sent only for 3270 display logical units (LUs), or LUs in a pool of display LUs.

The **Status-RTM** message is sent at the following times:

- After the OK response to the Open(SSCP) Request message, to inform the application of the initial RTM parameters.
- When the RTM counters are reset, either due to a request from the host or when the local node sends unsolicited RTM data to the host.
- When any of the RTM parameters are changed by the host.

For more information about the use of the **Status-RTM** message, see RTM Parameters. For more information about how the application supplies RTM data to the local node, see Response Time Monitor Data.

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FMI Message Summary

This section lists each of the messages used at the function management interface (FMI) and gives a reference to a topic in the section where each message is described. The formats of the messages are given in FMI Message Formats.

For each message the direction of flow is indicated. IN means from the application to the local node, and OUT means from the local node to the application. The connection on which the message flows is also given.

Message	Direction	Connection	Reference
Open(SSCP) Request	IN	SSCP	Opening the SSCP Connection
Open(SSCP) Response	OUT	SSCP	Opening the SSCP Connection
Open(SSCP) Error Response	OUT	SSCP	Opening the SSCP Connection
Open(PLU) Request	OUT	PLU	Opening the PLU Connection
Open(PLU) OK Response	IN	PLU	Opening the PLU Connection
Open(PLU) Error Response	IN	PLU	Opening the PLU Connection
Open(PLU) OK Confirm	OUT	PLU	Opening the PLU Connection
Open(PLU) Error Confirm	OUT	PLU	Opening the PLU Connection
Close(SSCP) Request	IN	SSCP	Closing the SSCP Connection
Close(SSCP) OK Response	OUT	SSCP	Closing the SSCP Connection
Close(PLU) Request	IN/OUT	PLU	Closing the PLU Connection
Close(PLU) OK Response	IN/OUT	PLU	Closing the PLU Connection
Data-FMI	IN/OUT	SSCP/PLU	Data Flow
Status-Acknowledge(Ack)	IN/OUT	SSCP/PLU	Data Flow, Confirmation and Rejection of Data
Status-Acknowledge(Nack-1)	IN/OUT	SSCP/PLU	Data Flow, Confirmation and Rejection of Data
Status-Acknowledge(Nack-2)	OUT	SSCP/PLU	Inbound Data
Status-Control(CLEAR) Request	OUT	PLU	Recovery
Status-Control(CLEAR) Ack	IN	PLU	Recovery
Status-Control(CLEAR) Nack-1	IN	PLU	Recovery
Status-Control(SDT) Request	OUT	PLU	Status-Control Message
Status-Control(RQR) Request	IN	PLU	Recovery
Status-Control(RQR) Ack	OUT	PLU	Recovery
Status-Control(RQR) Nack-1	OUT	PLU	Recovery
Status-Control(RQR) Nack-2	OUT	PLU	Recovery
Status-Control(STSN) Request	OUT	PLU	Recovery
Status-Control(STSN) Ack	IN	PLU	Recovery
Status-Control(STSN) Nack-1	IN	PLU	Recovery
Status-Control(CANCEL) Request	IN/OUT	PLU	Outbound Chaining, Inbound Chaining
Status-Control(CANCEL) Ack	IN/OUT	PLU	Outbound Chaining, Inbound Chaining
Status-Control(CANCEL) Nack-1	IN/OUT	PLU	Outbound Chaining, Inbound Chaining
Status-Control(CANCEL) Nack-2	OUT	PLU	Inbound Chaining
Status-Control(LUSTAT) Request	IN/OUT	PLU	LUSTATs
Status-Control(LUSTAT) Ack	IN/OUT	PLU	LUSTATs
Status-Control(LUSTAT) Nack-1	IN/OUT	PLU	LUSTATs
Status-Control(LUSTAT) Nack-2	OUT	PLU	LUSTATs
Status-Control(SIGNAL) Request	IN/OUT	PLU	Direction
Status-Control(SIGNAL) Ack	OUT	PLU	Direction
Status-Control(SIGNAL) Nack-1	OUT	PLU	Direction
Status-Control(SIGNAL) Nack-2	OUT	PLU	Direction
Status-Control(RSHUTD) Request	IN	PLU	Application-Initiated Termination
Status-Control(RSHUTD) Ack	OUT	PLU	Application-Initiated Termination
Status-Control(RSHUTD) Nack-1	OUT	PLU	Application-Initiated Termination
Status-Control(RSHUTD) Nack-2	OUT	PLU	Application-Initiated Termination
Status-Control(BID) Request	OUT	PLU	Brackets
Status-Control(BID) Ack	IN	PLU	Brackets
Status-Control(BID) Nack-1	IN	PLU	Brackets

Status-Control(CHASE) Request	IN/OUT	PLU	Confirmation and Rejection of Data
Status-Control(CHASE) Ack	IN/OUT	PLU	Confirmation and Rejection of Data
Status-Control(CHASE) Nack-1	IN/OUT	PLU	Confirmation and Rejection of Data
Status-Control(CHASE) Nack-2	OUT	PLU	Confirmation and Rejection of Data
Status-Control(SHUTC) Request	IN	PLU	Shutdown and Quiesce
Status-Control(SHUTC) Ack	OUT	PLU	Shutdown and Quiesce
Status-Control(SHUTC) Nack-1	OUT	PLU	Shutdown and Quiesce
Status-Control(SHUTC) Nack-2	OUT	PLU	Shutdown and Quiesce
Status-Control(SHUTD) Request	OUT	PLU	Shutdown and Quiesce
Status-Control(RTR) Request	IN	PLU	Brackets
Status-Control(RTR) Ack	OUT	PLU	Brackets
Status-Control(RTR) Nack-1	OUT	PLU	Brackets
Status-Control(RTR) Nack-2	OUT	PLU	Brackets
Status-Control(QC) Request	IN/OUT	PLU	Shutdown and Quiesce
Status-Control(QC) Ack	IN/OUT	PLU	Shutdown and Quiesce
Status-Control(QC) Nack-1	IN/OUT	PLU	Shutdown and Quiesce
Status-Control(QC) Nack-2	OUT	PLU	Shutdown and Quiesce
Status-Control(QEC) Request	IN/OUT	PLU	Shutdown and Quiesce
Status-Control(QEC) Ack	OUT	PLU	Shutdown and Quiesce
Status-Control(QEC) Nack-1	OUT	PLU	Shutdown and Quiesce
Status-Control(QEC) Nack-2	OUT	PLU	Shutdown and Quiesce
Status-Control(RELQ) Request	IN/OUT	PLU	Shutdown and Quiesce
Status-Control(RELQ) Ack	OUT	PLU	Shutdown and Quiesce
Status-Control(RELQ) Nack-1	OUT	PLU	Shutdown and Quiesce
Status-Control(RELQ) Nack-2	OUT	PLU	Shutdown and Quiesce
Status-Error	OUT	SSCP/PLU	Status-Error Message
Status-Resource	IN	PLU	Pacing and Chunking
Status-Session	OUT	SSCP/PLU	Status-Session Message, Status-Session Codes
Status-RTM	OUT	SSCP	RTM Parameters

The following table lists the messages that are used for LUA only.

Message	**Direction**	**Connection**	**Reference**
Status-Acknowledge(ACKLUA)	OUT	SSCP/PLU	Inbound Data from LUA Applications
Status-Control(...) ACKLUA	OUT	PLU	Inbound Data from LUA Applications
Status-Control(CRV) Request	OUT	PLU	Status-Control Message
Status-Control(CRV) Ack	IN	PLU	Status-Control Message
Status-Control(CRV) Nack-1	IN	PLU	Status-Control Message
Status-Control(BIS) Request	IN/OUT	PLU	Status-Control Message
Status-Control(BIS) Ack	IN/OUT	PLU	Status-Control Message
Status-Control(BIS) Nack-1	IN/OUT	PLU	Status-Control Message
Status-Control(SBI) Request	IN/OUT	PLU	Status-Control Message
Status-Control(SBI) Ack	IN/OUT	PLU	Status-Control Message
Status-Control(SBI) Nack-1	IN/OUT	PLU	Status-Control Message

FMI Status, Error, and Sense Codes

This section lists the function management interface (FMI) status codes, error codes, and sense codes used on **Open** messages, **Status** messages, and **Data** messages with the system detected error indicator (SDI) set.

This section contains:

- Status-Session Codes
- Error and Sense Codes

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Status-Session Codes

For the status codes used on Status-Session messages, the following table lists:

- The value for the status code.
- The valid qualifying codes (if any) and their values.
- On which sessions the combinations of primary and qualifying status codes can occur.

For an overall description of the role of the **Status-Session** message, see Status-Session Message. The individual codes are discussed in SSCP Connection and PLU Connection.

Status code	Value	Qualifying code	Value	Usage
STNOSESS (no session)	0x01	STPUINAC STPUACT STPUREAC STLUINAC	0x10 0x03 0x04 0x11	SSCP SSCP SSCP SSCP
STLINERR (link error)	0x02	DLC ERROR	(See Note 1)	SSCP
STLUACT (LU active)	0x05	-	-	SSCP
STLUREAC (LU reactivated)	0x06	-	-	SSCP
STBETB (between brackets)	0x07	-	-	PLU

> **Note** The qualifying status code supplied on a **Status-Session** link error is the error code supplied by the data link control layer of the local node.
>
> **Status-Session** link error code 20 is generated by the node rather than by the link service. It indicates that the link service is not yet available, but is being activated. Ignore this error code during session activation. Otherwise, all **Status-Session** link errors (including 20) will cause the emulator to send a **Close(SSCP)**. When the emulator receives the Close(SSCP) Response, it will start again and send a new **Open(SSCP)**.
>
> **Note** The session status identifier is obsolete. It was used by the Microsoft® SNA Server OS/2 and Microsoft MS-DOS®-based 3270 emulators. Its value was obtained by adding 484 (decimal) to the qualifying status code shown in the preceding table.

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Error and Sense Codes

This section describes the error and sense codes that are reported to the application in the following messages:

- Error Codes for Open(SSCP) Error Response
- Error Codes for Open(PLU) Error Confirm
- Error Codes for Nack-2 Messages
- Error Codes for Status-Error Messages
- Sense Codes for SDI Messages

Where the reported codes are SNA sense codes, a more complete description is given in Chapter 8 of the IBM document *Systems Network Architecture: Reference Summary* (GA27-3136). These SNA sense codes are also documented in Microsoft Host Integration Server 2004 Help.

In addition, the local node delivers negative responses from the host as **Status-Acknowledge(Nack-1)** and **Status-Control(...) Negative-Acknowledge-1**, which can have any SNA sense code.

Application designers should note that error codes listed here that are specific to Host Integration Server always have an initial byte value of 0x00, and therefore can be easily distinguished from SNA sense codes, which have nonzero initial bytes.

The error codes are listed in topics for each type of message with an indication of the reason for the error.

This section contains:

- Error Codes for Open Messages
- Error Codes for Nack-2 Messages
- Error Codes for Status-Error Messages
- Sense Codes for SDI Messages

Error Codes for Open Messages

The possible error codes for **Open(SSCP) Error Response** and **Open(PLU) Error Confirm** are shown in the following topics.

This section contains:

- Error Codes for Open(SSCP) Error Response
- Error Codes for Open(PLU) Error Confirm

Error Codes for Open(SSCP) Error Response

The following table gives the values for error code 1 and error code 2 that can be returned on the **Open(SSCP) Error Response**.

Error code 1	**Description**	**Error code 2**	**Description**
0	No servers found.	CSRENOSR (0)	No servers found.
0x0053	Logical unit (LU) not verified.	CSRECBSH (3)	LU not verified.
0x0055	System services control point (SSCP) connection already open.	CSRECBSH (3)	Control block / resource shortage.
0x0057	No LU in group free.		
0x0812	No free session control block available.		
0x1001	A connection activation failed recently.		
0x1002	The connection is inactive.		
0x1008	The link service is active remotely. This error return code is not supported by this level of Host Integration Server.		
0x1009	The SNA server is active, but the connection on which the requested LU is defined is not active.		
0x100B	The connection is in the process of activating as the result of another **Open(SSCP)** or operator activation or recovery from an outage.		
0x1010	The connection is active, but an activate physical unit (ACTPU) has not yet been received.		
0x1011	The connection is active, but an activate logical unit (ACTLU) has not yet been received.		
0x0063	Unrecognized Open request.	CSRESERV (1)	Service not present.
0x0A0E	LU/LU group not found in configuration.		

Note The error code 1 values 0x1001 to 0x1011 are returned when the Open(SSCP) Request specifies a nonforced Open. They do not indicate errors, but indicate that the LU-SSCP session is not active. The application can retry the **Open(SSCP) Request** specifying a forced Open, in which case the local node will attempt to activate the connection if possible.

Error Codes for Open(PLU) Error Confirm

The following table gives the values for error code 1 that can be returned on the Open(PLU) Error Confirm message. Error code 2 is zero, except when error code 1 is 0x0821. In this case it contains the byte offset in the **BIND** where the **BIND** failed to match the **BIND** check table.

Error code	Description
0x0051	Fewer than two buffer elements were present on **Open(PLU) Response**.
0x0052	System services control point (SSCP) connection is no longer active.
0x0821	**BIND** checking failed: error code 2 gives byte offset in **BIND** at which the error occurred.

Error Codes for Nack-2 Messages

The possible error codes delivered to the function management interface (FMI) application on Status-Acknowledge(Nack-2) and Status-Control(...) Negative-Acknowledge-2 messages are tabulated in the following table. A **Nack-2** is delivered to the application in response to data that is sent in error (or a Status-Control(...) Request that is in error). The data has not been sent to the host. The table indicates whether the error is critical, applying to the primary logical unit (PLU) connection only. If the error is critical, the critical failure indicator will be set in the message, and the application will receive a Close(PLU) Request as the next message.

All Nack-2 messages have the second word of information as 0x0000.

Error / Sense code	**Critical YES/NO**	**Description**
0x0040	YES	No buffer element on DATAFMI message.
0x0042	YES	DATAFMI message sent when no credit.
0x0043	YES	Invalid status-control for Transmission Service profile (TS profile).
0x0044	YES	Invalid status-control from application.
0x004A	YES	Half-duplex (HDX) contention and -QR,-BB,EB, or BKTFSM in pending-term-session.
0x0809	YES	Mode inconsistency.
0x1002	YES	Request/response unit (RU) length error.
0x1003	YES	Function not supported, invalid function management (FM) profile.
0x2002	NO	Chaining error.
0x2003	NO	Bracket error.
0x2004	NO	Direction error.
0x2005	YES	Data traffic reset.
0x2006	YES	Data traffic quiesced.
0x200D	YES	Response owed before sending request (half-duplex).
0x4003	YES	Begin bracket (BB) not allowed.
0x4004	YES	End bracket (EB) not allowed.
0x4006	YES	Exception response not allowed.
0x4007	YES	Definite response not allowed.
0x4009	YES	Change direction (CD) not allowed.
0x400A	YES	No-response not allowed.
0x400B	YES	Chaining not supported.
0x400C	YES	Brackets not supported.
0x400D	YES	CD not supported.
0x400F	YES	Incorrect use of FI.
0x4014	YES	Incorrect use of DR1, DR2, ER.
0x8005	NO	System services control point (SSCP) data sent when logical unit (LU) inactive.

Error Codes for Status-Error Messages

The possible error codes delivered to the function management interface (FMI) application on Status-Error messages are tabulated in the following table. A **Status-Error** message is delivered to the application in one of several cases, as shown in the following list:

- The local node detects an error in a response sent from the application (as a **Status-Acknowledge** or **Status-Control Ack/Nack-1** message).
- The local node detects an error in some data from the host that will not be delivered to the application as an system detected error indicator (SDI) message (such as an expedited flow request).
- The application sends an invalid **Status** message.

For inbound responses, the **Status-Error** codes have first byte 0x00. When the application is in error, the table indicates whether the error is critical, applying to the primary logical unit (PLU) connection only. If the error is critical, the application will receive a Close(PLU) Request as the next message.

The sense codes beginning with 0x40 will only be delivered if the corresponding receive check has been enabled in the connection information control block (CICB) on the Open(SSCP) Request from the application.

Where the sense code is marked with the * symbol, the second word of sense information carries the request code of the expedited flow request that was in error (for example 0x00C9 for SIGNAL).

Error / Sense code	Critical YES/NO	Description
0x0008	NO	Negative response already sent to this chain.
0x0040	YES	Invalid **Status** message from application.
0x0046	YES	Session failure due to correlation table shortage.
0x0050	YES	Invalid sequence number on Status-Ack.
0x0053	YES	Application may not send status control (**STSN**) negative acknowledge if it supports transaction numbers.
0x0056	YES	**Status-Ack** sent when previous RQD chains are outstanding. (For more information, see Outbound Data.)
0x0801	NO	Message received when pacing count is zero.
0x0805	NO	**BIND** from another PLU when already bound.
0x0809 *	NO	Mode inconsistency (**QEC** or **SHUTD**).
0x0815	NO	**BIND** from same PLU when already bound.
0x0821	NO	Incorrect **ACTLU** type (SSCP connection).
0x1003 *	NO	Wrong profile/network control request/invalid session control message.
0x2005	NO	Data traffic reset.
0x2007	NO	Data traffic not reset (**STSN** after **SDT**).
0x4009 *	NO	Change direction (CD) not allowed.
0x400B *	NO	Chaining not supported.
0x400C *	NO	Brackets not supported.
0x400F *	NO	Incorrect use of FI.
0x4011 *	NO	Incorrect use of request/response unit (RU) category.
0x4014 *	NO	Incorrect use of definite response 1 (DR1), definite response 2 (DR2), exception response (ER).

Sense Codes for SDI Messages

When the local node detects an error in a normal flow request from the host, the message is converted into a **DATAFMI** message with the system detected error indicator (SDI) set to inform the application and to allow data to be processed serially. The application must convert the message to a Status-Acknowledge(Ack) to allow the local node to send the required negative response to the host. The possible error codes delivered to the function management interface (FMI) application on such SDI messages are tabulated in the following table.

The sense codes beginning with 0x40 will only be delivered if the corresponding receive check has been enabled in the connection information control block (CICB) on the Open(SSCP) Request from the application. If a receive check has been disabled, the message can still be converted to an SDI message. For example, a message with begin bracket (BB), -begin chain (BC) would fail as 2002 or 2003 if 4003 were disabled.

When the application uses a **Status-Control(LUSTAT) Request** to reject outbound data, the sense codes supplied by the application will be present on the SDI message generated by the local node. For more information, see LUSTATs.

Sense code	**Description**
0x0809	Mode inconsistency.
0x080B	Bracket race error.
0x081B	Contention race condition.
0x1003	Incorrect FM profile for request.
0x2001	Sequence number error.
0x2002	Chaining error.
0x2003	Bracket error.
0x2004	Direction error.
0x2006	Data traffic quiesced.
0x4003	BB not allowed.
0x4004	End bracket (EB) not allowed.
0x4006	Exception response not allowed.
0x4007	Definite response not allowed.
0x4009	Change direction (CD) not allowed.
0x400B	Chaining not supported.
0x400C	Brackets not supported.
0x400D	CD not supported.
0x400F	Incorrect use of FI.
0x4011	Incorrect use of RU category.
0x4014	Incorrect use of definite response 1 (DR1), definite response 2 (DR2), exception response (ER).

Configuration Information

To obtain information about the Microsoft® Host Integration Server 3270 configuration, the application uses the calls listed in the following table.

Function	**Description**
sepdcrec	Returns a data structure that contains the 3270 user record for this user and the diagnostics record from the running configuration file.
sepdgetinfo	Returns general information about the version of Host Integration Server currently running, such as the release level, the network operating system, and the directory of the running configuration file.

If the return code from **sepdcrec** indicates that no 3270 user record was found for this user, the emulation program should terminate and not allow the user to use 3270 emulation. The Host Integration Server error message COM0438 is provided to log this error.

This section contains:

- 3270 User Record Format
- Diagnostics Record Format
- Creating NetView User Alerts

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3270 User Record Format

The format of the 3270 user record is shown below. The first structure definition is a logical unit (LU)/session information record, which includes details of a 3270 LU; the second is the 3270 user record, which includes a number of LU/session information records.

Note that the user record is not a fixed length, because the number of LU/session information records in the remap list is variable. The structures used below are provided simply as a template to allow you to map to the correct offset in the record.

```
typedef struct tecwrksd {
    UCHAR   cwshost[9];
    USHORT  cwsestyp;
    USHORT  cwsmodov;
    USHORT  cwspad;
} TECWRKSD;
```

Members

cwshost[9]
LU/pool name accessed.
cwsestyp
Session type (M2, M3, M4, M5, printer).
cwsmodov
Whether the user has override permission.
cwspad
Two bytes of padding.

```
typedef struct tecwrkus {
    USHORT   cwlen;
    USHORT   cwtype;
    UCHAR    cwname[21];
    UCHAR    cwremark[26];
    UCHAR    cwstylef[9];
    USHORT   cwvewrtm;
    USHORT   cwalert;
    USHORT   cwchghan;
    USHORT   cwmaxses;
    USHORT   cwnumrec;
    TECWRKSD cwsesdat[10];
    USHORT   cwmodisf;
    UCHAR    cwstatus;
    UCHAR    cwpad;
    USHORT   cwnumrmp;
    TECWRKSD cwremap[1];
} TECWRKUS;
```

Members

cwlen
Length of record.
cwtype
Type of record.
cwname[21]
User name.
cwremark[26]
Comment field.
cwstylef[9]
Initial style file name.
cwvewrtm
Whether user can view Response Time Monitor (RTM) information.
cwalert
Whether user has ALERT permission.
cwchghan

Whether user can change LU/pool name accessed.

cwmaxses
Maximum number of active sessions (1–10).

cwnumrec
Number of sessions for user.

cwsesdat[10]
Session information records.

cwmodisf
Permission to modify initial style.

cwstatus
Status byte: user or group.

cwpad
One byte of padding.

cwnumrmp
Number of LUs/pools in remap list.

cwremap[1]
LU/pool remap list.

For Windows 2000

Microsoft® Host Integration Server permits configuration of more than 10 sessions per user when used with clients running Microsoft Windows® 2000. The first 10 sessions are placed in the **cwsesdat** array with **cwnumrec** set to 10 and the remainder are placed in the location of the remap list. The **cwnumrmp** member indicates the number of **TECWRKSD** structures in the remap list. Note that this permits **cwmaxses** to be greater than **cwnumrec**.

The following "Members" list explains the meaning of each field in the structures and indicates how the application should use each field. For more information about Host Integration Server 3270 configuration, see Configuration Information.

Members

cwshost
The name (up to eight characters) of the LU or LU pool that this session is configured to use. The application specifies this name on the Open(SSCP) Request.

cwsestyp
The LU type (display or printer) of the LU used by this session and (if it is a display LU or a pool of display LUs) the screen model. The possible values are:

- CERTMOD2 (0) Model 2 display (24 by 80)
- CERTMOD3 (1) Model 3 display (32 by 80)
- CERTMOD4 (2) Model 4 display (43 by 80)
- CERTMOD5 (3) Model 5 display (27 by 132)
- CERTPRNT (4) Host printer

The application should use this value to distinguish between display and printer sessions and to set the appropriate screen model for display sessions.

cwsmodov
TRUE if the user has permission to override the screen model for display sessions—that is, to change the session to use a different screen model from the one configured. If this value is **FALSE**, the user should not be permitted to change the screen model. This field is not used for printer sessions and should not be checked.

cwlen
The length of the 3270 user record (this is variable because it contains a variable number of LU/session records in the remap list). The application should use this value to locate the start of the next 3270 user record when searching for the correct record.

cwtype
Identifies this as a 3270 user record.

cwname
The Local Area Network (LAN) Manager user name, or other identifying name, of the 3270 user (up to 20 characters). The application uses this to search for the correct 3270 user record.

cwremark
An optional comment field (up to 25 characters), used in the configuration program to give more information about the user (for example, the user's full name).

cwstylef
The name (up to eight characters) of the default style file used by this user (a file containing the user's 3270 customization

settings, used by the Host Integration Server 3270 emulation programs). This field can be used to identify the equivalent file for your 3270 emulator, if appropriate.

If this field is blank, no style file is used and the 3270 emulator should revert to its default settings (unless overridden by a style file specified by the user).

cwvewrtm
TRUE if this user is permitted to view a display of RTM statistics for his or her 3270 sessions. If this field is **FALSE**, the application should not display RTM statistics and should not display a last transaction time indicator (LTTI) on the status line of display sessions. For more information about the use of Response Time Monitor (RTM), see Diagnostics Record Format.

cwalert
TRUE if the user is permitted to send NetView user alerts. If this field is **FALSE**, the user should not be permitted to send alerts. For more information about the use of alerts, see Diagnostics Record Format.

cwchghan
TRUE if the user is permitted to remap a 3270 session to use a different LU (in which case it can be changed to use any LU in the remap list—see **cwremap**). If this field is **FALSE**, the application should not allow the user to remap sessions.

cwmaxses
The maximum number of active sessions permitted to this user. If the number of sessions configured (see **cwnumrec**) is greater than this, the user must not be allowed to activate more sessions at a time than this field specifies.

cwnumrec
The total number of sessions configured for this user. The user record always contains 10 LU/session records (see **cwsesdat**), but only this number of the records will be used—the remainder will be filled with zeros.

cwsesdat
Ten LU/session records. Some of these records can be filled with zeros, indicating that they are unused (**cwnumrec** gives the number of sessions that are used). The application should list, and allow the user to use, only the sessions that have valid session records here.

cwmodisf
TRUE if the user is permitted to modify the initial 3270 customization. If this field is **FALSE**, the application should use the customization defined by **cwstylef** (if specified); the user should not be allowed to make changes to this style, or to override it by loading a different style file.

cwstatus
Indicates whether the user name in this record is a LAN Manager user name or group name. The least significant bit of this byte is **CERTGRUP (1)** for a group, and **zero** for a user. Other bits are not used.

cwpad
Pad byte—not used by the application.

cwnumrmp
The number of LU/session records in the remap list (see **cwremap**).

cwremap
The list of LU/session records, which indicates the LUs to which the user can remap sessions (if any). If the user is not permitted to remap sessions (see **cwchghan**), this list is not used and should not be checked by the application.

Diagnostics Record Format

The format of the Diagnostics record is shown below. The first structure definition is an Alert information record, which includes details of a 3270 NetView user alert; the second is the Diagnostics record, which includes a number of Alert information records.

```
typedef struct tedalert {
    UCHAR    dalrtnam[53];
    UCHAR    daparam1[33];
    UCHAR    daparam2[33];
    UCHAR    daparam3[33];
} TEDALERT;
```

The following "Members" list explains the meaning of each field in the structures that is relevant to the application and indicates how the application should use each field. Fields that are not included in the list are used by other Microsoft® Host Integration Server components and need not concern the application; in particular, the network management connection name and the times at which RTM data is sent to the host are handled by the local node on behalf of the application.

Note that the application should determine whether the user is permitted to send NetView user alerts and/or view RTM data (see 3270 User Record Format). It should not display the appropriate information, as described below, if the user does not have permission to use that information. The host can also override whether the application is permitted to send and/or to display RTM data (for more information, see RTM Parameters).

For more information about how the application uses the RTM parameters, see RTM Parameters, Response Time Monitor Data, and Status-RTM.

Members

dalrtnam[53]
The description (up to 52 characters) of the alert corresponding to a particular alert number. The application should display this information to help the user determine which alert to send.

daparam1[33]
The descriptions (each up to 32 characters) of up to three parameters.

daparam2[33]
Required for the alert; depending on the specific alert.

daparam3[33]
One or more of these descriptions can be blank, indicating that the parameter is not used. For each of these descriptions that is not blank, the application should display this string to prompt the user for the appropriate parameter.

```
typedef struct tediagns {
    USHORT   dilen;
    USHORT   ditype;
    UCHAR    dinetmgt[9];
    USHORT   disrtmco;
    USHORT   disrtmub;
    USHORT   diwruldr;
    USHORT   dirtmth1;
    USHORT   dirtmth2;
    USHORT   dirtmth3;
    USHORT   dirtmth4;
    TEDALERT dialerts[20];
    UCHAR    diaudit[128];
    UCHAR    dierror[128];
    USHORT   diaudlev;
    UCHAR    dipad[16];
} TEDIAGNS;
```

Members

dilen
Length of record.

ditype
Type of record.

dinetmgt[9]
Network management connection name.

disrtmco
Send Response Time Monitor (RTM) data at counter overflow.
disrtmub
Send RTM data at UNBIND.
diwruldr
The definition by which response times are to be measured. The application should measure the response time from the time the user presses ENTER or an AID key to send data to the host, until one of the following events as defined by this field:

CERTWRIT (0)

The first host data reaches the 3270 display.

CERTUNLK (1)

The host unlocks the user's keyboard.

CERTDIRE (2)

The host gives the application direction so that the user can send further data.

Note that the host can override these definitions; for more information, see RTM Parameters.

dirtmth1
The thresholds that define the bands into which response times are to be classified. Note that the host can override these definitions; for more information, see RTM Parameters.
dirtmth2
RTM threshold #2.
dirtmth3
RTM threshold #3.
dirtmth4
RTM threshold #4.
dialerts[20]
Up to 20 alert records that define the alerts that Host Integration Server users can send to a host. There are always 20 records, but some of these can be blank, indicating that they are not used. The application should display the descriptions of any nonblank alerts together with the alert number (from 1 to 20) defined by the position of the alert record in this array.
diaudit[128]
Audit log file name.
dierror[128]
Error log file name.
diaudlev
Default audit level.
dipad[16]
16 bytes of padding.

Creating NetView User Alerts

You can create NetView user alerts for users to send. Users identify the alerts by number. Each number corresponds to a specific collection of information or requests that the user wants to send through NetView to a host operator.

Microsoft® Host Integration Server leaves blank fields for the user alert information in the structure that is returned from sepdcrec. To create specific user alerts, create appropriate data structures and call the TRANSFER_MS_DATA common service verb to send the user alert to NetView.

Compiling and Linking 3270 Client Applications

This section describes the 3270 client samples included with Microsoft® Host Integration Server 2004. The samples are located in the \SDK\Samples\SNA folder on the Host Integration Server 2004 CD.

This section lists and explains the header files and libraries needed to develop 3270 client applications for use with Host Integration Server 2004 client applications. It also provides information about compiling and linking the 3270 client applications.

This section contains:

- Building the 3270 Client Samples
- Client Interface Files for 3270 Applications
- 3270 Include Files
- Compiler Options for 3270 Applications
- Linking 3270 Client Applications

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Building the 3270 Client Samples

When installed from the Microsoft® Host Integration Server CD, all the 3270 client samples are built in a similar way, as described in this section. First, set the environment variables listed in the following table.

Variable	Description
ISVLIBS	The directory containing the Host Integration Server 2004 LIB files for Microsoft Windows® 2000.
ISVINCS	The directory containing the Host Integration Server 2004 header files.
SAMPLEROOT	The root directory where the sample code provided as part of the SDK has been installed on a local hard disk.

For example, after copying the contents of the SDK folder on the Host Integration Server 2004 CD to C:\SNASDK, use the following lines to set the variables:

```
ISVLIBS=C:\SNASDK\Lib
ISVINCS=C:\ SNASDK\Include
SAMPLEROOT=C:\SNASDK\Samples\SNA
```

Next, run NMAKE on the .mak file in each subdirectory below this root directory containing the actual sample source code. For example, for APING and APINGD, change to the Samples\aping directory and type the following:

nmake -f makeping.mak

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Client Interface Files for 3270 Applications

The files listed in the following table are required to build 3270 client applications for use with Microsoft® Host Integration Server.

File	Description
FMI.H	Main header file containing the definitions of buffer and message formats, function prototypes for the DL-BASE/DMOD interface calls, and constant definitions.
TRACE.H	Definitions of the logging and tracing macros.
FMISTR32.LIB	Function Management Interface (FMI) string library for use with Microsoft Windows® 2000.
SNACLI.LIB	Main interface library for developing 3270 client applications on Windows 2000.

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3270 Include Files

To compile the application, the header files FMI.H and TRACE.H are required. In addition, one of the standard operating system header files may be required. To include the required files, use the following lines in your application:

```
#include <fmi.h>
#include <trace.h>
```

Compiler Options for 3270 Applications

When compiling the 3270 client application, the compiler options listed in the following table are required.

Option	Explanation
/c	Compile only, without linking. Linking is normally done as a separate phase to include the required Microsoft® Host Integration Server libraries.
/D NOTRC	The NOTRC macro specifies that internal tracing should not be compiled into the application. The **/D NOTRC** option should be used for building a final system (internal tracing should not be included because it will degrade performance and require more memory and resources). For a development system, you may want to compile with internal tracing; if so, remove the **/D NOTRC** option.
/D WIN32_SUPPORT /D MSWIN_SUPPORT, /D OS2_SUPPORT, /D DOS_SUPPORT	These macros are used in the header files FMI.H and TRACE.H supplied with SNA services to support variants of the client interface for the different operating systems supported. One of these options must be defined, depending on the operating system for which the application is intended.

/Gzs	c:	Use **stdcall** calling conventions on i386/i486 and Pentium class processors.
	S:	Remove stack check calls.

The compiler flags listed in the following table are required, but any of the valid options for each flag may be used, as appropriate to your application.

Flag	Description
/A	Compiler model (Does not apply to Microsoft Windows® 2000)
/O	Optimization
/W	Warning level

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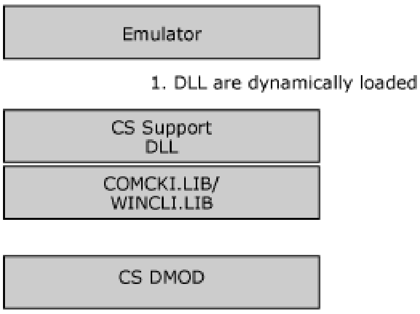
Linking 3270 Client Applications

This topic describes how to link 3270 client applications using different platforms.

The SNACLI.LIB library must be linked with the application.

The DMOD is implemented as a DLL. SNACLI.LIB contains import definitions for the APIs in the DLL, and some global variables required for the logging and tracing macros.

It is possible to create a DLL that is dynamically loaded when the user starts a session for an LU. In this case, to make the log and trace macros available, the application structure needs to be as shown in the following figure.


Emulator
1. DLL are dynamically loaded
CS Support DLL
COMCKI.LIB/ WINCLI.LIB
CS DMOD

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Support for 3270 Single Sign-On

This section describes the support for Single Sign-On for 3270 display sessions that is available in Microsoft® Host Integration Server 2004.

Over 3270 LUs, a Single Sign-On feature is supported to automate the overall logon process. When configured for this feature, Host Integration Server automatically replaces special keywords in the data stream with the actual host user name and password at appropriate points in the session.

This section contains:

- Prerequisites for 3270 Single Sign-On
- Registry Settings Used for 3270 Single Sign-On
- 3270 User Name and Password Replacement

Prerequisites for 3270 Single Sign-On

In preparation for using 3270 Single Sign-On, the system administrator must define a host security domain containing host connections. This host security domain must be initially created or modified to enable the Single Sign-On feature. The system administrator must enable a user's Microsoft® Windows Server™ 2003 or Microsoft Windows® 2000 account in the host security domain and either the administrator or the user must establish a mapped host account for the Microsoft® Windows Server™ 2003 or Windows 2000 domain user name.

The user must be logged on to a Microsoft® Windows Server™ 2003 or Windows 2000 domain with a user name and password. Note that this Single Sign-On feature is only supported over 3270 LUs.

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Registry Settings Used for 3270 Single Sign-On

The 3270 Single Sign-On feature depends on Microsoft® Host Integration Server scanning 3270 logical units (LUs) used in the logon process for special keywords that are defined in the registry on the computer running Host Integration Server. The values for these special keywords can be defined by the system administrator on the computer running Host Integration Server.

The registry settings used by the 3270 Single Sign-On process are located under the **HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services** registry node. The following entries are installed under the **SNASERVR\PARAMETERS** subkey:

3270SSOPadByte

This entry should be set to an ASCIIZ string to use as the character for padding replacement text in the user name or password if these strings are shorter than the length of the special tag strings defined below. The default value for this pad character is the ASCII space character.

3270SSOPostReplaceCount

This entry should be set to a DWORD that represents the number of message chains of RUs to scan after replacement of text for user name or password. The default value for this number is 10.

3270SSOPrefix

This entry should be set to an ASCIIZ string to use as the special prefix tag string in combination with the user name and password tags. The default value of this string is MS$.

3270SSOPwdTag

This entry should be set to an ASCIIZ string to use as the special tag string in combination with the **3270SSOPrefix** tag in defining the special host password string that will be replaced. The default value of this string is SAMEP, so the default host password string that is scanned for and replaced is MS$SAMEP. Note that length of the password string that is scanned for (MS$SAMEP, for example) determines the maximum length of the password string that can sent to the host using Single Sign-On. This limit occurs because the password substitution cannot change the length of the data message.

Note that the value of this string must be different from the value of the **3270SSOUserTag** entry for Single Sign-On to function properly.

3270SSOReplaceCount

A DWORD value that affects the time-out value for password substitution. User IDs and passwords will be substituted in each chain on the LU-SSCP and PLU-SLU sessions until the timer expires. By default the timer will be set to 30 seconds, but this behavior can reconfigured in the registry using the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries. The timer is started when the OPEN SSCP is received by the node.

If the **3270SSOReplaceCount** registry entry is defined and the **3270SSOReplaceTimer** registry entry is not defined, the node counts this number of RUs (on PLU-SLU session only) before time-out occurs. If both the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries are defined, the value for **3270SSOReplaceCount** will be used to determine when a time-out will occur. By default, this key is not defined and the node defaults to a time-out of 30 seconds.

3270SSOReplaceTimer

A DWORD value that affects the time-out value for password substitution. User IDs and passwords will be substituted in each chain on the LU-SSCP and PLU-SLU sessions until the timer expires. By default the timer will be set to 30 seconds, but this behavior can reconfigured in the registry using the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries. The timer is started when the OPEN SSCP is received by the node.

If the **3270SSOReplaceTimer** registry entry is defined and **3270SSOReplaceCount** is not defined, the node uses this value in seconds before time-out occurs. If both the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries are defined, the value for **3270SSOReplaceCount** will be used to determine when a time-out will occur. By default, this key is not defined and the node defaults to a time-out of 30 seconds.

3270SSOUserTag

This entry should be set to an ASCIIZ string to use as the special tag string in combination with the **3270SSOPrefix** tag in defining the special user name string that will be replaced. The default value of this string is SAMEU, so the default user name string that is scanned for and replaced is MS$SAMEU.

Note that length of the user name string that is scanned for (MS$SAMEU, for example) determines the maximum length of the username string that can sent to the host using Single Sign-On. This limit occurs because the user name substitution cannot change the length of the data message.

Note that the value of this string must be different from the value of the **3270SSOPwdTag** entry for Single Sign-On to function properly.

3270 User Name and Password Replacement

The SNA node on the host monitors the inbound session for a replacement sequence consisting of the **3270SSOPrefix** string immediately followed by one of the strings **3270SSOUserTag** or **3270SSOPwdTag**. Thus, the default user name string that would be scanned for and replaced is MS$SAMEU. When this string is found in the inbound session data, the node looks up the corresponding information (host user name in the current host security domain) and overwrites MS$SAMEU with this information. The same process occurs for the password string that would be scanned for and replaced, which defaults to MS$SAMEP.

Note that this operation cannot change the length of the data message. If the actual user name or password that is retrieved from the current host security domain is shorter than the replacement sequence, it is padded out with the first character of the **3270SSOPadByte** string used as a padding character. If the actual host user name or password string is longer than the string that is scanned for, these strings are truncated to the length of the scanned string so that the data message length is not affected.

Note that since the user name and password can be sent in any order, the registry string values for the **3270SSOUserTag** and **3270SSOPwdTag** entries must be different for Single Sign-On to function properly.

The SNA node monitors the SSCP-LU session for these special tag strings at all times and replaces all occurrences of these strings with corresponding looked-up data. On the LU-LU session, the node starts monitoring at start of session (BIND). The node stops monitoring when it has received **3270SSOPostReplaceCount** chains of request/response units (RUs) without seeing a substitution tag. The node will not restart monitoring until it receives an UNBIND–BIND sequence for that session.

Note that the node considers the sequence:

```
BIND, data, UNBIND(BIND FORTHCOMING), BIND …
```

As a continuation of the same LU-LU session and does not restart monitoring on receipt of the second BIND. This sequence is often used by host session managers handing off a session to an application subsystem, and is considered a single terminal session.

User IDs and passwords will be substituted in each chain on the system services control LU-SSCP and PLU-SLU sessions until the node has received **3270SSOPostReplaceCount** chains of RUs without seeing a substitution tag or a timer expires. By default the timer is set to 30 seconds, but this behavior can reconfigured in the registry using the **3270SSOReplaceCount** and **3270SSOReplaceTimer** registry entries. The timer is started when the OPEN SSCP is received by the node. After the timer expires, the node will stop scanning messages for the 3270 replacements strings for the user ID and password. If the replacement strings arrive after the timer expires, the replacement strings will be sent to the host unmodified causing the Single Sign-On to fail. The application will not receive any notification that the timer has expired. The only indication of a problem will likely be that the Single Sign-On to the host session has failed.

Note that all strings are specified in the registry in ASCII, but the node translates them to Extended Binary Coded Decimal Interchange Code (EBCDIC) through AE character mapping before scanning for a match.

SNA Internationalization Programmer's Guide

This section describes the features available in Microsoft® Host Integration Server 2004 for supporting international languages and different national language character sets.

The SNANLS API uses the language support features provided with Microsoft Windows® 2000 and Microsoft Windows XP. SNANLS supports European languages that use single-byte encoding, as well as East Asian languages that use double-byte or Unicode encoding.

For API references and other technical information about SNA Internationalization, see
SNA Internationalization Programmer's Reference.

This section contains:

- SNA National Language Support Programmer's Guide

SNA National Language Support Programmer's Guide

The SNA National Language Support (SNANLS) API standardizes the way in which national languages and locales are supported. SNANLS handles string conversion necessary for supporting a wide range of host and code pages. Components such as the Host Print service and Shared Folders service use SNANLS API to convert strings from EBCDIC to ANSI and from ANSI to EBCDIC.

The SNANLS API is the standard means to convert strings in Microsoft® Host Integration Server 2004. SNANLS presents a single interface to applications that need strings converted from one code page to another. These conversions may be EBCDIC-to-ANSI, ANSI-to-EBCDIC, EBCDIC-to-OEM code pages, OEM-to-EBCDIC, EBCDIC-to-ISO code pages, and ISO-to-EBCDIC. Additionally, SNANLS supports the broadest possible range of host and PC code page conversions.

SNANLS provides a uniform interface for programmers, hiding the details and difficulties of string conversion. SNANLS supports both SBCS and DBCS conversions. Two other lower-level APIs handle the actual string conversion. For SBCS conversions, SNANLS uses the system-provided Win32® NLS API that is resident on Microsoft Server™ 2003, Windows® XP, and Windows 2000.

For DBCS conversions, SNANLS uses the **TrnsDT** API. The **TrnsDT** API is installed with Host Integration Server 2004.

SNANLS is supported on Windows Server™ 2003, Windows XP, and Microsoft Windows 2000.

This section contains:

- National Language Support in Windows Server 2003, Windows XP, and Windows 2000

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National Language Support in Windows Server 2003, Windows XP, and Windows 2000

National Language Support (NLS) provides a standardized method of supporting multiple international locales, code pages, input methods, sort orders, and number/currency/time/date formats.

The Win32® NLS API provides developers with a way to access system-provided Unicode-to-ANSI and ANSI-to-Unicode conversion services. Microsoft® Windows Server™ 2003, Windows® XP, and Windows 2000 supply EBCDIC-to-Unicode and Unicode-to-EBCDIC translation tables for all of the popular host code pages.

The SNANLS API leverages the existing work done to support the NLS API on Server™ 2003, Windows® XP, and Windows 2000. Microsoft Host Integration Server 2004 takes advantage of these EBCDIC-to-Unicode-to-ANSI and ANSI-to-Unicode-to-EBCDIC code page conversion services.

Currently, the Win32 NLS API only supports SBCS EBCDIC code pages. However, future versions of the NLS API will support DBCS EBCDIC. SNANLS currently uses TrnsDT for DBCS conversions.

SNA Print Server Data Filter Programmer's Guide

The Host Print service of Microsoft® Host Integration Server 2004 provides server-based 3270 and 5250 printer emulation, enabling host applications to print to Local Area Network (LAN) printers supported by Microsoft Windows Server™ 2003 or Microsoft Windows® 2000 Server and Novell NetWare. This section introduces the SNA Print Server Data Filter API (sometimes referred to as the Print Exit API). This API can be used to extend the capabilities of the Host Print service in Host Integration Server 2004.

The user can provide a print data filter DLL that will be called by Host Print service when a print job is initiated, when data is sent to the printer, and when the print job is completed. This print data filter DLL can:

- Send data to the printer when a job starts (print a banner page, for example).
- Perform special processing on the data to be printed.
- Send data to the printer upon print job completion (print a trailer page, for example).

See also

- SNA Print Server Data Filter Programmer's Reference
- SNA Print Server Data Filter Samples

SNADIS Programmer's Guide

This section enables original equipment manufacturers (OEMs) and adapter vendors who are developing their own SNALink software to work with Microsoft® Host Integration Server 2004 SNA Services.

SNALink software must be written as a Microsoft® Windows® 2000 device driver. For information about writing Windows 2000 device drivers, see the Windows 2000 Device Driver Kit (DDK).

This section provides the following information:

- Internal concepts of Host Integration Server 2004 that are required to integrate new communications adapters into the server environment.
- Definitions of the interfaces used by Host Integration Server 2004 to communicate with SNALinks.
- Information about using the configuration and diagnostics features included in Host Integration Server 2004.
- Instructions for compiling and linking the SNALink support software.

The network operating systems currently supported by Host Integration Server 2004 include Microsoft LAN Manager (as implemented in Microsoft Windows 2000) and TCP/IP. Future versions of Host Integration Server may support other network operating systems. Because of this, it is recommended that you develop link support that is independent of the network operating system.

For API references and other technical materials for programming SNALink applications, see the SNADIS Drivers Programmer's Reference section of the SDK.

This section contains:

- SNALink Concepts in Host Integration Server
- The SNALink Interface
- SNALink Configuration Information
- The Data Link Control Interface
- Setup Information
- Compiling and Linking a SNALink
- Synchronous Dumb Card Interface
- SNA Modem Status Interface
- SNA Performance Monitor Interface

SNALink Concepts in Host Integration Server

This section describes key concepts used in the SNALink feature of Microsoft® Host Integration Server 2004. Because the purpose of this section is to enable original equipment manufacturers (OEMs) and adapter vendors to develop link support software to integrate their hardware adapters into a Host Integration Server 2004 system, only the relevant parts of the Host Integration Server 2004 architecture are described.

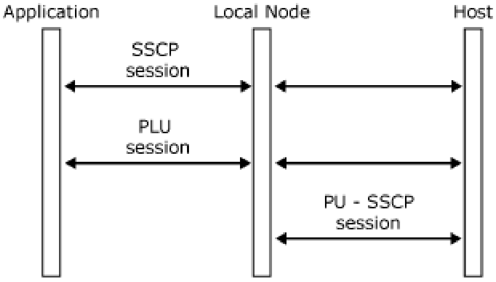
This section contains:

- Overview of SNALink
- SNALink Configuration and Management
- Structure of SNALink Components
- Messages
- LPI Connections

Overview of SNALink

A Microsoft® Host Integration Server 2004 SNALink must implement an SNA-compatible data transport mechanism capable of connecting the local type 2.1 node to remote host (PU4/5) or peer (PU2.1) systems.

The local node provides the SNA layers of path control, transmission control, data flow control, and logical unit (LU) services. The following figure shows an example of a Host Integration Server 2004 system.



The local node uses the data link control (DLC) interface to communicate with a SNALink. This interface is defined in The Data Link Control Interface. The SNALink and the DLC driver are responsible for transferring data between the path control layer of the node and the DLC adapter.

The routing of messages that flow between Host Integration Server 2004 components is handled by the SnaBase and Dynamic Access Module (DMOD) components. For details about how to send and receive messages, see The SNALink Interface.

SNALink Configuration and Management

The configuration information for a Microsoft® Host Integration Server 2004 system is stored in two forms:

- A centralized configuration file containing details of logical units (LUs), physical units (PUs), and connections.
- Entries in the Microsoft® Windows Server™ 2003 or Windows® 2000 registry containing configuration information for the SNALinks supported on that computer. This information contains parameters required by Host Integration Server 2004, and any other parameters that independent hardware vendor (IHV) code may require.

A Host Integration Server SNALink is defined when a Host Integration Server system is installed. A SNALink can support only one physical connection from the server. If a single adapter is capable of supporting multiple physical connections, Host Integration Server requires multiple SNALinks to be configured.

To reconfigure a server's SNALink support (for example, after installing a new adapter), the administrator uses either the Windows Network Control Panel applet or the Host Integration Server setup program. For further information about how this operates, see Setup Information.

All other configuration of a Host Integration Server system is performed using SNA Manager. As part of the configuration process, logical connections to remote PUs are associated with one or more SNALinks.

All configured SNALinks are automatically started when the Host Integration Server system is started. At this stage, the SNALink performs any initialization required, and then waits for instructions from local nodes.

When a connection is activated, either from SNA Manager or automatically (for example, in response to a 3270 user's request for a session with a remote host), the SNALink receives an Open(LINK) message from the local node. The SNALink should then perform whatever action is required to initiate that connection. This can involve dialing a telephone number for a switched Synchronous Data Link Control (SDLC) connection or bringing up level 2 on an X.25 link and sending a CALL packet.

If the IHV wants the same physical adapter to be available for use by multiple SNALinks (for example, a dumb SDLC card can be used to communicate using SDLC or X.25 protocols), the SNALink should not attempt to access the hardware until it has received an **Open(LINK)** message from the local node.

Structure of SNALink Components

The components of SNALink are:

- Local nodes
- SNALinks
- 3270 emulators

This section introduces the structure of these components and explains terms used to refer to the structure.

This section contains:

- Role of the Base
- Localities and DMODs
- Component Localities
- Partners
- SNALink Structure

Role of the Base

The Base is a part of each Microsoft® Host Integration Server 2004 component, such as the local 2.1 node or a link service that provides the operating environment for that component. It passes messages between components and provides functions common to all components, such as diagnostic tracing.

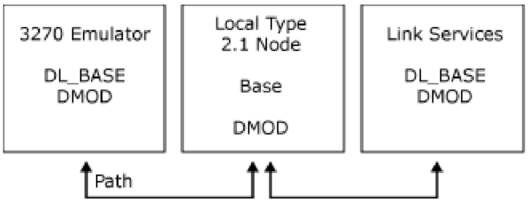
The Link Base is the type of Base used by Host Integration Server SNALink. The Base has entry points for initialization, sending messages, receiving messages, and termination.

Localities and DMODs

A Base and its components (that is, a Host Integration Server 2004 executable program) is called a **locality**. The Host Integration Server system therefore consists of one or more communicating localities (all the running Host Integration Server 2004 executable programs within the LAN Manager domain). For each Host Integration Server system, there is a central configuration file. In addition, each Host Integration Server computer maintains configuration information about the SNALinks it supports.

In a system such as Host Integration Server, where the number of localities and their types are not configured in advance, the relationships between the localities are set up dynamically as individual localities come and go. Localities that can enter and leave a system in this way are called **dynamic localities**.

Dynamic localities communicate using the Dynamic Access Module (DMOD) component, which provides the communications facilities needed to pass messages between the Bases. This is illustrated in the following figure.



This figure shows a system consisting of three dynamic localities. Dynamic localities can enter or leave this system at any time.

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Component Localities

SNALinks can enter dynamically into a Host Integration Server 2004 system. The SNALink, in conjunction with the Base, acts as a whole locality and communicates with the other localities in the system using a Dynamic Access Module (DMOD).

The SNALink Interface topic describes the interface to the Base and the DMOD that allows a SNALink (or any other Host Integration Server 2004 component) to participate in a Host Integration Server 2004 system.

Partners

For Host Integration Server 2004 components and applications to communicate with each other, it must be possible to identify a partner within a locality. A partner is an addressable component of a locality; that is, code to which messages can be sent. In a Host Integration Server system, there is generally only one partner within a locality (such as an SNALink or the 3270 emulation program). However, separate functions within the local 2.1 node (such as the 3270 and Advanced Program-to-Program Communications (APPC) functions) can be considered to be separate partners.

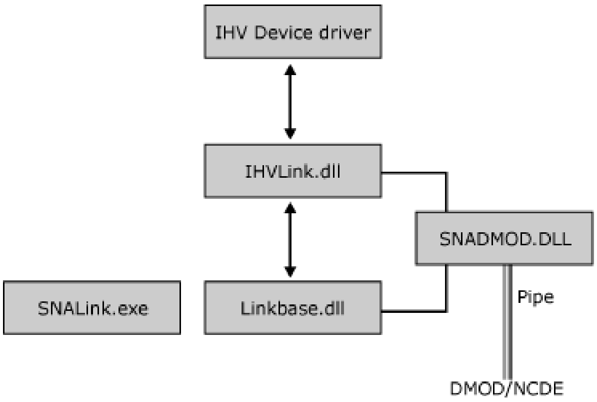
SNALink Structure

A Host Integration Server 2004 SNALink consists of the following:

- The link-specific protocol code provided by the independent hardware vendor (IHV)
- A Base
- A Dynamic Access Module (DMOD)

The DMOD, Base, and the IHV link-specific component of a Host Integration Server SNALink are implemented as dynamic-link libraries (DLLs). The executable component SNALINK.EXE is used to start a SNALink. SNALINK.EXE determines (from the Host Integration Server configuration) which link support DLL (for example, IHVLINK.DLL) is required and dynamically loads it before entering the Base scheduler.

The following figure shows the executable structure of a SNALink.



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Messages

Messages are used to pass data between partners in the Microsoft® Host Integration Server 2004 system. This section provides information about message structure and formats.

This section contains:

- Overview of Message Formats
- Buffer Header Format
- Buffer Element Format

Overview of Message Formats

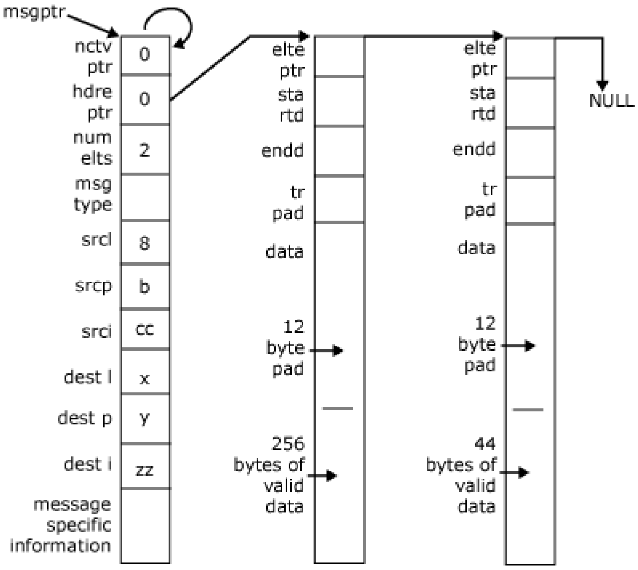
A message always contains fixed-format header information such as a message type and addressing information. It can also contain other header information specific to a particular message type (such as the message subtype) and an indefinite amount of extra data.

Messages are saved in buffers that consist of one header and zero or more elements:

- The header contains the fixed-format information and a pointer to an element. (This pointer will be NULL if there are no elements associated with the message.)
- An element contains any extra data for a message and a pointer to another element if the data continues into another element.

Buffer headers and elements are regarded as contiguous (8-bit) byte sequences. Messages of any length can be built up by chaining sufficient elements to a header.

The following figure shows a typical message with two elements.


msgptr
nctv ptr
0
hdre ptr
0
num elts
2
msg type
srcl
8
srcp
b
srci
cc
dest l
x
dest p
y
dest i
zz
message specific information
elte ptr
sta rtd
endd
tr pad
data
12 byte pad
256 bytes of valid data
elte ptr
sta rtd
endd
tr pad
data
12 byte pad
44 bytes of valid data
NULL

Buffer Header Format

This topic lists the common fields that always occur at the start of a buffer header. These are followed by further fields specific to the particular message. For details of individual message formats, see SNADIS Message Formats.

Field	Type	Description
PTRBFHDR	nxtqptr	When the buffer is in a queue, this field points to the header of the next buffer in the queue (NULL if it is the last buffer in the queue). When the buffer is not in a queue, this field points to itself. The Host Integration Server 2004 buffer management routines use this to check for buffer corruption.
PTRBFELT	hdreptr	Pointer to the first buffer element in the associated chain of buffer elements; NULL if the message consists only of a buffer header.
CHAR	numelts	Number of buffer elements chained from the header. Zero if the message consists only of a buffer header.
CHAR	msgtype	Message type. For more information, see individual message descriptions in SNADIS Message Formats.
CHAR	srcl	Source locality. For more information, see LPI Addresses.
CHAR	srcp	Source partner. For more information, see LPI Addresses.
INTEGER	srci	Source index. For more information, see LPI Addresses.
CHAR	destl	Destination locality. For more information, see LPI Addresses.
CHAR	destp	Destination partner. For more information, see LPI Addresses.
INTEGER	desti	Destination index. For more information, see LPI Addresses.

> **Note** Fields that occupy two bytes, such as **opresid** in the Open(LINK) request, are normally represented with the arithmetically most significant byte in the lowest byte address, irrespective of the normal orientation used by the processor on which the software executes. That is, the 2-byte value 0x1234 has the byte 0x12 in the lowest byte address. However, the following fields are exceptions:

- The **srci** and **desti** fields in buffer headers are stored in the local format of the application that assigns them (only the assigning application needs to interpret these values).
- The **startd** and **endd** fields in elements are always stored in low-byte, high-byte orientation (the normal orientation of an Intel processor).

Buffer Element Format

This topic lists the common fields that always occur at the start of a buffer element. The **dataru** field contains information specific to the particular message. For details about individual message formats, see SNADIS Message Formats.

Field	**Type**	**Description**
PTRBFELT	hdreptr–>elteptr	Pointer to next buffer element in the chain. NULL if this element is the last or only element in the chain.
INTEGER	hdreptr–>startd	Start of valid data in this element. The index into *dataru* of the first byte of valid data.
INTEGER	hdreptr–>endd	End of valid data in this element. The index into *dataru* of the last byte of valid data.
CHAR	hdreptr–>trpad	Pad byte (reserved).
CHAR[SNANBEDA]	hdreptr–>dataru	An array of characters that contains the data for this element. Note that the valid data might not occupy the whole of the element. The **startd** and **endd** fields give the indexes into this array of the start and end of the valid data. The constant SNANBEDA is defined in SNA_DLC.H as 268.

The following information will help you to interpret the message formats:

- Fields that occupy two bytes are represented with the arithmetically most significant byte in the lowest byte address, irrespective of the normal orientation used by the processor on which the software executes. That is, the 2-byte value 0x1234 has the byte 0x12 in the lowest byte address. The exceptions to this are the **startd** and **endd** fields in elements, which are always stored in low-byte, high-byte orientation (the normal orientation of an Intel processor).
- The offsets indicated by the **startd** and **endd** fields are expressed in terms of the first byte of dataru being offset 1; the first byte of valid data is at **dataru(startd–1)**. For example, if **startd** is 11 and **endd** is 18, **dataru** begins with 10 bytes that are not valid data, followed by 8 bytes of valid data.

In the example message format illustrated in Overview of Message Formats, each element has a **startd** of 13, indicating 12 bytes of padding before the start of the valid data. This leaves room for 256 bytes of data, and hence the element data (300 bytes long in this example) requires two elements.

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LPI Connections

Partners communicate by passing messages to each other. If two partners want to communicate with each other, a locality, partner, index (LPI) connection is set up between the two partners. Messages then flow between the partners over this connection. The term "LPI connection" is explained in LPI Addresses. Note that this is not related to the Microsoft® Host Integration Server 2004 concept of a connection between the local node and a remote system.

This section contains:

- Paths and DMODs
- LPI Addresses
- Making Connections

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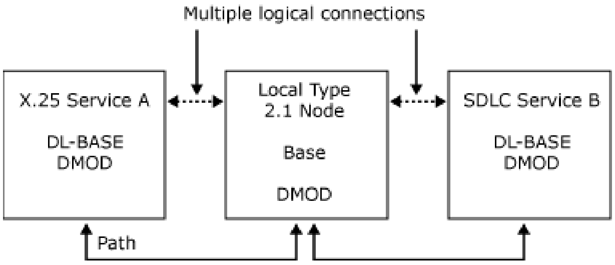
Paths and DMODs

Dynamic Access Modules (DMODs) are responsible for the communication between localities. When the DMODs in two localities can successfully pass messages between them, a path is said to exist between the two localities. A path must exist between two localities before a connection can exist between partners in those localities.

In Host Integration Server 2004, a path is implemented using reliable LAN connections (named pipes, SPX, TCP, VINES IP)—one LAN connection for each path. When the two localities are on the same computer, a local pipe is used. This is implemented using shared buffers to increase performance, but is used by the application in exactly the same way as communication with a remote locality.

The DMOD provides communication between dynamic localities and provides guaranteed in-order delivery of messages flowing over paths between localities. If the DMOD loses its path to another locality, it informs the Base.

The following figure illustrates the paths and connections between a Host Integration Server local node and two SNALinks. X.25 service A has two connections to the local node (one for each of two virtual circuits); SDLC service B has one connection to the local node.



LPI Addresses

A locality, partner, index (LPI) address is used to identify each end of a connection. It has three components: locality (L), partner (P), and index (I).

- **Locality** is a 1-byte identifier that uniquely identifies a locality within a system. This locality corresponds to a Host Integration Server 2004 component (local node, SNALink, 3270 emulator, and so on).
- **Partner** is a 1-byte identifier for the type of service. Each type of service has a unique value. A Host Integration Server local type 2.1 node has a defined value of 0x11. A Host Integration Server emulator has a defined product identifier of 0x12. A Host Integration Server link service (X.25. SDLC, Token Ring, Ethernet, or Channel, for example) has a defined value of 0x16.
- **Index** is a 2-byte identifier that uniquely identifies a logical entity within the product. The meaning and use of this field is defined by the communicating services. It is used to distinguish multiple connections between the same services (for example, to identify one of many virtual circuits available from an X.25 SNALink). The value of zero should not be used as an index. Applications must assign unique index values for every active LPI connection within the node.

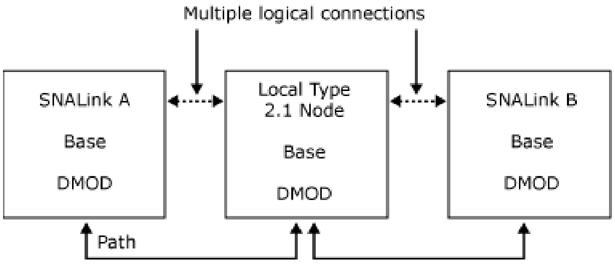
A message flowing over a connection carries a pair of LPIs, identifying the source and destination of the message. These are the source LPI and destination LPI of the message. Together they identify the connection on which the message is flowing.

Note that more than one connection can exist between any pair of services. The Index values are then used to distinguish the connections. For example, in communications between the local node and a SNALink, the L and P values identify the message as being data link control (DLC) data for that local node, and the I value indicates which connection the data is intended for.

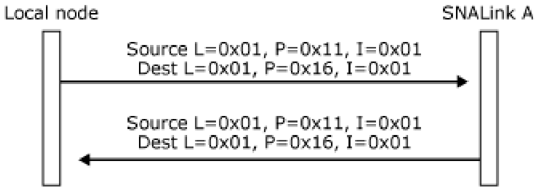
The LPIs are assigned by a combination of the products and the Dynamic Access Modules (DMODs) when the connection is opened, as described in Making Connections.

Because they are assigned dynamically for each component, the L values are not the same across a whole system. For example, a local 2.1 node locality could be known as locality 4 to one SNALink locality and locality 6 to a second SNALink locality. However, from the viewpoint of any locality, there exists a unique L value for each remote locality within which a path exists. This L value is used as an index into an internal table that identifies the path to that locality.

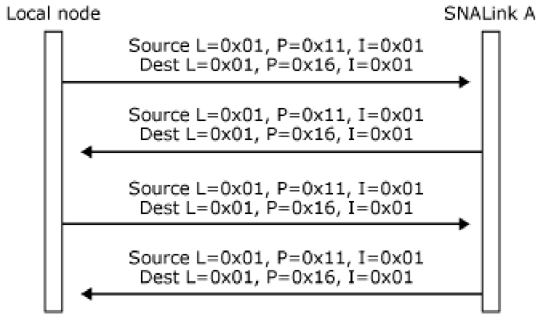
The following three figures show an example of the L values that could be used between the components shown in Paths and DMODs, and examples of the LPI values that would be used by the local node on messages flowing between the components.



The following figure shows L values specified on messages between the local node and SNALink A.


Local node
SNALink A
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x16, I=0x01
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x16, I=0x01

The following figure shows LPI values specified on messages flowing on two different connections between the local node and SNALink A.


Local node
SNALink A
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x16, I=0x01
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x16, I=0x01
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x16, I=0x01
Source L=0x01, P=0x11, I=0x01
Dest L=0x01, P=0x16, I=0x01

The Base is called by any piece of code that wants to send a message. It uses the destination L value on the message to determine where to send it. When the message gets to the remote locality, the Base in that locality routes it to the appropriate service if the locality contains more than one service.

Making Connections

Before messages can flow across connections, the connections must be established, or opened. This is necessary because a service does not initially know the locality, partner, index (LPI) address of the service with which it wants to communicate. There may not even be a suitable service for it to communicate with.

When a local node wants to communicate with an SNALink, it attempts to open a connection by sending an **Open(LINK)** request to the SNALink. This message will have LPI values already set up by the Base, which the SNALink should save for referencing the connection in the future.

The data link control (DLC) interface does not permit the SNALink to issue an Open request.

The SNALink Interface

The SNALink interface specifies how an Independent Hardware Vendor (IHV) link DLL fits into the SNA link service architecture provided by the Base/DMOD interface. This section describes the SNALink interface, the entry points that an IHV link DLL can call, and those functions that a link service must provide to the Base/DMOD interface. These entry points allow messages to be sent to and received from the local 2.1 node.

This section contains:

- Process Structure and Scheduling
- SNALink Initialization
- SNALink Termination
- Sending Messages
- The Dispatcher
- Receiving Messages
- The Work Manager
- Base/DMOD and SNALink Entry Point Summary
- Sample Code for SNALinkDispatchProc

Process Structure and Scheduling

The primary thread of execution within a Microsoft® Host Integration Server 2004 SNALink is under the complete control of the Base. The Base schedules the SNALink by calling predefined entry points, which the IHV link support code must provide.

The IHV link support code can spawn extra threads of execution; however, the Base is not reentrant. The IHV code must ensure that only a single thread is executing within the Base at any moment in time.

The recommended SNALink structure uses the dispatcher to handle messages received from the local node and the work manager to process data received from the link. These routines and the way in which they are scheduled are described in The Dispatcher and The Work Manager respectively.

SNALink Initialization

When the SNALink is loaded into memory, the Base/DMOD performs all initialization required by the Microsoft® Host Integration Server 2004 system, including announcing availability of the new SNALink to other Host Integration Server 2004 components.

When this has been completed, the Base/DMOD calls the SNALinkInitialize function, which must be provided by the IHV link support code.

SNALinkInitialize is called with a parameter that is a handle to the global Base event. This handle should be saved by the SNALink and used to signal the Base when an event occurs (for example, when data is received from the link).

The **SNALinkInitialize** function should also:

- Read in the Host Integration Server 2004 configuration information for the SNALink. For details, see SNALink Configuration Information.
- Set up any required data structures.
- Register with the driver that provides the support for the hardware adapter, initializing this if necessary.

If initialization fails for any reason (for example, if an associated driver is not installed), the function should report the failure to the administrator by calling **SNAReportStatus**.

SNALink Termination

When a critical error occurs, forcing abnormal termination of the SNALink, the IHV code must ensure that all active connections are cleanly terminated, using whatever protocols are appropriate for the link type in use. For example, an X.25 SNALink would send a CLEAR packet on all active VCs and possibly take down level 2.

This should be performed using the process detach facility of the Win32® API function **DLLEntryPoint** .

Sending Messages

The SNALink should build a message in a buffer, and then call the Base to send it. The message contains source and destination LPIs, which are set up when the connection is opened. For more information, see LPI Connections.

The SNALink can either obtain a new buffer to contain the message to be sent (using SNAGetBuffer) or reuse one in which it has previously received a message. The application is responsible for any buffer that it has obtained or in which it has received a message. It must either use (or reuse) the buffer to send a message or release it (using SNAReleaseBuffer). If a buffer to be reused does not contain the correct number of elements for the message to be sent, the application can obtain additional elements (using SNAGetElement) or release existing ones (using SNAReleaseElement). It is the application's responsibility to maintain the **numelts** field in the message header.

The function used to send a message to the node is SNASendMessage.

The Dispatcher

Whenever a Base event occurs, the Base calls the link support code dispatcher function SNALinkDispatchProc to handle the event. The term Base event in this context means:

- A message arriving from a local 2.1 node.
- A Base timer tick occurring—this relatively slow event happens approximately every five seconds.
- Losing contact with a local 2.1 node (for example, the machine being powered down).

The **SNALinkDispatchProc** function should examine parameters passed to it by the Base to determine why it has been called (for details, see Sample Code for SNALinkDispatchProc) and call an appropriate function to handle the event. When the event has been processed, control returns to the Base scheduler.

Receiving Messages

The Base calls the SNALink dispatcher function SNALinkDispatchProc when a message is available for it.

Note that after the application receives a message, it is responsible for the buffer in which the message was received. It must either reuse the buffer to send a message (using SNASendMessage) or release it (using SNAReleaseBuffer). If the buffer to be reused does not contain the correct number of elements for the message to be sent, the application can obtain additional elements (using SNAGetElement) or release existing ones (using SNAReleaseElement).

The Work Manager

When no work is currently outstanding, the Base thread of execution sleeps, waiting for an event or for a maximum period of five seconds. SNALinks should signal the Base when an event occurs (such as data arriving on the link) by setting the Base global event. A handle to this event is passed on the SNALinkInitialize call.

When the Base is rescheduled, it calls the SNALink work manager function SNALinkWorkProc. This function should handle any link events that have occurred.

A common use of this function is in an SNALink where there is a single thread that handles the protocol of the link and also multiple threads suspended on synchronous calls to a driver read function. When data is received from the link, it is placed on an internal queue, and the driver sets the global Base event. This causes the Base to be scheduled, and **SNALinkWorkProc** is called. **SNALinkWorkProc** then removes messages from the queues and passes them to the Base to be sent to the local node.

Base/DMOD and SNALink Entry Point Summary

The following tables show entry points divided into the categories SNALink, buffer management, and Base/DMOD, and listed in alphabetic order within each category.

SNALink entry points

Entry point	Description
SNALinkDispatchProc	Dispatcher.
SNALinkInitialize	Initialize SNALink.
SNALinkTerminate	Terminate SNALink.
SNALinkWorkProc	Work manager.

Buffer management entry points

Entry point	Description
SNAGetBuffer	Get buffer.
SNAGetElement	Get buffer element.
SNAReleaseBuffer	Release buffer.
SNAReleaseElement	Release buffer element.

Base/DMOD entry points

Entry point	Description
SNAGetLinkName	Get the name of the SNALink.
SNASendAlert	Send a preformatted NMVT alert to NetView.
SNASendMessage	Send a message to the node.

The following functions are defined in SNALink Configuration Information:

Entry point	Description
SNAGetConfigValue	Get a named item of configuration information.
SNAGetSystemInfo	Get Microsoft® Host Integration Server 2004 system information.

> **Note** Standard calling conventions [WINAPI] are used for all entry points including those provided by the IHV SNALink.

The format of buffer headers and elements is described in Messages. The formats of individual messages contained in buffers are defined in SNADIS Message Formats.

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Sample Code for SNALinkDispatchProc

This section contains outline source code for the link dispatcher function SNALinkDispatchProc.

```
/***********************************************************************/
/* First, include the SNA service header files                        */
/***********************************************************************/
#include <sna_dlc.h>
#include <sna_cnst.h>
#include <trace.h>

/***********************************************************************/
/* The link dispatcher routine - SNALinkDispatchProc                   */
/***********************************************************************/
VOID SNALinkDispatchProc (msgptr, function, locality)
PTRBFHDR msgptr;
INTEGER  function;
INTEGER  locality;
{
  INTEGER     discard_buff;
  COM_ENTRY("Ldisp");
  if (msgptr != NULL)
  {
    TRACE4()"received message from local node"));
    discard_buff = FALSE;
    switch (msgptr->msgtype)
    {
      case OPENMSG:
             /* process the OPEN message */
             break;
      case CLOSEMSG:
             /* process the CLOSE message */
             break;
      case DLCDATA:
             /* Data to be sent on link */
             break;
      case DLCSTAT:
             /* Switch on the subtype of the message */
             switch (msgptr->dshdr.dstype)
             {
               case STRESRCE :
                      /* call flow control processor */
                      break;
               case DLCSDXID:
                      /* call XID processor */
                      break;
               default:
                      discard_buff = TRUE;
                      break;
             }
             break;
      default:
             discard_buff = TRUE;
             break;
    }
    if (discard_buff)
    {
      /* message has not been processed, so simply discard */
      SNAReleaseBuffer(msgptr);
      msgptr = NULL;
    }
  }
  else if (function == SBLOST)
  {
    /* Lost contact with local node 'locality'  */
    /* Terminate all connections on this node (matching destl-value) */
    }
    else if (function == SBTICK)
    {
      /* 5 second timer tick */
    }
    COM_EXIT;
  }
```

SNALink Configuration Information

The configuration information for all SNALinks on a computer is stored hierarchically, referenced by the SNALink name.

The entry for each SNALink must include certain fields that are required by the Microsoft® Host Integration Server 2004 system. These are listed in the following table.

Required field	**Description**
TYPE	The type of the SNALink. Acceptable values for TYPE are: SDLC, X25, TOKENRING, TCPIP, FRAMERELAY, CHANNEL, ISDN, ETHERNET.
LINKMODULE	The name of the IHV DLL that provides the protocol code.

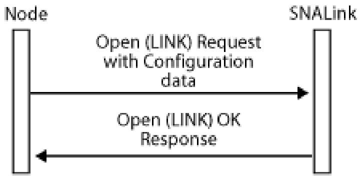
The remainder of the configuration information consists of entries of the form PARAMETER = VALUE. Parameters can be set to either an integer or a string.

Examples of possible parameters that may be required by an SNALink are as follows:

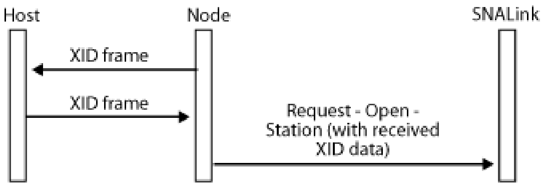
- PortNumber = 3
- LineType = SWITCHED
- L3PacketSize = 128
- T1Timeout = 30

Note that to support more than one port on a multiport adapter, you must define multiple SNALinks. It is not possible to configure a single SNALink to support more than one physical link.

The following figure shows a sample configuration for a computer with two SNALinks—SDLC1 and X25HOST.



End-to-end connection established



The configuration information is accessed using API calls that Host Integration Server 2004 provides.

The IHV Setup utility must write the configuration information for each SNALink supported. See Setup Information for information about how this should be performed.

This section contains:

- Accessing Configuration Information

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Accessing Configuration Information

The following table lists the calls the SNALink uses to obtain its configuration information.

Call	Description
SNAGetConfigValue	Returns the value of a named configuration parameter.
SNAGetSystemInfo	Returns general information on the version of SNA server currently running, such as the release level, and the network operating system.

If the return code from **SNAGetConfigValue** indicates that the specified configuration parameter is not available, or if the information returned is invalid, it is the SNALink's responsibility to decide what action to take. If appropriate, an error message could be logged.

It is strongly recommended that the SNALink read all required configuration parameters at initialization time (when SNALinkInitialize is called by the Base). This safeguards against the configuration information changing while the link service is running.

> **Note** Standard calling conventions (WINAPI) are used for all entry points, including those provided by the IHV SNALink.

The Data Link Control Interface

The data link control (DLC) interface defines the interface between the local 2.1 node and an SNALink. The DLC interface is defined in terms of the messages that are sent across the interface. Note that this is logically distinct from the definition of the Base/Dynamic Access Module (DMOD) interface, which defines the API used to send messages between two components in Microsoft® Host Integration Server 2004 (for example, between the local node and an SNALink).

DLC messages are exchanged between the local node and an SNALink across LPI connections. For details, see Structure of SNALink Components.

The local node uses the DLC interface to:

- Activate DLC connections.
- Exchange format 0 or format 3 XIDs for station activation.
- Exchange DLC information frames.
- Handle DLC error notification.

This section contains:

- Supported Configurations
- Opening a Connection
- DLC Information Transfer
- Closing a Connection
- Incoming Call Support
- SDLC Multipoint Connections

Supported Configurations

The 2.1 node supports the full range of station roles:

- Primary data link control (DLC) stations
- Secondary DLC stations
- DLC station role negotiation

For Synchronous Data Link Control (SDLC) connections, the node allows:

- Leased lines configured as:
    - Secondary point-to-point
    - Primary point-to-point or multipoint
    - Negotiable point-to-point
- Switched lines (point-to-point only) with:
    - Remote physical unit (PU) identification through XID exchange
    - Auto dial (with suitable hardware support)
    - Incoming call support

For X.25 and 802.2, the node also supports:

- Multiple connections over one physical link
- Incoming calls with validation of caller's address

In addition, for X.25, the node supports permanent virtual circuits (PVCs) and switched virtual circuits (SVCs).

Opening a Connection

The 2.1 node is capable of supporting multiple connections through one or more SNALinks. For each connection, the node opens two Locality Partner Index (LPI) connections to the SNALink:

- LINK LPI connection to handle activation and deactivation of the connection.
- STATION LPI connection to transfer data to and from the remote station.

The one exception to this rule is the case of primary multipoint connections where there is a single LINK LPI connection and multiple STATION LPI connections. This special case is described in SDLC Multipoint Connections.

The following messages flow over the data link control (DLC) interface and are used to activate a connection to a remote station.

Message	Description
Open(LINK) Request	• Flows from node to DLC over LINK connection. • Opens the LINK LPI connection between the node and the SNALink. • Provides configuration data for the SNALink. • Provides link connection data such as Token Ring address for the remote station.
Open(LINK) Response	• Flows from DLC to node over LINK connection. • Reports whether the SNALink has accepted the **Open(LINK) Request**. • Returns certain link-specific configuration parameters to the local node. • Can be an OK Response or an Error Response.
Request-Open-Station	• Flows from DLC to node over LINK connection. • Passes an XID received from the SNALink up to the node. • Indicates that the SNALink has received a mode setting command, such as SNRM over SDLC, or SABME over 802.2.
Send-XID	• Flows from node to DLC over LINK connection. • Passes an XID from the node to the SNALink to be sent out over the link to the remote station.
Open(STATION) Request	• Flows from node to DLC over STATION connection. • Opens the STATION LPI connection between the node and the SNALink. • Specifies certain station-specific configuration information.
Open(STATION) OK Response –or– Open(STATION) Error Response	• Flows from DLC to node over STATION connection. • Acknowledges **Open(STATION) Request**.
Station-Contacted	• Flows from DLC to node over STATION connection. • Informs the local node that the link is now ready for data transfer.

The use of these messages in activating various types of connections is described throughout the rest of this section. For information about the format of the messages, see SNADIS Message Formats.

The name of the Request-Open-Station message is historical. In earlier versions of the DLC interface, the higher-level software (such as the local node) always sent an **Open(STATION) Request** in response to this message—hence the name Request-Open-Station. However, now that multiple XIDs can be exchanged before the link is activated, the **Open(STATION) Request** is only sent at the end of the XID exchange.

The Request-Open-Station message now has two distinct semantic meanings:

- A Receive-XID
- A Receive-Set-Mode

This section contains:

- Opening the LINK LPI Connection

- Activating a Host Connection
- Activating a Peer Connection
- Opening the STATION LPI Connection
- Node Identification and Signaling Information
- XID Retries
- Multiple Connections

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Opening the LINK LPI Connection

The local node attempts to activate a connection:

- During system initialization if the connection is configured as initially active.
- If the system administrator manually activates the connection.
- If a 3270 or logical unit (LU) 6.2 session is requested when there is no active connection to support the LU, and the connection is configured to be activated on demand.

For each connection to be activated, the local node opens a LINK Locality Partner Index (LPI) connection by sending an Open(LINK) Request to the SNALink. This message contains configuration data such as:

- Synchronous Data Link Control (SDLC) line type: leased, switched.
- Operational role: primary, secondary, or negotiable.
- Time-out values.
- Retry limit values.
- Line speed.
- Half-duplex/full-duplex.
- 802.2 remote service access point (SAP) address.
- X.25 facility data.

For incoming calls, the local node primes the SNALink by opening the LINK LPI connection, but does not perform an activation sequence at this stage. For details, see Incoming Call Support.

The local node also inserts the first XID frame to be used (where applicable) and link connection data to be used on a switched link. The link connection data can be:

- A telephone number for a manual or autodial modem (in this case, the SNALink software could dial the required number or send a message to the operator specifying the number to be dialed).
- The media access control (MAC) address of the remote station.
- The X.25 remote data terminal equipment (DTE) address.

Finally, the **Open(LINK)** contains various time-out values that should be used by the SNALink when setting up protocol timers. For more information, see Open(LINK) Request and Open(LINK) Response.

The SNALink should return an **Open(LINK) OK Response** if:

- Its internal control blocks are successfully initialized.
- Its device driver has installed correctly.
- Its link hardware is successfully initialized.

The SNALink should not wait for an end-to-end connection before giving an **Open(LINK) Response**.

If the SNALink has successfully initialized, it should return an **Open(LINK) OK Response** immediately, supplying the required link-specific configuration information to the node (such as the maximum BTU size it can support). The local node uses this information during XID negotiation with the remote station.

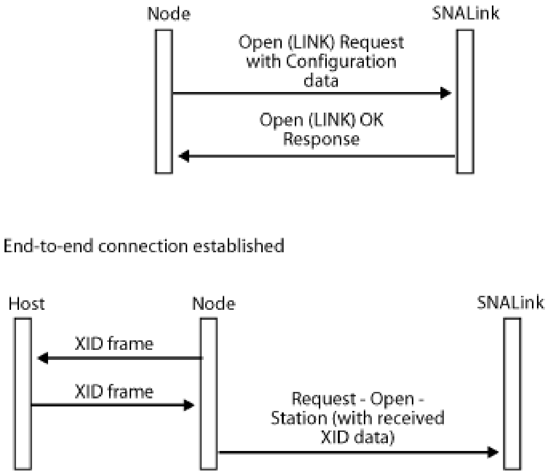
If the SNALink cannot initialize successfully, it responds with an **Open(LINK) Error Response** containing an error code. The error is logged and the local node notifies the system operator before retrying the link activation.

If an XID is supplied on the **Open(LINK) Request**, this should be sent when the end-to-end connection is established for a primary or negotiable link. Note that the supplied XID can be a NULL XID, which has a zero length. Hence, it is important that the XID field is examined rather than checking for a zero XID length. An XID will be supplied for all connections except primary leased connections (which could be multipoint).

When an SNALink receives an XID frame from the remote station, it is passed to the local node in a Request-Open-Station message on the LINK LPI connection.

If the SNALink fails to receive any frames from the remote station, it generates an Outage message as described in Closing a Connection.

The following figure shows the **Open(LINK) Request** and **Open(LINK) Response**, followed by an exchange of XIDs.


Node
SNALink
Open (LINK) Request with Configuration data
Open (LINK) OK Response
End-to-end connection established
Host
Node
SNALink
XID frame
XID frame
Request - Open - Station (with received XID data)

Activating a Host Connection

A host connection can be activated over a leased Synchronous Data Link Control (SDLC) line, X.25, 802.2, or a switched SDLC line. This section describes the activation procedures for each type of connection.

This section contains:

- Leased SDLC Line (No XIDs Exchanged), Channel Adapter
- X.25, 802.2, or Switched SDLC Line (XIDs Exchanged)

Leased SDLC Line (No XIDs Exchanged), Channel Adapter

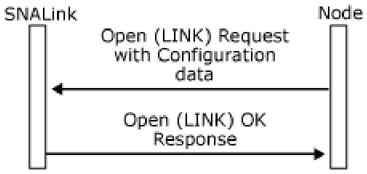
For a connection to a host computer using a leased Synchronous Data Link Control (SDLC) line, the SNALink receives a set normal response mode (SNRM) when the end-to-end connection is established. The SNALink responds with an unnumbered acknowledgement (UA) and informs the local node that the connection is ready for data transfer. This is done with the Request-Open-Station message with the Rcv-Set-Mode flag set.

The node then opens the STATION Locality Partner Index (LPI) connection with the Open(STATION) message. If the SNALink has an available control block, it responds with an **Open(STATION) OK Response**. This is followed by a Station-Contacted message.

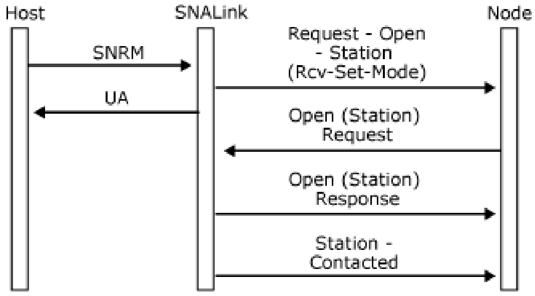
A channel connection is treated the same way as a leased secondary SDLC connection. Each channel connection is associated with a channel subaddress in the range 0x00 to 0xFF. The SNA service node sends the channel link service an Open(LINK) Request for each configured channel connection when the connection is activated. The link service should expect to receive multiple **Open(LINK) Requests**, one for each supported subchannel address.

Note that the Request-Open-Station message flows on the LINK LPI connection, whereas the Station-Contacted message flows on the STATION LPI connection.

The message flow for a leased line is shown in the following figure.


SNALink
Node
Open (LINK) Request with Configuration data
Open (LINK) OK Response

End-to-end connection established


Host
SNALink
Node
SNRM
UA
Request - Open - Station (Rcv-Set-Mode)
Open (Station) Request
Open (Station) Response
Station - Contacted

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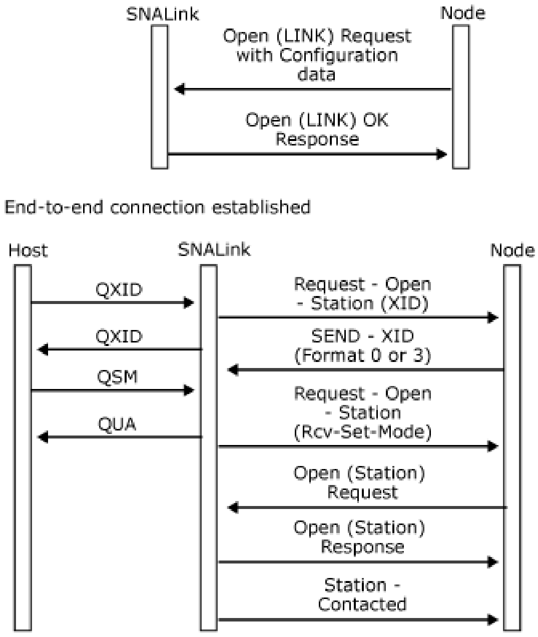
X.25, 802.2, or Switched SDLC Line (XIDs Exchanged)

The initial sequence for a host connection over X.25, 802.2, or a switched Synchronous Data Link Control (SDLC) line is similar to the sequence over a leased line. The only difference is that exchange identifications (XIDs) are exchanged before the host (or front-end processor) sends a mode-setting command such as set mode (QSM) on an X.25 qualified logical link control (QLLC) link.

When the SNALink receives an XID, it is passed to the local node on a Request-Open-Station message (on the LINK Locality Partner Index (LPI) connection). The local node then passes the data link control (DLC) a Send-XID message (also on the LINK LPI connection) containing the XID to be sent to the host. The host typically checks the node identifier in this XID and, if it is valid, sends the mode-setting command.

The sequence is shown in the following figure.


SNALink
Node
Open (LINK) Request with Configuration data
Open (LINK) OK Response
End-to-end connection established
Host
SNALink
Node
QXID
QXID
QSM
QUA
Request - Open - Station (XID)
SEND - XID (Format 0 or 3)
Request - Open - Station (Rcv-Set-Mode)
Open (Station) Request
Open (Station) Response
Station - Contacted

At the link level, a mode-setting command is required to enter the information transfer state. For an SDLC link, this is a set normal response mode (SNRM). For an X.25 QLLC link, this is a QSM. For an 802.2 link, it is set asynchronous balanced mode extended (SABME). If the SNALink acknowledges the command (with a UA/QUA) immediately, it needs to buffer any data that arrives on the link in the short window before the Open(STATION) Request arrives from the local node. The alternative is to wait for the **Open(STATION) Request** before sending the UA/QUA response.

For switched connections using SDLC modems, the Open(LINK) Request contains dial digits for manual or auto-dial modems. It is the responsibility of the SNALink to handle the management of these devices. For X.25 and 802.2 connections, the **Open(LINK) Request** contains the address of the remote station.

The SNALink should initiate the dialing procedure when it receives the **Open(LINK) Request**.

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Activating a Peer Connection

For a peer connection, there is an activation sequence that involves the two stations exchanging format 3 exchange identification (XID) frames. As part of this sequence, the two stations agree on their link roles. They also exchange information relating to the link level connection, such as the maximum frame size supported.

The node passes XIDs to the SNALink over the LINK LPI connection using the Send-XID message. The SNALink returns received XIDs to the local node over the LINK LPI connection using the Request-Open-Station message.

Fixed Link Roles and Negotiable Link Roles show examples of XID exchange for the two cases:

- The link roles are explicitly configured for the two stations.
- The link roles of both stations are negotiable.

Points to note are:

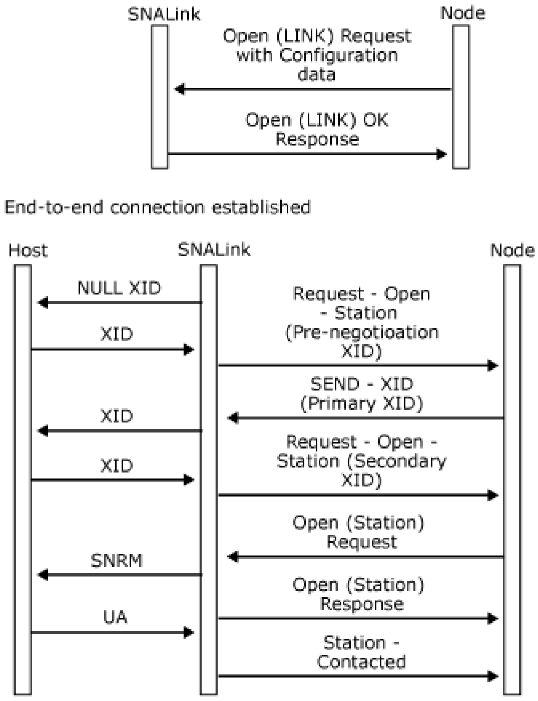
- The Open(LINK) Request is supplied with a NULL XID that is sent when the end-to-end connection is established.
- After the first NULL XID, all XIDs are format 3.
- If both stations are set up to be negotiable, the station with the higher node identifier becomes the primary.
- If both stations are negotiable and have the same node identifier, both stations produce randomized node identifiers that are compared as before.

This section contains:

- Fixed Link Roles
- Negotiable Link Roles

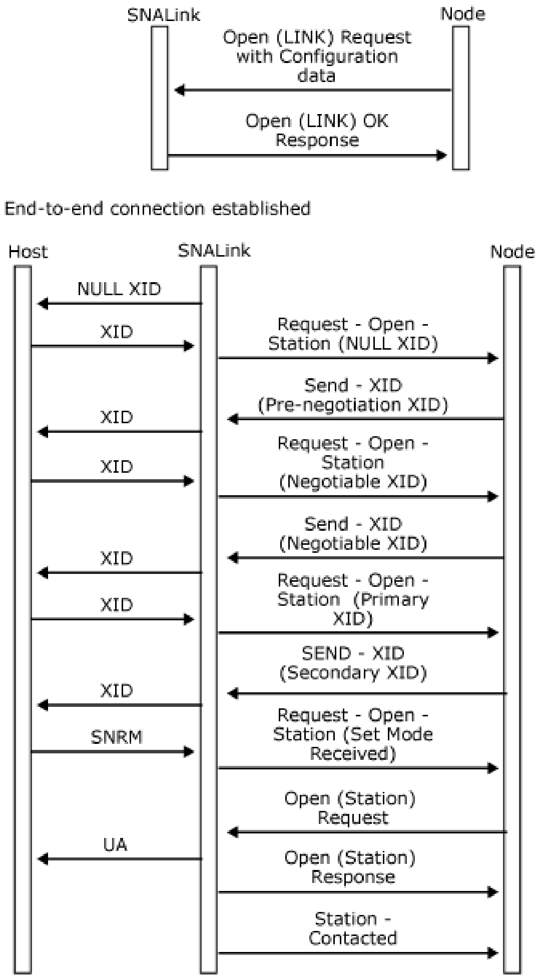
Fixed Link Roles

The following figure shows the sequence of messages for a peer connection where the local end is configured as the primary station and the remote end is configured as the secondary.


SNALink
Node
Open (LINK) Request with Configuration data
Open (LINK) OK Response
End-to-end connection established
Host
SNALink
Node
NULL XID
Request - Open - Station (Pre-negotioation XID)
XID
SEND - XID (Primary XID)
XID
Request - Open - Station (Secondary XID)
XID
Open (Station) Request
SNRM
Open (Station) Response
UA
Station - Contacted

Negotiable Link Roles

The following figure shows the sequence of messages for a peer connection where both the local and remote ends are configured as negotiable. Because the remote node identifier is larger (numerically) than the local node identifier, the remote station will become primary.


SNALink
Node
Open (LINK) Request with Configuration data
Open (LINK) OK Response
End-to-end connection established
Host
SNALink
Node
NULL XID
XID
Request - Open - Station (NULL XID)
Send - XID (Pre-negotiation XID)
XID
Request - Open - Station (Negotiable XID)
XID
Send - XID (Negotiable XID)
XID
Request - Open - Station (Primary XID)
XID
SEND - XID (Secondary XID)
XID
Request - Open - Station (Set Mode Received)
SNRM
Open (Station) Request
UA
Open (Station) Response
Station - Contacted

local node identifier	= 0x05D11111
remote node identifier	= 0x05D22222

The following summaries the rules that the SNALink must follow when supporting exchange identification (XID) exchange, and in particular XID role negotiation:

- If an XID is supplied in the Open(LINK) Request, it must be transmitted as soon as the end-to-end connection is established for primary or negotiable links.
- All XIDs received from the remote station must be passed to the local node in a Request-Open-Station message.
- An XID received from the local node in a Send-XID message must be transmitted immediately.
- XID transmissions must be retried until an XID is received from the remote station. For half-duplex links, the retry time-out should be randomized to prevent repeated XID clashes.
- When a mode-setting command, such as set normal response mode (SNRM), QSM, or set asynchronous balanced mode extended (SABME), is received before the station has been opened, a Request-Open-Station must be sent to the local node with the Rcv-Set-Mode flag on.
- When the local node sends an Open(STATION) message, the link should examine it to determine its link role (that is, primary or secondary).
- A secondary station should send a Station-Contacted message after receiving and responding to the **Open(STATION)** message.
- For a primary station, the mode-setting command should be sent when the **Open(STATION)** message is received. The Station-Contacted message should be sent to the local node when this command has been acknowledged by the secondary station (for instance, an unnumbered acknowledgement (UA) received on an Synchronous Data Link Control (SDLC) link).

If the local node detects an error during role negotiation, such as both physical units (Pus) configured as primary, it sends out an XID containing an error vector. The vector is appended to the end of the normal XID data. The vector number specified is 0x22, and the vector data specifies that the data link control (DLC) role field is in error.

After sending the error XID, the local node sends a **Close(LINK)** message to terminate the connection (see Closing a Connection).

The following table is a matrix of the possible combinations of station link roles and shows the eventual role of the local station.

	Local Station			
Remote Station		**Primary**	**Secondary**	**Negotiable**
	Primary	Fail	Secondary	Secondary
	Secondary	Primary	Fail	Primary
	Negotiable	Primary	Secondary	Either*

*The station with the higher node identifier becomes the primary.

Opening the STATION LPI Connection

After receiving a Request-Open-Station (RQOS) message, the local node sends an Open(STATION) message to the SNALink when:

- The station is configured as secondary (or has negotiated to secondary), and the RQOS message has the Rcv-Set-Mode flag on, indicating that the SNALink has received a mode-setting command such as set normal response mode (SNRM).
- The station is configured as primary (or has negotiated to primary), the RQOS message contains a secondary exchange identification (XID), and the local station has sent at least one negotiation-proceeding XID.

The Open(STATION) Request contains the link index that was on the Open(LINK) Request. This field is used to correlate the LINK and STATION LPI connections for SNALinks that support multiple connections, such as X.25, 802.2, and channel.

This **Open(STATION) Request** contains configuration data for the link station, such as the Synchronous Data Link Control (SDLC) address of the adjacent link station (0x00 for secondary stations, 0x01 to 0xFE for primary stations).

The SNALink should use this address field for determining the local station's role. If it is set to 0x00, the local station is a secondary station. Otherwise, the local station is the primary station. This field has this meaning even when the address is not used because of the link type (such as 802.2).

See Open(STATION) Request for the format of this message.

If the station cannot be initialized (perhaps due to a lack of resources), the SNALink responds with an Open(STATION) Error Response containing the appropriate error code.

Node Identification and Signaling Information

For information about the role an SNALink plays in node identification, see Incoming Call Support.

When exchange identifications (XIDs) are exchanged, there are two mechanisms for identifying the remote station:

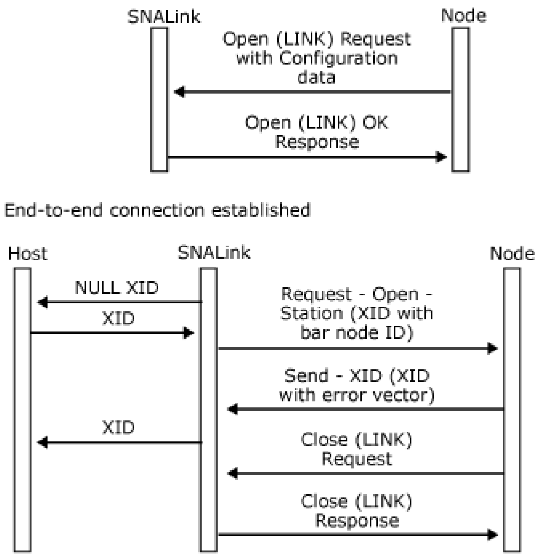
- The node identifier on received XIDs.
- The data link control (DLC) defined address; for example, the media access control (MAC) address. This is known as signaling information.

The presence of signaling information depends on the type of the SNALink. For instance, there is no signaling information over a Synchronous Data Link Control (SDLC) link, but there is signaling information over X.25 and 802.2. The SNALink passes signaling information to the local node on the Request-Open-Station message by appending it after the XID.

If signaling information is present, the local node checks it against the configured value in the dial-digits record of the Host Integration Server 2004 configuration file. For incoming call support, this allows the local node to determine the connection that is to be activated. For a fuller description of incoming calls, see Incoming Call Support.

If there is no signaling information, the local node compares the control point (CP) name on the received XID with the remote control point name in the configuration.

If the remote station is identified correctly, XID exchange proceeds as detailed in Activating a Peer Connection. However, if there is a mismatch, the local node sends an XID (in the Send-XID message) containing an error vector followed by a Close(LINK) Request, as shown in the following figure.


SNALink
Node
Open (LINK) Request with Configuration data
Open (LINK) OK Response
End-to-end connection established
Host
SNALink
Node
NULL XID
XID
Request - Open - Station (XID with bar node ID)
Send - XID (XID with error vector)
XID
Close (LINK) Request
Close (LINK) Response

XID Retries

When the local node specifies that the SNALink is to send an exchange identification (XID), either by supplying it on the Open(LINK) Request or by sending it on a Send-XID message, it is the responsibility of the SNALink to perform any retries.

XIDs need to be retried because:

- The remote station has not been started yet.
- Frames may be lost on the line due to noise.

Synchronous Data Link Control (SDLC) SNALinks should implement a contact time-out and a retry limit—values for these are provided on the Open(LINK) message. The time-out specifies how often the XID should be retried, and the retry limit specifies how many XIDs should be sent before abandoning the connection activation and sending an Outage message to the local node. The SNALink should stop retrying the XID when one of the following occurs:

- It receives an XID from the remote station.
- An Open(STATION) message is received from the node.
- A mode-setting command is received on the link.

Multiple Connections

For 802.2 and X.25 links, multiple connections can use the same physical link supported by a single instance of the SNALink software.

For each connection to a remote station, there is a LINK LPI connection and a STATION LPI connection (this is different from Synchronous Data Link Control (SDLC) multipoint as described in SDLC Multipoint Connections). Hence, there can be multiple pairs of LPI connections between a local node and an SNALink. For each connection, the local node issues an Open(LINK) Request and, after exchange identification (XID) exchange, an Open(STATION) Request.

The local node is configured with a maximum number of connections that can be active at any one time. In addition, each potential connection is configured with the address of the remote station. This information is required when activating a connection, and is included in the **Open(LINK) Request** for an outgoing connection.

DLC Information Transfer

When the local node has opened the LINK and STATION LPI connections and received a Station-Contacted message from the SNALink for a remote station, it can exchange data using the data link control (DLC) interface with the physical unit (PU) and associated logical units (LUs) at the remote station.

Data messages are contained within buffers. The transmission header (TH) of the SNA path information unit is contained within the buffer header. The request/response header (RH), if present, and request/response unit (RU) are contained within one or more buffer elements. The TH is contained in the buffer header for historical reasons. Typically, this will be copied by the SNALink into the element before **startd**, to keep the entire frame in contiguous memory locations. For a description of the DLC-Data message format, see DLC-Data.

Note that all data messages to a specified remote station flow on the associated DLC STATION LPI connection, and not on the controlling DLC LINK LPI connection.

This section contains:

- DLC Flow Control

DLC Flow Control

The flow of data messages at the data link control (DLC) interface for each link station is flow controlled. For each direction of flow, there is an initial credit of messages that can be transmitted.

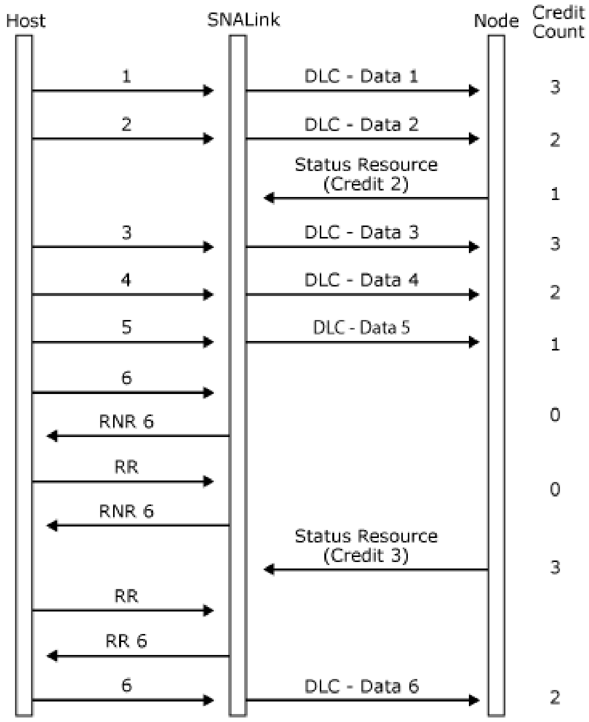
Flow control is maintained by initial specification on the Open(STATION) Request and Open(STATION) OK Response messages, and by the sending of DLC Status-Resource messages to give more credit periodically.

The sender maintains a count of credit, starting at the initial value set on the **Open(STATION)**, which is decremented for each DLC-Data message sent. When the credit count reaches zero, no more DLC-Data messages can be sent until more credit is received.

For flow in a given direction, the amount of credit is specified by the recipient of the data, because the recipient has to do any queuing. The initial credit values are passed on the Open(STATION) message (on the request for flow from the SNALink to the local node and on the response for flow from the local node to the SNALink).

The initial credit for the flow from the SNALink to the local node is determined by the node. The initial credit for the flow from the local node to the SNALink is set by the SNALink software—a suggested value is 16.

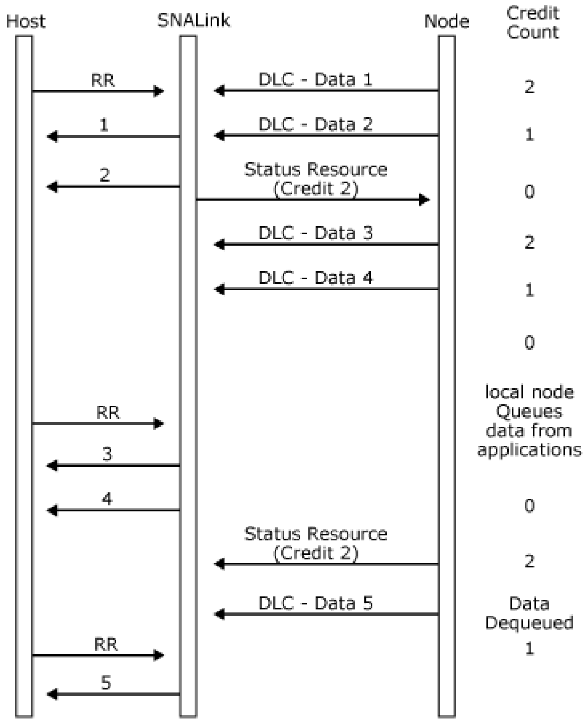
If the SNALink runs out of credit to send to the local node, it should either queue the data or discard it and send no acknowledgment. It should also start sending receive not ready (RNR), for example, when polled by a primary station. An example message flow with an Synchronous Data Link Control (SDLC) SNALink is shown in the following figure with an initial credit of 3. When the SNALink runs out of credit, it does not acknowledge any further frames and starts sending RNR.



For flow control from the local node to the SNALink, when the node runs out of credit, it queues the data and applies back pressure on sessions using that station. There is thus end-to-end flow control in this direction, independent of any SNA pacing that may be in force.

The SNALink gives credit to the local node for the messages that have been transmitted, not for the messages for which acknowledgments have been sent. The amount of data queuing in the SNALink is kept down most of the time because frames will usually be acknowledged.

Flow control for the flow of data from the local node to the SNALink is shown in the following figure, where the initial credit is assumed to be 2.


Host
SNALink
Node
Credit Count
RR
DLC - Data 1
2
1
DLC - Data 2
1
2
Status Resource (Credit 2)
0
DLC - Data 3
2
DLC - Data 4
1
0
local node Queues data from applications
RR
3
4
0
Status Resource (Credit 2)
2
DLC - Data 5
Data Dequeued
1
RR
5

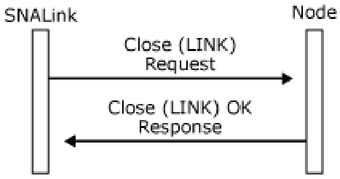
Closing a Connection

The local node closes a connection to a remote station:

- If the system administrator manually deactivates the connection.
- If the connection is configured as on-demand and no 3270 or LU 6.2 sessions are active.
- If an outage has been reported by the SNALink.

The local node closes a connection by sending a Close(LINK) message. The SNALink then takes some action, such as lowering Data Terminal Ready (DTR) on an Synchronous Data Link Control (SDLC) link or issuing a DLC_CLOSE_STATION on a 802.2 connection. It then replies with a **Close(LINK) OK Response** as shown in the following figure.

The case of multipoint connections is slightly different and is considered in SDLC Multipoint Connections. The following topics discuss point-to-point connections.



This section contains:

- Outages
- Connection Retries

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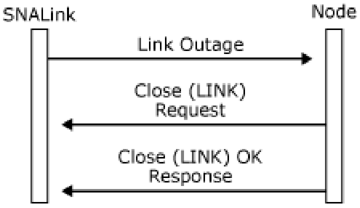
Outages

If the SNALink detects a link or station failure, it reports the failure by sending an Outage message to the node on either the LINK or STATION LPI connection depending on whether it is a link or station outage. Generally, a station outage indicates a problem at the remote station, and a link outage indicates a local or line problem.

When the local node receives an Outage message, it:

- Logs an error containing the outage code.
- Cleans up each session using the connection and informs applications of the failure (for instance, with a Comm Check code on a 3270 emulator).
- Sends a Close(LINK) Request to the SNALink.

On receipt of the **Close(LINK) Request**, the SNALink should clear up its internal resources for the connection and send back a Close(LINK) Response.



There is a special case when the node loses contact with the SNALink software. In this case, the node is notified of this event (a lost locality) and performs outage processing apart from sending messages to the SNALink.

The outage codes are not distinguished by the node, but they are logged. For the sake of consistency across SNALink implementations, the values listed in the following topics should be used.

This section contains:

- SDLC Outage Codes
- 802.2 Outage Codes
- X.25 Outage Codes

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SDLC Outage Codes

The following table describes Synchronous Data Link Control (SDLC) outage codes.

Outage code	Description
0x0D	Internally generated for SNALink lost locality.
0x11	Data set ready (DSR) failure.
0x12	Clear to send (CTS) failure.
0x14	Data carrier detect (DCD) failure.
0x24	Nonproductive receive retry limit exceeded.
0x25	Idle time-out retry limit exceeded.
0x29	Connection problem. subqual = 0x00I-frame retransmission subqual nonzeroXID retransmission
0x2D	Abnormal modem response.
0x2E	Write time-out retry exceeded.
0xA0	Exchange identification (XID) exchange failed on multidrop line. Subqual is address of secondary station.
0x15	Discontact (DISC) received.
0x23	Receive buffer overrun.
0x2C	Invalid command received. subqual = 0x03invalid N(R) subqual = 0x04invalid or unsupported command/response subqual = 0x05excess I-field
0x80	Disconnect mode (DM) received in information transfer state.
0x81	Discontact retry limit exceeded.
0x82	Contact retry limit exceeded.
0x83	Poll retry limit exceeded.
0x84	No response retry limit exceeded.
0x85	Remote busy retry limit exceeded.
0x86	Frame reject (FRMR) received. subqual = 0x00no reason given subqual = 0x03invalid N(R) subqual = 0x04invalid or unsupported command/response subqual = 0x05excess I-field
0x87	Invalid frame received. subqual = 0x03invalid N(R) invalid or unsupported command/response subqual = 0x05excess I-field
0x88	Request Initialization Mode (RIM) received.
0x89	Request Disconnect (RD) received.

802.2 Outage Codes

The following table describes 802.2 outage codes.

Outage code	Description
0x29	Remote node not active.
0xAB	The set asynchronous balanced mode extended (SABME) received while connection active.
0xAC	Frame reject (FRMR) sent.
0xAD	FRMR received.
0xAE	Discontact (DISC)/disconnect mode (DM) received.
0xAF	Link lost.

X.25 Outage Codes

The following table describes X.25 outage codes.

Outage code	Description
0x37	Loss of a virtual circuit.
0x60	Switched virtual circuit (SVC) cleared down by remote station or network.
0x61	Permanent virtual circuit (PVC) has been reset by remote station or network.
0x62	Attempt to connect to remote station through SVC failed.

Connection Retries

If an initially active or operator-started connection is closed because of an outage, the node periodically tries to reopen the connection. This can be stopped by manually deactivating the connection. This retry mechanism is also used when the node attempts to open a connection but the SNALink software has not yet been started. On-demand connections are not retried automatically by the node, but will be retried if the user attempts to reactivate a session using the connection.

Note that this connection retry timer is totally separate from the timers specified on the Open(LINK) Request.

Incoming Call Support

The local node allows an SNALink to be set up to support incoming calls. In this mode of operation, the node primes the SNALink by sending an Open(LINK) Request, but the SNALink does not attempt to activate the link until it receives an exchange identification (XID) from a remote station.

The SNALink recognizes an **Open(LINK) Request** for an incoming call by the absence of a connection name in the destination name field (this field is filled with ASCII blanks).

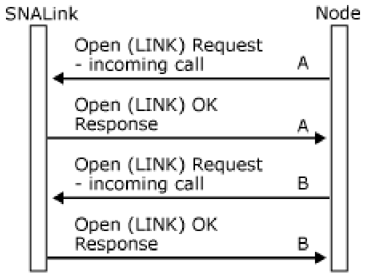
For incoming calls, **Open(LINK) Request** requires an immediate response from the SNALink, just as in the case of an **Open(LINK) Request** for an outgoing call.

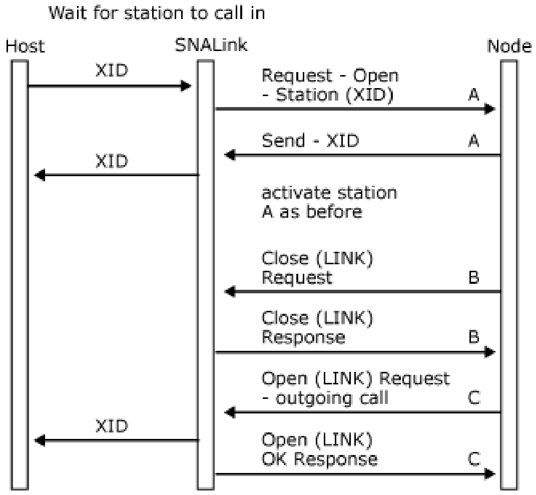
For a Synchronous Data Link Control (SDLC) SNALink, there can be only one **Open(LINK)** outstanding. However, 802.2 and X.25 allow the possibility of multiple connections being handled through a single SNALink. In these cases, for each configured connection that is primed to await incoming calls, the local node will send an **Open(LINK)** with a blank connection name to the SNALink.

When an incoming call is received by the SNALink, the received XID should be passed to the local node on any LPI connection that is primed for incoming calls. The LPI connection selected must then be used for all future messages relating to that incoming call.

It is not necessary for the SNALink to perform validation of incoming calls—this will be performed by the local node. However, if required, the SNALink can choose to validate calls before passing them to the node. A common example of this is to ensure that only X.25 calls with a specific local address are passed through to the local node.

The following figure shows incoming call support with an SNALink that supports two connections. A remote station calls in and uses connection A. The node sets up connection B for incoming calls but then needs to open connection C. Because the SNALink only supports two connections, connection B is closed.


SNALink
Node
Open (LINK) Request - incoming call
A
Open (LINK) OK Response
A
Open (LINK) Request - incoming call
B
Open (LINK) OK Response
B


Wait for station to call in
Host
SNALink
Node
XID
Request - Open - Station (XID)
A
Send - XID
A
XID
activate station A as before
Close (LINK) Request
B
Close (LINK) Response
B
Open (LINK) Request - outgoing call
C
XID
Open (LINK) OK Response
C

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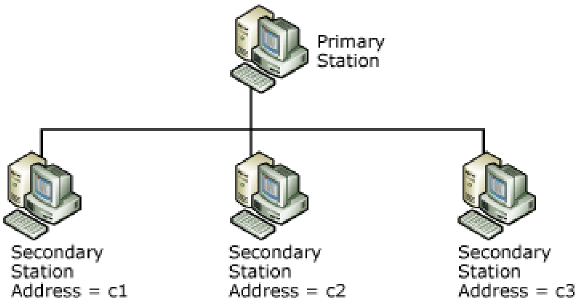
SDLC Multipoint Connections

The node can support primary multipoint (also known as multi-dropped) links, at both the primary and secondary end. Multipoint is a special configuration for a Synchronous Data Link Control (SDLC) leased link where a single SDLC line at the primary station can be used to communicate with up to 16 secondary stations. Special hardware is required to fan out the primary line so that there is a physical connection to each secondary station. The following figure shows an example with three secondary stations.


Primary Station
Secondary Station Address = c1
Secondary Station Address = c2
Secondary Station Address = c3

The SDLC address of the secondary station is used to route frames to and from the individual secondary stations. Hence, the SNALink at the secondary station needs to check the SDLC address as the primary sends all frames to all secondary stations. The SNALink at the secondary station should only accept frames with its SDLC address—the other frames should be ignored.

From the viewpoint of the node at a secondary station, the message flow at the data link control (DLC) interface is as for a point-to-point connection (described in Opening a Connection). The node need have no knowledge that this is a multipoint connection.

The primary end has to handle the special processing required for multipoint connections. The remainder of this section concentrates on the primary station.

At the primary end, there are the following LPI connections:

- One LINK LPI connection.
- A STATION LPI connection for each active secondary station.

Because the exchange identification (XID) exchange is carried out using the single LINK LPI connection, the Request-Open-Station and Send-XID messages always specify the station address of the secondary station that the XID has arrived from or is going to. Note that no XID is supplied on the Open(LINK) Request.

Each STATION LPI connection has different values of I, the index. After the station has been activated, data messages flow on the STATION LPI connection rather than the LINK LPI connection.

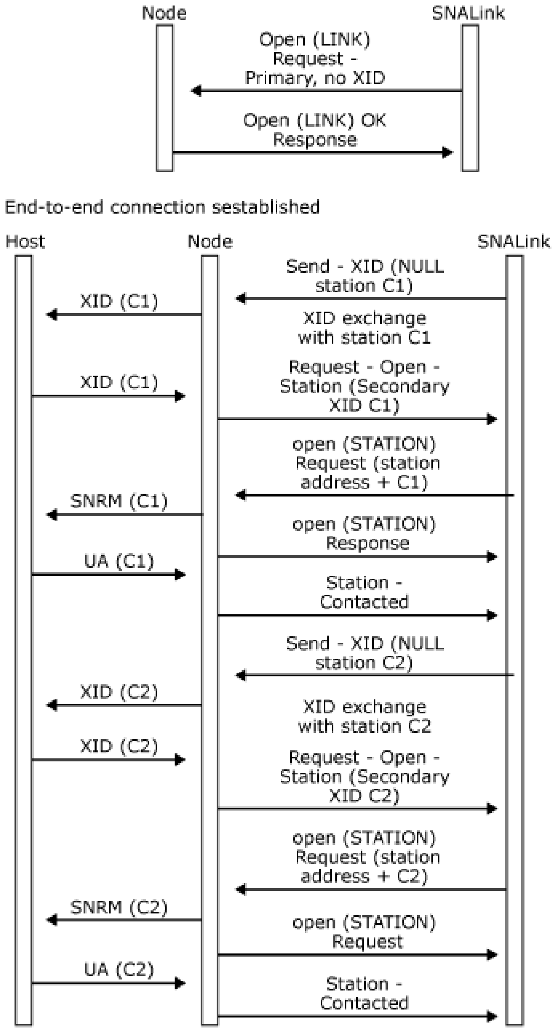
If the XID exchange fails because the secondary is failing to reply to the XID, the SNALink generates a special variant of link Outage message. Ideally, the SNALink would give a station Outage message, but this is not possible because the STATION LPI connection is not yet open. Instead, the SNALink generates a link Outage message with code 0xA0 and a subqualifier that is the SDLC address of the station.

When the stations are activated on a multipoint link, the majority of messages flow across the STATION LPI connections. If a connection to a particular secondary station is to be closed (because the operator deactivates it, for instance), the node issues a Close(STATION) Request. The SNALink replies with a Close(STATION) Response to the node and sends a Discontact (DISC) frame to the secondary station.

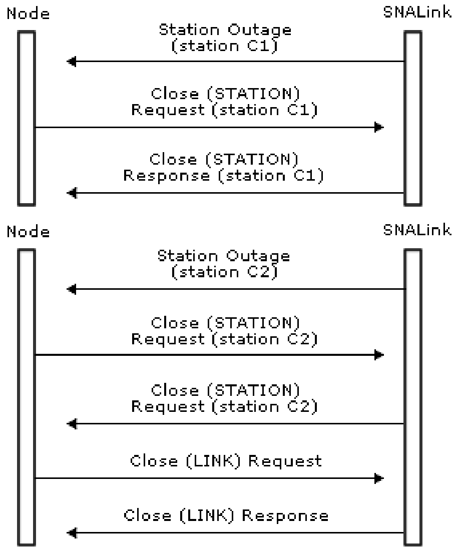
The SNALink can generate both station and link Outage messages. If the problem only affects a particular station, such as not responding to polls, the link generates a station Outage message and the node closes the station with a **Close(STATION) Request**. The SNALink responds with a **Close(STATION) Response**.

If the problem affects the link as a whole, such as the line being disconnected from the primary SDLC adapter, the SNALink generates a link Outage message and the node sends a Close(LINK) Request. The SNALink responds with a Close(LINK) Response.

Whenever the node receives a **Close(STATION) Response**, it checks to see if any stations are still active on the multipoint link. If not, a **Close(LINK) Request** is sent. The SNALink responds with a **Close(LINK) Response**. The following figure shows the message flows for outage processing. It shows a multipoint connection with two secondary stations (the full XID exchange is not shown).


Node
SNALink
Open (LINK) Request - Primary, no XID
Open (LINK) OK Response
End-to-end connection sestablished
Host
Node
SNALink
Send - XID (NULL station C1)
XID (C1)
XID exchange with station C1
XID (C1)
Request - Open - Station (Secondary XID C1)
open (STATION) Request (station address + C1)
SNRM (C1)
open (STATION) Response
UA (C1)
Station - Contacted
Send - XID (NULL station C2)
XID (C2)
XID exchange with station C2
XID (C2)
Request - Open - Station (Secondary XID C2)
open (STATION) Request (station address + C2)
SNRM (C2)
open (STATION) Request
UA (C2)
Station - Contacted

The following figure shows close processing for a multipoint configuration with two secondary stations. Outage conditions are detected on both stations.


Node
SNALink
Station Outage (station C1)
Close (STATION) Request (station C1)
Close (STATION) Response (station C1)
Node
SNALink
Station Outage (station C2)
Close (STATION) Request (station C2)
Close (STATION) Request (station C2)
Close (LINK) Request
Close (LINK) Response

Note that the station messages are labeled in the figure with station addresses. In fact, the node and SNALink use the LPI addresses to identify the two stations.

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Setup Information

This section describes the integrated link service installation provided with Microsoft® Host Integration Server 2004.

In Host Integration Server 2004, SNA Manager is used to install and configure link services. Host Integration Server 2004 uses the Microsoft System Installer (MSI) and MSI packages for the installation of the Host Integration Server software. Link services from independent hardware vendors (IHVs) are not included in the main Host Integration Server MSI packages. IHV link services are installed using a separate IHV-provided MSI package.

A sample IHV link service using the generic Synchronous Data Link Control (SDLC) link service that illustrates IHV link service installation is included in the Host Integration Server software development kit (SDK). The SDK samples are installed on your computer when the SDK option is selected during installation of Host Integration Server software. These sample files are also located on the Host Integration Server 2004 CD under the SDK\Samples\IHVLInks subdirectory. Host Integration Server 2004 does not support the earlier .inf-based link service setup procedure.

This section contains:

- Setup Registry Architecture
- Integrated Link Service Setup on Host Integration Server 2004

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Setup Registry Architecture

There are two main subtrees in the Microsoft® Windows® 2000 registry where information is kept relevant to Microsoft® Host Integration Server 2004: the **SOFTWARE** tree and the **SYSTEM** tree. Both of these are subtrees of **HKEY_LOCAL_MACHINE**. The **SOFTWARE** tree contains generic information about independent hardware vendor (IHV) link services, and the **SYSTEM** tree contains information about the individual components of those services. While reading the following topics, it may be helpful to view examples of what is being discussed by inspecting the registry of an existing system with several of the built-in link services installed.

This section contains:

- Product Entries
- Service Entries

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Product Entries

All of the information relevant to the product as a whole resides in the registry under the key **SOFTWARE\Microsoft**. Each product or link support has an entry whose name consists of the product name and version separated by an underscore. This key contains most of the information about the product, such as the script name and option name that control it and the service name for that particular instance.

Each instance key must also have a NetRules key. This key contains all of the information for the Network Control Panel Applet bindings.

The Host Integration Server Setup writes the path of the root directory of the computer's Host Integration Server tree into the key:

SOFTWARE\Microsoft\SNA Server\CurrentVersion\Setup\RootDir

Service Entries

Each instance of a component appears to the system as a unique service. These services must be created using the Service Control Manager (SCM). The SCM creates a registry entry for each service under **SYSTEM\CurrentControlSet\Services**. This key contains all of the service-specific information.

The top-level service key contains information that the SCM uses to control the service. This includes the type of service that this key represents, how it should be started, what sort of error handling should be used, the path to the executable image, and so on. All information in this key should be handled by the SCM. Each service key also contains two subkeys—the Linkage key and the Parameters key.

The Linkage key is used by the Network Control Panel Applet to store binding information. The Parameters key contains information that is relevant to Host Integration Server 2004 Setup, such as the name of the DLL responsible for handling a link service. All information in this key should be handled by Host Integration Server 2004 Server Setup. The Parameters key contains another key, ExtraParameters, which is used for any IHV-specific information, including component-specific parameters and other information not required by the main SNA Server Setup program.

Integrated Link Service Setup on Host Integration Server 2004

In Microsoft® Host Integration Server 2004, the SNA Manager supports installation and configuration of link services. Host Integration Server 2004 uses the Microsoft System Installer (MSI) and MSI packages for the installation of the Host Integration Server software. Link services from independent hardware vendors (IHVs) are not included in the main Host Integration Server MSI packages. IHV link services are installed using a separate IHV-provided MSI package. For an example of this process, install the DLC, 802.2, or IBM Synchronous Data Link Control (SDLC) link service in Host Integration Server.

IHV MSI Packages contain two types of features:

- Features that can be installed and used independently of Microsoft Host Integration Server 2004.
- Features that require Microsoft Host Integration Server 2004 to function.

Features that can be installed and used independently of Microsoft Host Integration Server 2004 include drivers, utilities, and applications that can run without Host Integration Server support. These features should be represented in the package as one or more features in the MSI Select Features dialog box. (For more information, see the Generic Link Service sample feature "Generic Link Service" from the Generic.msi Feature table.) Generic.msi can be found in the Host Integration Server 2004 SDK on the CD and in the install directory at the following address: SDK\Samples\IHVLinks\Packages\Generic.msi.

Features that require Microsoft Host Integration Server 2004 include drivers, utilities, and applications that require Host Integration Server to function. These features should be represented in the package as one or more features in the MSI Select Features dialog box. These features should be hidden if Host Integration Server is not installed on the computer. (For more information, see the Generic Link Service sample feature "Host Integration Server Support" from the Generic.msi feature table.)

Properties can be equated to a variable (either global or local) in a high-level programming language such as C or C++. Properties can be used as a placeholder for informational text, or as values used during an installation. (For more information, see the property SERVER_INSTALLED in the custom action source code GenSet.cpp, and the Condition table entry in the Generic.msi package.)

Custom Actions provide a method of extending the capabilities of MSI. Functions not supported in MSI, can be custom written, and invoked from within a sequence table or directly from a dialog control event. (For more information, see the Custom Actions SetHISPath and GetHISData in the GenSet.cpp source file.)

Launch Conditions provide a method of preventing an install from launching. The sample MSI package included with the Host Integration Server SDK does not use a launch condition, however, if your package requires Host Integration Server to be installed for your features to function, you should include a launch condition that fails the installation if Host Integration Server is not detected.

The Condition table provides a method of controlling the layout of the features listed in the select feature dialog box. The sample MSI package uses the Condition table to hide the "Host Integration Server Support" if Host Integration Server is not detected in the installation.

For Host Integration Server to control the installed state of IHV features that require Host Integration Server to be installed, the following registry keys must be included in the package for each separate feature which requires Host Integration Server to be installed.

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\SnaBase\IHVSupport\<ihv key>
<feature table entry 1> : REG_SZ : <product code 1>
<feature table entry 2> : REG_SZ : <product code 2>
.
.
.
<feature table entry n> : REG_SZ : <product code n>
```

Where:

<feature table entry x> specifies an entry in the feature table (not title).

<product code x> specifies the package product code.

Note that feature table entries must be unique. Product codes may or may not be unique depending on the number of packages provided by an IHV. One package may have several Host Integration Server dependent features and therefore should list each feature separately.

These registry keys should be installed by the feature rather than globally by the package.

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\SnaBase\LinkServicesInstalled
<Link Service Name> : REG_SZ : <Link Service Configuration Dll name>
```

Target paths specify a directory where files will be installed. An MSI package will contain one or more target paths.

The sample package contains two features:

- Generic Link Service
- Host Integration Server Support

The Generic Link Service is not dependent on Host Integration Server. This feature installs the following:

- gencfg.exe into the <Generic Link Service> directory.
- generic.sys driver into the %windir%\system32\drivers directory.
- generic.inf into the %windir%\inf directory

Host Integration Server Support is dependent on Host Integration Server. This feature installs the following:

- gendtct.dll into the HIS\system directory.
- generic.dll into the HIS\system\hwsetup\i386 directory.

This feature contains the following entry in the condition table to hide the feature if Host Integration Server is not detected

```
HIS_RELATED_FEATURE  0  SERVER_INSTALLED="NO"
```

See dialog snapshots later in this topic for layout of features with and without Host Integration Server installed:

Adds:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\SnaBase\LinkServicesInstalled
Generic Link Service : REG_SZ : GENERIC.DLL

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\SnaBase\IHVSupport\GenericLinkService
HIS_RELATED_FEATURE : REG_SZ : {FDF11E0E-3BFF-4B0F-89BD-E4E1FB979E4D}
```

The sample package uses one custom action DLL with two entry points:

```
SetHISPath
GetHISData
```

The **SetHISPath** entry sets the target path to the Host Integration Server 2004 install directory.

The **GetHISData** entry sets the MSI property SERVER_INSTALLED to "YES" if Host Integration Server is installed and sets the MSI property SERVER_INSTALLED to "NO" if Host Integration Server is not installed.

The sample contains two target paths:

```
INSTALLDIR
INSTALLDIR1
```

The INSTALLDIR target path specifies the installation directory for the features that are not dependent on Host Integration Server. It can be set using the **browse** button in the **Select Features** dialog box when the Generic Link Service feature is currently selected.

The INSTALLDIR1 target path specifies the directory where Host Integration Server is installed. This target path is set by the custom action SetHISPath.

The IHVUtil.exe tool can be used to verify the Host Integration Server dependent interfaces. If the tool is launched after the IHV package is installed, all Host Integration Server dependent features should show up in the dialog box. Executing Remove from the dialog box should remove the Host Integration Server dependent feature as well as remove it from the dialog box.

Note that the sample provided can also be tested using the SNA Manager. While the sample does not actually function, it will appear as an installed link service.

This section contains:

- Integrated Link Service Configuration and Reconfiguration on Host Integration Server 2004
- Constructing an Integrated Link Service DLL on Host Integration Server 2004

Integrated Link Service Configuration and Reconfiguration on Host Integration Server 2004

In Microsoft Host Integration Server 2004, the initial configuration functions are performed by your configuration DLL running in the context of SNA Manager.

After your link service has been created, SNA Manager must be able to locate its configuration DLL when the operator wishes to reconfigure the link service. To support this feature, when your configuration DLL initially creates the link service, it must put a new value in the registry of the target server as follows:

SYSTEM\CurrentControlSet\Services\<yourLinkService>\Parameters

DLLName: REG_SZ: <configDllName>

where:

<configDllName> is the file name and extension of the configuration DLL, for example, IBMSDCFG.DLL. No path is specified in the value.

This value replaces **InfName**, which was used in SNA Server 2.*x* to name the path to the .inf file.

Since SNA Manager can be running on a management workstation remote from the target server, the configuration DLL must be able to create configuration information on the target server. Host Integration Server loads the appropriate configuration DLL over the network from \<snaRoot>\SYSTEM\HWSETUP\<cpu> on the target server as needed.

> **Note** There is an alternate way of locating the link service configuration DLL (linkcfg) if the link services from the vendor were not included with the released Host Integration Server CD.
>
> Depending on the setup tool used by the vendor, the vendor's setup software may not be able to read the registry and locate the directory where link services should be installed. To resolve this problem, the SNA Manager scans the **LinkServicesInstalled** key prior to making the call to the link service configuration DLL. The SNA Manager checks for a % character in the configDllName and if it exists, configDllName will be interpreted differently than just the name of the configuration DLL. The following example illustrates this case:
>
> Under the **SYSTEM\CurrentControlSet\Services\<yourLinkService>\Parameters key**
>
> **DLLName: REG_SZ: "share\%s\<relative path and DLL Name>**
>
> If a %s string is found, \\ServerName will be prepended and the CPU architecture string (i386) will be substituted for %s.

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Constructing an Integrated Link Service DLL on Host Integration Server 2004

Microsoft Host Integration Server 2004 provides an enhanced method for installing integrated link services that allows for remote setup and administration of new link services, as well as support for setup and configuration using a command-line tool. This feature is based on the link service provider supplying a setup and configuration DLL exporting a specific list of functions. A developer must follow certain standards for using this SNA link service configuration DLL (linkcfg) and set various keys and values as registry settings to be used by Host Integration Server for link service configuration.

To support vendors using these setup and configuration features, Host Integration Server includes the source code for a sample generic Synchronous Data Link Control (SDLC) link service configuration DLL. Also included for use by developers is the source code to a library of utility functions (lnktools) that are commonly useful when implementing the linkcfg DLL. This sample code and the documentation that follows can be used as a guideline for vendors developing similar link service configuration DLLs for their hardware. This sample source code is located on the Host Integration Server CD in the \SDK\SAMPLES\IHVLinks subdirectory. Sample include files, C++ files, resource files, makefiles, and project files are included for use with Microsoft® Visual C++® version 6.0 and later.

This section contains:

- Components of an Integrated Link Service Configuration DLL on Host Integration Server 2004
- Contents of IHVLinks Sample Kit on Host Integration Server

Components of an Integrated Link Service Configuration DLL on Host Integration Server 2004

The link service configuration DLL (linkcfg) must export the following functions.

Exported function	Purpose
CommandLineAdd	Called from **LinkCfg** to parse command-line input.
ConfigureLinkService	Called from SNA Manager to add or modify a link service.
ConfigureLinkServiceEx	Called from SNA Manager to add or modify a link service, returning a configuration buffer to be added to the configuration file.
DisplayHelpInfo	Returns a buffer containing command-line syntax for this type of link service.
RemoveLinkService	Called from SNA Manager to remove a link service.
RemoveAllLinkServices	Called from Setup to remove all instances of this link service.

The sample linkcfg.cpp DLL is written in C++ using the Microsoft Foundation Classes (MFC) and uses a single property sheet with two property pages as follows:

- The card configuration property page implementation is in the cardcfg.cpp and cardcfg.h files. This property page is concerned with configuring various hardware properties (interrupt, DMA channel, and I/O address, for example) of the link service hardware.
- The connection mode property sheet implementation is in the mode.cpp and mode.h files. This property page is concerned with configuring mode information (link service name, link service title, Synchronous Data Link Control (SDLC) line type, for example) for the link service.

The two property pages are linked to the link service property sheet in linkcfg.cpp within the **ConfigureLS** routine. This function is called by the exported **ConfigureLinkService** and **ConfigureLinkServiceEx** routines in linkcfg.cpp. An actual link service configuration DLL developed from these sources may require more property pages depending on the information needed to configure the actual link service DLL.

The registry.h include file used by linkcfg.cpp contains a global definition of the registry entries required for the sample generic SDLC link service. The values in this structure will be modified to contain the actual information specified by the user. This structure is added to the registry when a new link service is configured, and this structure is removed when a link service is deleted. The registry values that a developer must modify include the Link Registry Base entry (LINKSERVICE is used in the sample include file), the name of the device driver root (GenSdlc is used in the sample include file and source code), and various software and service registry settings appropriate for the target link service.

Several of the exported link service DLL functions use a configuration buffer, the CONFIG_BUFFER structure defined in linkcfg.h. The format of any CONFIG_BUFFER used by developers must match the structure format of this sample file for the first three parameters. Other parameters may differ for a developer's version of the CONFIG_BUFFER structure based on the target link service.

The sample link service configuration DLL calls a set of general utility functions that are not specific to any target link service. These utility functions are included in the lnktools library (lnktool.cpp) that is linked in as an OBJ file. This lnktools library includes the following utility functions that are useful in developing link service configuration DLLs.

Utility function	Purpose
AddPerfmonCounters	Add Perfmon counters for this link service.
bCreateService	Create a service on a computer.
bDeleteService	Delete a service on a computer.
bStopService	Stop a service running on a computer.
CheckForExistingLinkService	Check to see if a link service of this type exists with this title.
ConvertHexStringToDWORD	Convert a hexadecimal string to a DWORD value.
ExtractNextParameter	Get the next parameter from a buffer.
fAddRegistryEntry	Add a new registry value to the registry.
fCanWeAdministerRemoteBox	Determine if the user has administrative privileges on the remote computer.
fConnectRegistry	Connect to a remote computer's registry and return a handle to the remote registry.
fDisconnectRegistry	Disconnect from a remote computer's registry.
fFindAndReplaceString	Find and replace a substring within a string.
fFindString	Determine if a string exists within a string buffer.

fFindStringInMultiSZ	Find a string in a REG_MULTI_SZ string list and return entire string.
fQueryRegistryValue	Query a value from the registry.
fRegistryKeyExists	Test whether a registry key exists.
fRemoveRegistryEntry	Remove a registry key.
fRemoveRegistryValue	Remove a registry value.
fStringCompare	Determine if two strings compare.
LoadStringResource	Load a string from the string resource.
ParseNextField	Return the next field from a string.
RemovePerfmonCounters	Remove Perfmon counters for this link service.
ReturnString	Return a pointer to a string resource string.

The sample source code for a generic SDLC link service configuration DLL (linkcfg) includes several functions that may be useful as sample code when developing link service configuration DLLs for other hardware. The following functions are included in the linkcfg.cpp source code that may be of use as examples.

Utility function	**Purpose**
bDetectNetworkCard	Detect the remote network card and return the card settings buffer for the sample generic SDLC link service.
bLastGenericDFTLinkService	Check for the last generic SDLC link service for the sample generic SDLC link service. This routine is used to determine if the GENSDLC Device Driver (if one exists) can be removed.
ConfigureLS	The common link service configuration function used by the sample generic SDLC link service.
fAddAllRegistryValues	Add all registry values for the sample generic SDLC link service.
fAddClassAndBindformRegistries	Add the class and bindform registry entries for the sample generic SDLC link service. The bindform and class registry entries can only exist for the first link service of this type.
fEnumerateEventLogSources	Enumerate the Event Log sources registry value for the sample generic SDLC link service.
fRemoveAllRegistryValues	Remove all registry values for the sample generic SDLC link service.
fReplaceAllRegistryValues	Replace all user-provided information in the registry data for the sample generic SDLC link service.
fReplaceRegistryData	Replace global registry data for the sample generic SDLC link service.
fReplaceRegistryKeyName	Replace global registry structure strings for the registry key name for the sample generic SDLC link service.
fSetupGlobalValues	Create or update all user-provided information in the registry data structure for the sample generic SDLC link service.
InitializeGlobalStructure	Initialize link service data contained in the global data structure for the sample generic SDLC link service.

Contents of IHVLinks Sample Kit on Host Integration Server

The sample source code for a generic Synchronous Data Link Control (SDLC) integrated link configuration MSI package that illustrates an integrated independent hardware vendor (IHV) link service installation are included on the Microsoft Host Integration Server 2004 CD. These sample programs are located in the \SDK\Samples\IHVLinks subdirectory on the Host Integration Server 2004 CD. These files are copied to your hard drive during Host Integration Server software or Host Integration Client software installation when the Host Integration Server Software Development Kit (SDK) option is selected. These samples are installed in the SDK\Samples\IHVLinks subdirectory below where the Host Integration Server SDK software is installed (C:\Program Files\Microsoft Host Integration Server\SDK, by default).

These sample files include the following directories.

Directory	Description
LinkServ	Directories used in creating the IHVLinks sample generic SDLC link service configuration and detection DLLs.
LinkServ\Build	A file containing the normal COFF base address for a link service configuration DLL (linkcfg).
LinkServ\Detect	The source code to the sample generic SDLC link service detection DLL.
LinkServ\Linkcfg	The source code to the sample generic SDLC link service configuration DLL. The link service configuration DLL must export specific functions. A definitions (.DEF) file must be used so that exported function names are not decorated by the compiler and linker.
LinkServ\LnkTools	The source code to a collection of library routines used by the generic SDLC link service configuration DLL.
LinkServ\NT5INF	An INF file that can be used with the generic SDLC link service.
Setup	Directories used in creating the IHVLinks sample generic SDLC link service setup and setup test tools.
Setup\Bins	The compiled generic MSI package containing the generic SDLC link service driver, configuration and detection DLLs, and configuration tool.
Setup\CASource	This directory contains the source code used for the custom actions in setup. The GetHISData custom action sets the MSI property SERVER_INSTALLED to "YES" if Host Integration Server 2000 is installed, otherwise the property is set to "NO". This custom action is used to disable Host Integration Server 2004 dependent features from the installation directory if not installed. The SetHISPath custom action sets the target directory INSTALLDIR1 to the installation directory where Host Integration Server 2004 was installed. This custom action is used to set the destination directory for the link service configuration DLLs.
Setup\Package	The sample GENERIC.MSI SDLC link service package ready for installation and testing.
Setup\Tools	The source code for various utility functions and tools that can be used to test your integrated link service MSI package.

This sample source code is included for your reference. The communication between workstation management station and Host Integration Server is performed by RPCSVC.EXE, the SNA remote procedure call (RPC) service.

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Compiling and Linking a SNALink

This section provides information about compiling and linking a SNALink for use with the Microsoft® Host Integration Server 2004. This section also lists and explains the header files and libraries need to build a SNALink.

This section contains:

- Host Integration Server 2004 DLC Header Files
- Included Files
- Required Exports
- Compiler Options
- Linking

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Host Integration Server 2004 DLC Header Files

The following files are required to build a Microsoft® Host Integration Server 2004 SNALink:

File	**Description**
SNA_DLC.H	Main header file containing the definitions of buffer and message formats.
SNA_CNST.H	Function prototypes for the Base/DMOD interface calls and constant definitions.
TRACE.H	Definitions of the logging and tracing macros.
IHVLINK.LIB	Main library for the SNADIS interface.

Included Files

To compile a SNALink, the header files SNA_DLC.H, SNA_CNST.H and TRACE.H are required. In addition, one of the standard operating system header files may be required. To include the required files, the following lines should be used in your application:

```
#include <sna_dlc.h>
#include <sna_cnst.h>
#include <trace.h>
```

> **Note** The TRACE.H include file is required to enable SNA tracing and use of the Microsoft® Host Integration Server 2004 Trace viewer utility.

Required Exports

The IHV link support DLL must export the following entry points:

- SNALinkInitialize
- SNALinkWorkProc
- SNALinkDispatchProc

These are called by the Base scheduler when the SNALink is invoked.

Compiler Options

When compiling the SNALink DLL, the following compiler options are required:

Option	Explanation
/c	Compile only, without linking. Linking is done as a separate phase to include the required Microsoft® Host Integration Server 2004 libraries.
/D NOTRC	The NOTRC macro specifies that internal tracing should not be compiled into the application. The /D NOTRC option should be used for building a final system (internal tracing should not be included because it will degrade performance and occupancy). For a development system, you may want to compile with internal tracing; if so, remove the /D NOTRC option.
/D WIN32_SUPPORT	The macro WIN32_SUPPORT is used in the header files SNA_DLC.H, SNA_CNST.H, and TRACE.H to support variants of the DLC interface for Microsoft Windows® 2000.
/Gzs	**z**: Use stdcall conventions . **s**: Remove stack check calls.

The following compiler flags are required, but any of the valid options for each flag may be used, as appropriate to your application:

/O	Optimization
/W	Warning level

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Linking

The IHVLINK.LIB library must be linked with the application. It contains the Base, DMOD imports, and diagnostics routines. The DMOD and the Base are implemented as DLLs.

> **Note** The Microsoft® Host Integration Server 2004 library only contains the external references for the corresponding DLLs, which are part of the main Host Integration Server 2004 product.

Synchronous Dumb Card Interface

This section describes the interface to the synchronous dumb card device driver used by the Synchronous Data Link Control (SDLC) and X.25 SNALinks that Microsoft® Host Integration Server 2004 supplies. The interface provides a simple but flexible mechanism for transferring frames of data through a dumb synchronous communications card (such as the IBM MPCA card).

This interface is intended primarily for independent hardware vendors (IHVs) who want to provide drivers for their own dumb cards that are directly compatible with SDLC and X.25 SNALinks. It can also be used by Independent Hardware Vendors (IHVs) who intend to write their own SNALinks and want to ensure that their drivers conform to the standard Host Integration Server 2004 model.

This section contains:

- Driver Interface
- I/O Request Packets

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Driver Interface

Application software running on Microsoft® Windows Server™ 2003 or Windows® 2000 normally does not interact directly with device drivers. Usually, the operating system itself controls the interface to underlying device drivers on behalf of the application. For example, Disk I/O consists of sequences of driver requests generated by a file system, as a result of an application making file system requests.

By contrast, in the Microsoft® Host Integration Server 2004 device driver model, synchronous dumb cards are controlled directly by the SNALink using input and output control (IOCTL) commands. This mechanism enables the SNALink to pass raw control packets to the driver without any intervention from the operating system.

This is achieved by issuing an Open request with a file name that identifies the device driver. The operating system detects the fact that this file is a driver and passes an OPEN I/O request packet to the driver. The user application is returned a handle that can be used to reference the driver.

The IBMSYNC driver creates various device names. During setup, the configuration for adapters in the computer is saved in the registry. When the driver starts, it reads this data and creates the device names for all the adapters that are found.

The following table lists the device names that the IBMSYNC driver can create.

Device name	**Description**
\Device\IBMSDLC	Standard IBM Synchronous Data Link Control (SDLC) adapter.
\Device\MPCA_1	IBM MPCA 1 adapter. This adapter has a switch set on it to enforce MPCA 1 operation. This adapter is the primary MPCA adapter in the computer and supports direct memory access (DMA) interrupt mode.
\Device\MPCA_2	IBM MPCA 2 adapter. This adapter has a switch set on it to enforce MPCA 2 operation. This adapter is the secondary MPCA adapter in the computer and supports only interrupt mode.
\Device\SYNC_*x*	Generic adapter (for example, Microgate). The letter *x* is 1 (for the primary adapter) or 2 (for the secondary adapter).
\Device\MPAA_S*x*	IBM MPAA adapter, where *x* represents the number of the MCA slot where the adapter is installed in the computer. This number is a value from 1 through 8.
\Device\SYNC_S*x*	Generic MPAA adapter (for example, the Microgate MPAA adapter). The letter *x* represents the number of the MCA slot where the adapter is installed in the computer. This number is a value from 1 through 8.

Subsequent IOCTL calls using **DeviceIOControl** made by the SNALink using the driver handle cause the operating system to pass an IOCTL I/O request packet to the driver. The driver therefore sees IOCTL requests from the SNALink as a series of I/O request packets passed to it by the operating system.

The Host Integration Server 2004 dumb card interface uses the following operating system calls:

- **OpenFile**
- **DeviceIOControl**
- **CloseFile**

DeviceIOControl allows free-format information to be passed to the driver. The dumb card interface uses its own format of information to pass all requests to the driver (with the exception of Open and Close requests, which are handled differently by the operating system).

This section contains:

- Architecture Overview

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Architecture Overview

This section describes how information is transferred between the driver and the SNALink.

This section contains:

- Interface Record
- Event Signaling
- Link Characteristics

Interface Record

Status information is transferred between the driver and the SNALink using a buffer known as the interface record.

The driver allocates this buffer when it starts and maintains the information in it while it is running. The contents of this buffer are copied to an SNALink buffer by using an IOCTL call of type **READ_INTERFACE_RECORD**.

Event Signaling

The device driver notifies the SNALink whenever an event occurs (such as a frame being received from the line) by setting an event.

The SNALink provides the driver with a handle to this event (or semaphore) at the start of day by issuing an IOCTL call of type **SET_EVENT_HANDLE**.

Link Characteristics

Before the driver can transfer any data, it needs information about the link. This includes the following:

- The frame size.
- The station address to listen on (if required).
- Details of hardware selectable options, such as SDLC/HDLC, Internal/External clocking, and so on.

For more details of these options, refer to the topic Function 0x42: Set Link Characteristics.

I/O Request Packets

All I/O requests are passed to the driver by Microsoft® Windows Server™ 2003 or Windows® 2000 using the standard IRP structure. For more details about this, refer to the Windows Server 2003 or Windows 2000 Device Driver Kit.

I/O request packets are defined in terms of C structures. The relevant fields are accessed as follows:

Field name	Description
IRP.CurrentStackLocation -> MajorFunction	Defines the IRP as an IOCTL.
IRP.IoStatus	Status codes upon completion of request.
IRP.CurrentStackLocation -> IoControlCode	The IOCTL function code.

IoControlCode identifies the function to be performed and **IoStatus** is the mechanism for returning result codes to the SNALink. The structure **IoStatus** is defined as follows:

IoStatus.Status

A standard Windows Server 2003 or Windows 2000 result code (for example, STATUS_INVALID_PARAMETER) as defined in the Windows Server 2003 or Windows 2000 header file NTSTATUS.H.

IoStatus.Information

For successful read-frame IOCTLs, the length of the received buffer (can be zero if no data available). Additional error information, as defined in the header file SECLINK.H.

This section contains:

- Initialization
- OPEN Call
- CLOSE Call
- IOCTL Command Summary
- Equates and Structure Layouts

Initialization

Device drivers under Windows Server 2003 or Windows 2000 should perform all initialization required at the start of day when they are loaded by Windows Server 2003 or Windows 2000. Configuration information for device drivers is stored in the Configuration Registry under Windows Server 2003 or Windows 2000. For more details, refer to the documentation supplied with the Windows Server 2003 or Windows 2000 Device Driver Kit.

The SNALinks for dumb cards are implemented by the following files:

SDLC SNALink
  SNAroot\SYSTEM\IBMSDLC.DLL
X.25 SNALink
  SNAroot\SYSTEM\IBMX25.DLL

To bind to one of these, an installation script should mention the appropriate DLL in the IHVDLL registry entry that the script creates for the link service.

OPEN Call

The **OPEN** call has no parameters. It grants access to the driver from a particular process. The driver ensures that only one **OPEN** is accepted by the link at any one time. When **OPEN** is processed, the driver attempts to reserve access to hardware resources such as interrupt vectors. The **OPEN** is rejected if this fails.

After a successful **OPEN** request, the driver expects to receive the following IOCTL commands:

- **SET_EVENT_HANDLE**
- **SET_INTERFACE_RECORD**
- **SET_LINK_CHARACTERISTICS**

Of these, the first two can be performed in any order, but both should be issued before calling **SET_LINK_CHARACTERISTICS**.

When these three calls have been successfully performed by the SNALink, the driver is ready for information transfer.

CLOSE Call

The **CLOSE** call has no parameters. It performs the logical converse of **OPEN**. Resources are released back to the operating system when a **CLOSE** is performed.

IOCTL Command Summary

The parameters to the IOCTL request packet are stored in the following fields in the associated I/O request packet (IRP).

IRP.CurrentStackLocation -> IOControlCode	**Function code**
IRP.SystemBuffer	Address of parameter buffer (if used)
IRP.CurrentStackLocation -> InputBufferLength	Length of parameter buffer
IRP.UserBuffer	Address of data buffer
IRP.CurrentStackLocation -> OutputBufferLength	Length of data buffer

Note that under Windows Server 2003 or Windows 2000, the operating system reserves the lower four bits of the IOCTL function codes to determine the method used to map the various buffers passed on the **DeviceIoControl** function call into the driver address space. The various options available to device driver writers are:

Low nibble	**IOCTL definition**
0	METHOD_BUFFERED
1	METHOD_IN_DIRECT
2	METHOD_OUT_DIRECT
3	METHOD_NEITHER

For further details of the memory mapping performed by these various options, refer to the Windows Server 2003, Windows 2000, or Windows DDK documentation.

For a driver function code of ZZ, using memory mapping code M, the IOCTL code passed on the **DeviceIoControl** function call is 0xZZM.

The function codes are set out as shown in the table later in this topic. Note that all other function codes will be returned with the error ERROR_INVALID_DEVICE_REQUEST in the field **IoStatus.Status**. The Windows Server 2003 or Windows 2000 I/O System validates the address and length of the areas passed as parameter and data packets. If the address validation fails, an exception will be raised.

All requests must return immediately. In general, they are simple, immediate operations, but in the case of Transmit Frame and Receive Frame, the driver must not suspend the calling SNALink thread while waiting for I/O to complete—a relevant return code should be sent instead, allowing the SNALink to retry.

The complete list of functions is as follows.

Function	**Function code**	**Windows Server 2003 or Windows 2000 IOCTL code**
Function 0x41: Set Event/Semaphore Handle	0x41	0x410
Function 0x42: Set Link Characteristics	0x42	0x420
Function 0x43: Set V24 Output Status	0x43	0x430
Function 0x44: Transmit Frame	0x44	0x441
Function 0x45: Abort Transmitter	0x45	0x450
Function 0x46: Abort Receiver	0x46	0x460
Function 0x47: Off-Board Load	0x47	0x470
Function 0x61: Get/Set Interface Record	0x61	0x613
Function 0x62: Get V24 Status	0x62	0x622
Function 0x63: Receive Frame	0x63	0x632
Function 0x64: Read Interface Record	0x64	0x642

In the function descriptions in the following topics, the bit-numbering convention is: The bits in a byte are numbered 0 through 7, where bit 0 is the least significant and bit 7 is the most significant.

> **Note** There is no function for the controlling autodialer across the synchronous dumb card interface. This autodial feature is implemented in the link service itself. The Microsoft link services that support the synchronous dumb card interface first perform the dial operation by sending the dial string containing the server-stored number to a COM port rather than the SDLC chip, and then sending a command to the device driver to raise DTR through a Set V24 Output Status IOCTL.

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Equates and Structure Layouts

Many standard operating system device driver error codes are used (for example, "invalid function"), together with a new set of device driver-specific errors. Return codes below 0x80 reflect serious failures.

```
/* Copyright Data Connection Ltd. 1989 */_
/******************************************************************************/
/* Link Device Driver interface constants and structures. */
/******************************************************************************/
/******************************************************************************/
/* WIN32  16/04/92  SW   Added more helpful names from WIN32 hdr file         */
/* IHV    03/06/92  MF2  Add semfisui.h                                       */
/******************************************************************************/

/******************************************************************************/
/* This include file is used in 5 subsystems                    */
/*                                                              */
/* - the NT   driver                          LINK_NTDRIVER     */
/* - the X25  link service for NT             LINK_NTX25        */
/* - the SDLC link service for NT             LINK_NTSDLC       */
/* - the X25  link service for OS/2           LINK_OS2X25       */
/* - the SDLC link service for OS/2           LINK_OS2SDLC      */
/*                                                              */
/* (The OS/2 driver doesn't count because it is in assembler). */
/*                                                              */
/* These are distinguished by #defines as set in the following */
/*                                                              */
/******************************************************************************/

#ifdef        IMADRIVER
  #define     LINK_NTDRIVER
#else
  #ifdef      SDLC
    #ifdef    WIN32
      #define LINK_NTSDLC
    #else
      #define LINK_OS2SDLC
    #endif
  #else
    #ifdef    WIN32
      #define LINK_NTX25
    #else
      #define LINK_OS2X25
    #endif
  #endif
#endif
/******************************************************************************/
/* Device function codes for DosDevIOCtl to link device driver               */
/******************************************************************************/
#ifdef WIN32                /* WIN32 constants defined in semfisui.h          */
#define IoctlCodeSetEvent               0x410
#define IoctlCodeSetLinkChar            0x420
#define IoctlCodeSetV24                 0x430
#define IoctlCodeTxFrame                0x440
#define IoctlCodeAbortTransmit          0x450
#define IoctlCodeAbortReceiver          0x460
#define IoctlCodeSetInterfaceRecord     0x610 /*IRMdl?*/
#define IoctlCodeGetV24                 0x623
#define IoctlCodeRxFrame                0x633
#define IoctlCodeReadInterfaceRecord    0x643   /*IRMdl?*/
#else
//obsolete names from previous version
//#define CELDDSSH 0x41       /* Set Semaphore Handle                           */
//#define CELDDSLC 0x42       /* Set Link Characteristics                       */
//#define CELDDSVS 0x43       /* Set V24 Output status                          */
//#define CELDDTXF 0x44       /* Transmit a frame of data                       */
```

```
//#define CELDDATX 0x45       /* Abort Transmitter                              */
//#define CELDDARX 0x46       /* Abort Receiver                                 */
//#define CELDDGIR 0x61       /* Get Interface Record Address                   */
//#define CELDDGVS 0x62       /* Get V24 Input Status                           */
//#define CELDDRXF 0x63       /* Receive a frame of data                        */
//#define CELDDCAT 0x82       /* Device function category code                  */
//
// new names

#define IoctlCodeSetEvent               0x41
#define IoctlCodeSetLinkChar            0x42
#define IoctlCodeSetV24                 0x43
#define IoctlCodeTxFrame                0x44
#define IoctlCodeAbortTransmit          0x45
#define IoctlCodeAbortReceiver          0x46
#define IoctlCodeSetInterfaceRecord     0x61
#define IoctlCodeGetV24                 0x62
#define IoctlCodeRxFrame                0x63

#endif

/****************************************************************************/
/* Constants for the driver-specific IOCtl return codes.                    */
/****************************************************************************/
#define CEDNODMA 0xff80     /* Warning (NO DMA!) from set link chrctrstcs    */
/****************************************************************************/
/* Equates for the link options byte 1.                                     */
/****************************************************************************/
#define CEL4WIRE 0x80
#define CELNRZI  0x40
#define CELPDPLX 0x20
#define CELSDPLX 0x10
#define CELCLOCK 0x08
#define CELDSRS  0x04
#define CELSTNBY 0x02
#define CELDMA   0x01

/****************************************************************************/
/* Equates for the driver set link characteristics byte 1.                  */
/****************************************************************************/
#define CED4WIRE 0x80
#define CEDNRZI  0x40
#define CEDHDLC  0x20
#define CEDFDPLX 0x10
#define CEDCLOCK 0x08
#define CEDDMA   0x04
#define CEDRSTAT 0x02
#define CEDCSTAT 0x01

/* Nicer names for NT-style code */

#define LinkOption_4Wire           CED4WIRE
#define LinkOption_NRZI            CEDNRZI
#define LinkOption_HDLC            CEDHDLC
#define LinkOption_FullDuplex      CEDFDPLX
#define LinkOption_InternalClock   CEDCLOCK
#define LinkOption_DMA             CEDDMA
#define LinkOption_ResetStatistics CEDRSTAT

/****************************************************************************/
/* Equates for the output V24 interface flags.                              */
/****************************************************************************/
#define CED24RTS 0x01
#define CED24DTR 0x02
#define CED24DRS 0x04
#define CED24SLS 0x08
#define CED24TST 0x10
```

```
/* Nicer names for NT-style code */

#define IR_OV24RTS  CED24RTS
#define IR_OV24DTR  CED24DTR
#define IR_OV24DSRS CED24DRS
#define IR_OV24SlSt CED24SLS
#define IR_OV24Test CED24TST


/****************************************************************************/
/* Equates for the input V24 interface flags.                               */
/****************************************************************************/
#define CED24CTS 0x01
#define CED24DSR 0x02
#define CED24DCD 0x04
#define CED24RI  0x08

/* Nicer names for NT-style code */

#define IR_IV24CTS  CED24CTS
#define IR_IV24DSR  CED24DSR
#define IR_IV24DCD  CED24DCD
#define IR_IV24RI   CED24RI
#define IR_IV24Test 0x10


/****************************************************************************/
/* Structure for the device driver interface record.                        */
/****************************************************************************/

#define CEDSTCRC  0         /* Frames received with incorrect CRC           */
#define CEDSTOFL  1         /* Frames received longer than the maximum      */
#define CEDSTUFL  2         /* Frames received less than 4 octets long      */
#define CEDSTSPR  3         /* Frames received ending on a non-octet bndry  */
#define CEDSTABT  4         /* Aborted frames received                      */
#define CEDSTTXU  5         /* Transmitter interrupt underruns              */
#define CEDSTRXO  6         /* Receiver    interrupt overruns               */
#define CEDSTDCD  7         /* DCD (RLSD) lost during frame reception       */
#define CEDSTCTS  8         /* CTS lost while transmitting                  */
#define CEDSTDSR  9         /* DSR drops                                    */
#define CEDSTHDW 10         /* Hardware failures - adapter errors           */

#define CEDSTMAX 11

#define SA_CRC_Error       CEDSTCRC
#define SA_RxFrameTooBig   CEDSTOFL
#define SA_RxFrameTooShort CEDSTUFL
#define SA_Spare           CEDSTSPR
#define SA_RxAbort         CEDSTABT
#define SA_TxUnderrun      CEDSTTXU
#define SA_RxOverrun       CEDSTRXO
#define SA_DCDDrop         CEDSTDCD
#define SA_CTSDrop         CEDSTCTS
#define SA_DSRDrop         CEDSTDSR
#define SA_HardwareError   CEDSTHDW  /* e.g. CmdBufferFull not set  */

#define SA_Max_Stat        CEDSTMAX

#ifdef WIN32

typedef struct          _INTERFACE_RECORD
{
  int                    RxFrameCount;   /* incremented after each frame rx'd */
  int                    TxMaxFrSizeNow; /* max available frame size av. now  */
                                         /* (changes after each Tx DevIoctl   */
                                         /* to DD or after Tx completed)      */
  int                    StatusCount;    /* How many status events have been  */
                                         /* triggered.                        */
  UCHAR                 V24In;          /* Last 'getv24i/f' value got        */
  UCHAR                 V24Out;         /* Last 'setv24 outputs' value set   */


/*       The values for the indexes into the link statistics array of the */
/*       various types of statistic. */

  int                   StatusArray[SA_Max_Stat];

}                       IR,
                     * PIR;

#else
typedef struct teifrec {

        USHORT    RxFrameCount;
        USHORT    TxMaxFrSizeNow;
        USHORT    StatusCount;
        UCHAR     V24In;
        UCHAR     V24Out;
        USHORT    StatusArray[CEDSTMAX];

        }TEIFREC;

typedef TEIFREC far * TEIFRPTR;
#endif

/****************************************************************************/
/* Structure for the set link characteristics parameter block.              */
/****************************************************************************/

#ifdef WIN32
typedef struct  _SLPARMS
{
        int     SLFrameSize;            /* max frame size on link - must be  */
                                        /* in range 270 to ?2K-ish           */
        LONG    SLDataRate;             /* not used by us - external clocks  */
        UCHAR   SLOurAddress1;          /* ) e.g C1/FF or 00/00 or 01/03     */
        UCHAR   SLOurAddress2;          /* )                                 */
        UCHAR   SLLinkOptionsByte;      /* see documentation & LinkOption_*  */
        UCHAR   SLSpare1;
}
                SLPARMS;
#else

typedef struct teslcrec {

        USHORT  SLFrameSize;
        ULONG   SLDataRate;
        UCHAR   SLOurAddress1;
        UCHAR   SLOurAddress2;
        UCHAR   SLLinkOptionsByte;
        UCHAR   SLSpare1;

        }TESLCREC;

#endif

/****************************************************************************/
/* DEVICEIOCTL macros                                                       */
/****************************************************************************/
#ifdef WIN32
/* NT_SUCCESS ripped of from DDK's ntdef.h, which we do not want to include  */
/* for now temporarily (12/5/92)                                            */
#define NT_SUCCESS(Status) ((NTSTATUS)(Status) >= 0)

#define SETEVENTHANDLE(H) NtDeviceIoControlFile(                    \
                seldrvrh,                   \
                H,                          \
                ( PVOID ) NULL,             \
                ( PVOID ) NULL,             \
                &IoStatus,                  \
                IoctlCodeSetEvent,          \
                ( PVOID ) NULL,             \
                0L,                         \
                ( PVOID ) NULL,             \
                0L                          \
               )

#define SETINTERFACERECORD(R) NtDeviceIoControlFile(   \
                seldrvrh,                   \
                ( PVOID ) NULL,             \
                ( PVOID ) NULL,             \
                ( PVOID ) NULL,             \
                &IoStatus,                  \
                IoctlCodeSetInterfaceRecord,           \
                                            \
                &R,                         \
                sizeof(R),                  \
                ( PVOID ) NULL,             \
                0L                          \
               )

#define SETV24STATUS NtDeviceIoControlFile(            \
                seldrvrh,                   \
                ( PVOID ) NULL,             \
                ( PVOID ) NULL,             \
                ( PVOID ) NULL,             \
                &IoStatus,                  \
                IoctlCodeSetV24,            \
                NULL,             \
                0L,                         \
                &pInterfaceRecord->V24Out,  \
                1L                          \
               )


/***********************************************************************/
/* The above change is temporary!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!*/
/***********************************************************************/

#define GETV24STATUS NtDeviceIoControlFile(   \
                  seldrvrh,                   \
                  ( PVOID ) NULL,             \
                  ( PVOID ) NULL,             \
                  ( PVOID ) NULL,             \
                  &IoStatus,                  \
                  IoctlCodeGetV24,            \
                  ( PVOID ) NULL,             \
                  0L,                         \
                  ( PVOID ) NULL,             \
                  0L                          \
                 )

#define SETLINKCHARACTERISTICS(A) NtDeviceIoControlFile(      \
                seldrvrh,                   \
                NULL,                       \
                ( PVOID ) NULL,             \
                ( PVOID ) NULL,             \
                &IoStatus,                  \
                IoctlCodeSetLinkChar,       \
                &A,                         \
                sizeof(A),                  \
                ( PVOID ) NULL,             \
                0L                          \
               )
```

```
#define TRANSMITFRAME(A,B) NtDeviceIoControlFile(             \
                 seldrvrh,                 \
                 NULL,                     \
                 ( PVOID ) NULL,           \
                 ( PVOID ) NULL,           \
                 &IoStatus,                \
                 IoctlCodeTxFrame,         \
                 ( PVOID ) NULL,           \
                 0L,                       \
                 A,                        \
                 B                         \
                )

#define RECEIVEFRAME(A,B) NtDeviceIoControlFile(              \
                 seldrvrh,             \
                 NULL,                 \
                 ( PVOID ) NULL,       \
                 ( PVOID ) NULL,       \
                 &IoStatus,            \
                 IoctlCodeRxFrame,     \
                 ( PVOID ) NULL,       \
                 0L,                   \
                 A,                    \
                 B                     \
                )

#define READINTERFACERECORD NtDeviceIoControlFile( \
                 seldrvrh,             \
                 NULL,                 \
                 ( PVOID ) NULL,       \
                 ( PVOID ) NULL,       \
                 &IoStatus,            \
                 IoctlCodeReadInterfaceRecord, \
                 ( PVOID ) NULL,       \
                 0L,                   \
                 &InterfaceRecord,     \
                 sizeof(InterfaceRecord) \
                )

#else
#define NT_SUCCESS(R) ((R) == 0)

#define SETEVENTHANDLE(H)  DosDevIOCtl(NULL,           \
                   &H,                                 \
                   IoctlCodeSetEvent,                  \
                   CELDDCAT,                           \
                   seldrvrh)

#define GETINTERFACERECORD(P) DosDevIOCtl(NULL,        \
                   &P,                                 \
                   IoctlCodeGetInterfaceRecord,        \
                   CELDDCAT,                           \
                   seldrvrh)

#define SETV24STATUS DosDevIOCtl(NULL,                 \
                   NULL,                               \
                   IoctlCodeSetV24,                    \
                   CELDDCAT,                           \
                   seldrvrh)

#define GETV24STATUS DosDevIOCtl(NULL,                 \
                     NULL,                             \
                     IoctlCodeGetV24,                  \
                     CELDDCAT,                         \
                     seldrvrh)

#define SETLINKCHARACTERISTICS(A) DosDevIOCtl((long) NULL,  \
                   (char far *) &A,                          \
                   IoctlCodeSetLinkChar,                     \
                   CELDDCAT,                                 \
                   seldrvrh)

#define TRANSMITFRAME(F,L) DosDevIOCtl(F,               \
                   &L,                                  \
                   IoctlCodeTxFrame,                    \
                   CELDDCAT,                            \
                   seldrvrh)

#define RECEIVEFRAME(F,L)  DosDevIOCtl(F,               \
                           &L,                          \
                           IoctlCodeRxFrame,            \
                           CELDDCAT,                    \
                           seldrvrh)
#endif

//##############################################################################

/******************************************************************************/
/* INFO_ : additional information error codes put in IoStatus.Information    */
/******************************************************************************/

#define INFO_CANT_ALLOCATE_SPINLOCK      1
#define INFO_CANT_CONNECT_INTERRUPT      2
#define INFO_HARDWARE_INIT_FAILURE       3
#define INFO_SET_EVENT_NO_EVENT          4
#define INFO_HARDWARE_CMD_TIMEOUT        5
#define INFO_LINKCHAR_BUF_WRONG_SIZE     6
#define INFO_FRAME_BUF_TOO_BIG           7
#define INFO_FRAME_BUF_TOO_SMALL         8
#define INFO_NO_CLOCKS                   9
#define INFO_NO_DMA_FDX                 10
#define INFO_CANT_ALLOCATE_MDL          11
#define INFO_CANT_ALLOCATE_MEMORY       12
#define INFO_DMA_BUFFER_UNUSABLE        14
#define INFO_TX_BUFFER_FULL             15
#define INFO_TX_FRAME_TOO_BIG           16
#define INFO_TX_FRAME_TOO_SMALL         17
#define INFO_READ_IR_BUFFER_WRONG_SIZE  18
#define INFO_NEEDS_MCA_BUS              19
#define INFO_NEEDS_ISA_BUS              20
```

SNA Modem Status Interface

This section describes the interface to the modem status used by Synchronous Data Link Control (SDLC) and X.25 SNALinks that Microsoft® Host Integration Server 2004 supplies. This interface provides a set of simulated modem lights to show modem status. The modem status interface is intended primarily for the Microgate cards with internal modems, but can be used with any SDLC or X.25 link service to show the modem status.

This interface is intended primarily for independent hardware vendors (IHVs) who wish to provide drivers for their own dumb cards that are directly compatible with SDLC and X.25 SNALinks that Host Integration Server 2004 provides. It can also be used by IHVs who intend to write their own SNALinks but who wish to ensure that their drivers conform to the standard Host Integration Server 2004 model.

This section includes the following topics:

SNA Device Driver Interface to Modem Status

Supporting Modem Status in an SNA Link Service

Modem API Summary

DevIoctl Definitions to Support SNA Modem Status

SNA Device Driver Interface to Modem Status

There are three interfaces from which modem status can be gathered:

- The SNADIS Dumb Card Interface **GetV24Status** IOCTL call that reports the status of the Ring Indicator (DRI), Carrier Detect (DCD), Clear To Send (CTS), and Data Set Ready (DSR) signal lines.
- The SNADIS Dumb Card Interface **SetV24Status** IOCTL call that sets the status of the Data Terminal Ready (DTR) and Request To Send (RTS) signal lines.
- The SNADIS Dumb Card Interface receive and transmit IOCTL calls, used to set the operating mode of the device driver.

Whenever one of the first two interfaces indicates a modem line is high, the corresponding light in the display is lit. However, the transmit and receive IOCTL calls cannot provide a definitive statement as to whether the card is receiving data, only that it is ready to receive data. To work around this limitation and to have the modem lights give a reasonable indication of ordinary data throughput, the following mechanism is recommended:

Simulate the receive and transmit lights with counters and track the number of frames received and transmitted for each link service. The display application uses this information to control the flashing of the receive and transmit lights.

The other topics in this section describe the changes that must be made to the link service for supporting the modem status interface and the interface provided to the display application. Microsoft® Host Integration Server 2004 comes with an application that displays the modem status.

Supporting Modem Status in an SNA Link Service

The implementation of a link service that supports the modem status requires the following:

- A call to the SNA Modem interface to initialize the SNA Modem data structures.
- Modification of the SNA Modem structures as the status changes, as reported by the **DevIoctl** calls.

Independent hardware vendors (IHVs) who use the Microsoft® Host Integration Server 2004 SDLC link service and who fully implement the SNADIS interface do not need to make any changes to use the modem status feature. However, IHVs should check that the status returned by **DevIoctl** calls from their device driver conforms to the requirements described later.

IHVs who provide both the device driver and link service need to implement the code in their link service that initializes the SNA Modem API and updates the modem status information.

Modem API Summary

To simplify the task for independent hardware vendors (IHVs) who want to use this feature, four new entry points have been added to SNALINK.DLL. An IHV who uses these must be linking with IHVLINK.LIB, a stub library that contains the exports library for SNALINK.DLL. This API enables the IHV to simply maintain the contents of a MODEM_STATUS structure. The underlying SNALINK library code handles the communication of this information to the modem lights application.

The modem status functions are as follows.

Function	Description
SNAModemInitialize	Initializes the communication path to the SNA Modem application.
SNAModemAddLink	Adds an SNA link.
SNAModemDeleteLink	Deletes the resources associated with a link.
SNAModemTerminate	Terminates an SNA link.

DevIoctl Definitions to Support SNA Modem Status

The **SNA DevIoctl** interface is modified to update the MODEM_STATUS structure for a link each time a modem status change is detected or caused by a **GetV24** or **SetV24** IOCTL call. Code is manually added to the link service to track the number of frames received and transmitted.

The **DevIoctl** changes are highlighted as follows.

```
#define SETV24STATUS                                              \
         NtDeviceIoControlFile(seldrvrh,NULL,NULL,NULL,&IoStatus, \
                               IoctlCodeSetV24,NULL,0L,           \
                               &pInterfaceRecord->V24Out,1L);     \
         if (SavedIROut != (InterfaceRecord.V24Out &              \
                            (MASK_DTR | MASK_RTS)    ))           \
         {                                                        \
           SavedIROut = (pInterfaceRecord->V24Out &               \
                         (MASK_DTR | MASK_RTS)    );              \
           pSharedMem->V24Out = pInterfaceRecord->V24Out;         \
         }


#define GETV24STATUS(rc)                                          \
         rc |= NtDeviceIoControlFile(seldrvrh,NULL,NULL,NULL,     \
               &IoStatus,IoctlCodeGetV24,NULL,0L,NULL,0L);        \
         rc |= READINTERFACERECORD;                               \
         if (SavedIRIn != (InterfaceRecord.V24In &                \
                     (MASK_CTS | MASK_DSR | MASK_DCD| MASK_DRI))) \
         {                                                        \
             SavedIRIn = (InterfaceRecord.V24In &                 \
                     (MASK_CTS | MASK_DSR | MASK_DCD| MASK_DRI)); \
             pSharedMem->V24In = InterfaceRecord.V24In;           \
         }
```

pSharedMem is a pointer to the MODEM_STATUS structure for this link service.

V24In and *V24Out* are of type char and are used to notify the display application when status changes, not each time it is read or set.

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SNA Performance Monitor Interface

This section describes the interface for performance monitoring (Perfmon) used by SNADIS links that Microsoft® Host Integration Server 2004 supplies. This interface is provided to simplify the integration of SNADIS-compliant link services with the Microsoft Windows® 2000 System Monitor applications. It provides a common look-and-feel to all link service performance counters exported by SNADIS links, independent of the vendor and link transport (channel, Twinax, SDLC, X.25, TR, E/Net, and so on).

The performance monitoring statistics maintained for an SNA link service are stored in a series of ADAPTERCOUNTER structures that are members of an ADAPTERPERFDATA structure. These structures are defined in the SEMFPERF.H header file.

Three API entry points are exported from IHVLINK.DLL (and the IHVLINK.LIB import library) that are used by the Perfmon API. These functions should be called in the order noted below at link service initialization time.

To support performance monitoring, an SNA Link driver first calls SNAInitLinkPerfmon to initialize data structures used by the Perfmon application. This call should be followed with a call to the function SNAGetLinkPerfArea, which returns a shared mutex handle and a pointer to the shared data area for the **ADAPTERPERFDATA** structure used by the Perfmon application to store the link statistics. This handle and shared memory data area parameter are the returned values from **SNAInitLinkPerfmon**. Finally, the SNAGetPerfValues function is called to fill in the *ServiceNameIndex* and *FirstCounterIndex* fields so that the Perfmon application knows where to get the descriptions of the performance counters from the registry.

After these three calls have been made, the SNA link driver simply maintains the count members in the **ADAPTERCOUNTER** structures that make up the **ADAPTERPERFDATA** structure, incrementing the count member whenever data is received, connections fail, and other events occur. The Perfmon application accesses these counters to display Host Integration Server 2004 performance monitoring data statistics.

Network Integration Security Guides

The network integration features of Microsoft® Host Integration Server 2004 fall into several areas. Each area has a Security guide.

This section contains:

- APPC Programmer's Security Guide
- CPI-C Programmer's Security Guide
- LUA Programmer's Security Guide
- SNA Print Server Data Filter Programmer's Security Guide

APPC Programmer's Security Guide

The following topics discuss security as it applies to the APPC section of the Microsoft® Host Integration Server 2004 SDK.

About APPC security for developers

This section discusses security practices and issues that apply to C-language applications that you write to use Advanced Program-to-Program Communications (APPC) to exchange data in a Systems Network Architecture (SNA) environment.

Conversation Security

- Owners of APPC transaction programs may want to allow only a limited set of users to start the program. APPC provides a mechanism, called APPC conversation security, where the client transaction program supplies credentials to the server to gain access to the program. You can find more information on conversation security in the section: APPC Security.

Several APPC verbs create a connection with a remote LU. When creating a connection with a remote LU, credentials may be required to establish access. The **security** parameter controls conversation security, and the **pwd** and **user_id** parameters specify the information used to validate the user on the host.

Conversational security is documented in the topic Conversation Security, and in the reference pages for the following APPC verbs:

- ALLOCATE
- MC_ALLOCATE
- SEND_CONVERSATION
- MC_SEND_CONVERSATION

Session Security configuration using SNACFG

You can use the utility SNACFG to set session security for a remote LU. Possible values are none, use a plaintext key, and use a scrambled key.

Automatic Login

The configuration of Host Integration Server 2004 to support automatic login is discussed in the topic Support for CPI-C Automatic Logon.

Setting the service key with CNOS

You can specify a master or service key using the **key** parameter when changing the number of sessions with the CNOS verb. This is a plaintext parameter, and is valid if the keylock feature has been secured.

CPI-C Programmer's Security Guide

The following topics discuss security as it applies to the CPI-C section of the Microsoft® Host Integration Server 2004 SDK.

About CPI-C security for developers

The Common Programming Interface for Communications (CPI-C) is a platform-independent API designed to simplify the use APPC verbs, and has many of the same issues and features as APPC.

This section discusses security practices and issues that apply to C-language applications that you write to use CPI-C to exchange data between a Host Integration Server system and a computer or computers in a Systems Network Architecture (SNA) environment.

Session Security configuration using SNACFG

You can use the utility SNACFG to set session security for a remote LU. Possible values are none, use a plaintext key, and use a scrambled key.

Conversation Security in CPI-C

Conversation security in CPI-C controls who can connect to a remote LU. You can find more information in the topic Conversation Security.

A programmer controls conversation security using the Set_Conversation_Security_Type call and sets user credentials using the Set_Conversation_Security_User_ID and Set_Conversation_Security_Password call from the CPI-C SDK.

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LUA Programmer's Security Guide

The following topics discuss security as it applies to the LUA section of the Microsoft® Host Integration Server 2004 SDK.

About LUA security for developers

LUA presents a simple API that enables programmatic control over the SNA messages. LUA has a simple structure, but exposes a complex data stream, that associated with SNA messages.

Since LUA is a low-level interface, the programmer must be especially vigilant on security issues.

Threats and mitigations for LUA

Programmers who use this feature should be aware of the following security practices and issues.

The data stream between Host Integration Server and the Mainframe is not encrypted.

LUA provides no encryption for the data stream between Host Integration Server and the Mainframe.

SNA Print Server Data Filter Programmer's Security Guide

The following topics discuss security as it applies to the APPC section of the Microsoft® Host Integration Server 2004 SDK.

Threats and mitigations for SNA Print Server Data Filter

Programmers who use the SNA Print Server Data Filter should be aware of the following security issue.

Store DLLs in a secure location

The DLLs which support the SNA Print Server Data Filter API can be configured by an administrator or developer. Because of this, the DLLs should be stored in a secure location. The default installation directory is secure. If this location is customized, by an administrator or developer, the new location should also be secured.

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Administration and Management Programmer's Guide

The following section describes how to use Windows® Management Instrumentation (WMI) to programmatically manage different tasks for Microsoft® Host Integration Server.

This section contains:

- About WMI and HIS
- Using WMI with HIS

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About WMI and HIS

Windows® Management Instrumentation (WMI) is a component of the Microsoft® Windows operating system that provides management information and control in an enterprise environment. In the context of Microsoft Host Integration Server, WMI provides a programming and scripting interface for four major administrative tasks: configuration, run-time control, health monitoring, and trace capturing.

This section contains:

- About WMI and the Host Integration Server Architecture
- What You Can Do to Administer HIS with WMI
- What You Need to Know Before Programming for WMI and HIS
- Supported Platforms for Administering with WMI

About WMI and the Host Integration Server Architecture

The architecture of the Windows® Management Instrumentation (WMI) technology includes management applications, managed objects, providers, and the management infrastructure.

Management Applications

A management application is a Microsoft® Windows-based application or service that processes or displays data from a managed object. A management application can perform a variety of tasks in a Host Integration Server (HIS) environment, such as configuring servers running HIS, measuring performance, reporting outages, and correlating data. The management application is what you will probably be creating using this Programmer's Guide.

Managed Objects

A managed object represents a logical or physical enterprise component. A managed object is modeled in WMI using the Common Information Model (CIM), and is accessed by a management application through the WMI programming interface. A managed object in the HIS 2004 environment can be any component of the system, from a link service device driver communicating with hardware to software configuration information about users and connected logical units (LUs).

WMI Providers

A WMI provider is a COM object that exposes an interface to a managed object. The WMI providers supplied with HIS 2004 use the WMI COM API to supply the WMI repository with data from HIS managed objects, to handle requests on behalf of HIS management applications, and to generate notifications of events.

Management Infrastructure

The management infrastructure is made up of WMI and the CIM repository. WMI lets users handle communications between management applications and providers. Users store their static data in the CIM repository. Applications and providers communicate through WMI using a common application programming interface (COM API). The COM API, which supplies event notification and query processing services, is available in the C and C++ programming languages.

The CIM repository holds static management data. Static data is data that does not regularly change. WMI also supports dynamic data, which is data that must be generated on demand because it changes frequently. Data can be placed in the CIM repository by WMI or network administrators. Information can be placed in the CIM repository using either the managed object format (MOF) language and the MOF Compiler or the WMI COM APIs. The WMI providers supplied with HIS 2004 use both mechanisms.

Management applications can access the COM API directly to interact with WMI and the CIM repository to make management requests of HIS 2004. Applications can also use other access methods such as Open Database Connectivity (ODBC) and HTML to make these requests. An ODBC driver for WMI is included with Windows 2000. The protocol used for communication between local and remote components is Distributed Component Object Model (DCOM).

What You Can Do to Administer HIS with WMI

The Windows® Management Instrumentation (WMI) providers for Host Integration Server (HIS) are designed as programming and scripting administration interfaces. As such, these providers are optimized to perform get and set information, and to start and stop services. The following section describes what components of HIS you can administer with WMI, and what tasks you can perform on those components.

This section contains:

- What Administrative Tasks You Can Perform on HIS with WMI
- What Sections of HIS You Can Administer with WMI

What Administrative Tasks You Can Perform on HIS with WMI

With the Windows Management Instrumentation (WMI) providers for Host Integration Server (HIS) you can administer a variety of components on HIS. However, any administration you perform on HIS through WMI is performed through the following tasks:

- Logging on to WMI

  Like most providers, you must first log on to the WMI provider to use it. Therefore, the WMI providers expose the logon and security interfaces. For more information, see Logging On to HIS through a WMI Provider.

- Getting and setting information

  Most of the tasks you will do through WMI will be checking information about different HIS services. You can also set information. For more information, see Accessing an HIS Property through WMI.

- Calling methods

  The methods exposed on the WMI providers for HIS are designed mainly to administer various HIS services. You can administer these HIS services by calling the relevant **Start**, **Stop**, **Pause**, or **Cancel** method through the relevant provider. For more information, see Calling an HIS Method through WMI.

What Sections of HIS You Can Administer with WMI

Host Integration Server (HIS) 2004 is included with Windows Management Instrumentation (WMI) providers that grant administrative access to the following areas:

- Rolling out, configuring, and restoring services

  The SNA Provider WMI Programmer's Reference and SNA Trace Provider WMI Programmer's Reference providers expose information regarding the Setup and rollout procedures for HIS. You can use instances of classes such as **MsSna_LinkService** to set up and administer link services, and the classes derived from **MsSna_Config** to configure your system. For more information, see Configuring HIS with WMI.

- Starting and stopping services and connections

  The **WmiSna** provider exposes the **MsSna_Server**, **MsSna_Service**, and **MsSna_Connection** classes. These classes and their derived classes let you add an SNA service, start and stop services, pause services, and start and stop connections. For more information, see Controlling Services and Connections with WMI.

- Health monitoring

  The **WmiSnaStatus** provider exposes information regarding the SNA service status. **WmiSnaStatus** uses a variety of classes derived from **MsSnaStatus_Event** to describe changes in different parts of your system. For more information, see Health Monitoring for HIS with WMI.

- Trace capturing

  The **WmiSnaTrace** provider supports classes and instances derived from the **MsHisTrace_Config** class, which displays information regarding different configuration files. **WmiSnaTrace** also supports the **MsHisTrace_Event**, which describes an event that occurs whenever a trace is triggered. For more information, see HIS Trace Capturing with WMI.

Additionally, Microsoft Windows 2000 includes several standard WMI providers, such as a registry provider, for accessing information from the system registry. Windows 2000 also supplies a Windows 2000 Event Log provider that enables applications to receive notifications of Windows 2000 and HIS 2004 events and to access the information stored in the Windows 2000 event log. Third-party vendors can create custom providers to interact with managed objects specific to their environment.

What You Need to Know Before Programming for WMI and HIS

To use this guide effectively, you should be familiar with the following:

- Microsoft® Host Integration Server 2004
- SNA concepts
- Windows Management Instrumentation (WMI)
- Microsoft Windows Server™ 2003 operating systems, Windows® XP Professional, Windows 2000 Server

Depending on the API and development tools used, you should also be familiar with the following languages:

- WMI COM/DCOM APIs
- WMI Query Language
- WMI schema and MOF file syntax
- Windows Script Host
- Microsoft Visual Basic® .NET
- Visual Basic for Applications
- Visual Basic Scripting Edition
- JScript®
- Microsoft ODBC
- Microsoft ADO
- Active Server Pages

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Supported Platforms for Administering with WMI

Microsoft Windows Management Instrumentation (WMI) is included as part of Microsoft® Windows Server® 2003, Windows® XP, and Windows 2000. For use with Host Integration Server (HIS), the WMI Software Development Kit version 1.1 or later can be installed on one of the following operating systems:

- Microsoft Windows Server 2003
- Microsoft Windows XP Professional
- Microsoft Windows 2000 Server
- Microsoft Windows 2000 Advanced Server
- Microsoft Windows 2000 Datacenter Server

Windows Script Host (WSH) is installed by default with Windows 2000.

Complete information about WSH is available as part of the Windows 2000 MSDN® Platform SDK.

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Using WMI with HIS

There are two main types of programming tasks described in this section: basic tasks and advanced tasks. A basic task is one of the tasks common to most every Windows® Management Instrumentation (WMI) application: logging on to WMI, getting and setting properties, and calling methods. The advanced tasks are those built on the basic tasks, and describe the tasks for which the developers incorporated WMI into Microsoft® Host Integration Server (HIS). Additionally, this section discusses common problems that you may experience when installing and programming WMI for HIS, and solutions to those problems.

This section contains:

- Installing WMI on HIS
- Basic WMI Tasks for HIS
- Advanced WMI Tasks for HIS
- Programming Considerations for Using WMI with HIS

Installing WMI on HIS

Host Integration Server (HIS) 2004 should automatically install the relevant files for you to use the relevant Windows Management Instrumentation (WMI) interfaces. However, you may have to modify the location of certain managed object format (MOF) files if you want to use WMI on remote servers, and you may have to modify certain security settings if you want to have WMI work correctly as well.

This section contains:

- Installing WMI Providers on an HIS Server
- Upgrading to Windows Server 2003 with HIS and WMI
- Setting ASP Security for HIS and WMI

Installing WMI Providers on an HIS Server

Microsoft Host Integration Server (HIS) 2004 provides several Windows Management Instrumentation (WMI) providers. The managed object format (MOF) files used by HIS are installed in the System directory below where HIS is installed. The default location for these files is in the following subdirectory:

> C:\Program Files\Microsoft Host Integration Server\System

To use or view these MOF files on other computers (a computer with the Administration client or end-user client, for example) to develop applications, these MOF files must be copied from the HIS computer. These MOF files document the WMI providers supplied with HIS and the class identifiers (CLSIDs), classes, properties, and methods supported by these providers.

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Upgrading to Windows Server 2003 with HIS and WMI

Windows Server 2003 interacts with WMI providers differently than previous editions of the operating system. One change is how the operating system handles the credentials under which the provider is hosted. If you upgraded your HIS computer to Windows Server 2003, you may have to recompile the HIS WMI namespace using updated Windows Server 2003 MOF files. Recompiling with the new MOF files should let you use WMI on Windows Server 2003.

To recompile the HIS WMI namespace for Windows Server 2003

- Use the following syntax on the command prompt:

  Mofcomp -class:forceupdate mof filename

  The following examples show how to recompile each MOF file:

  ```
  Mofcomp -class:forceupdate  wmiHIS_xp.mof
  Mofcomp -class:forceupdate wmiHIS_xp.mof
  Mofcomp -class:forceupdate wmisnastatus_xp.MOF
  Mofcomp -class:forceupdate wmisnatrace_xp.mof
  Mofcomp -class:forceupdate wmisna_xp.mof
  ```

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Setting ASP Security for HIS and WMI

WMI scripting using Active Server Pages (ASP) is enabled automatically on Microsoft® Windows® 2000. For the correct security setting for ASP on Windows 2000, it is recommended that you set **Anonymous Authentication** to **Off** and enable **Integrated Windows Authentication** in the Internet Information Services (IIS) configuration for directories with ASP files used with Host Integration Server (HIS). To access HIS configuration and status information, an application or user must have the appropriate administrative rights, which are not available with anonymous authentication. Use the following procedure on Windows 2000 to correctly configure security using ASP.

To configure security using ASP

1. Open the IIS (point to **Start**, **Administrative Tools**, **Services**, and then click **IIS Admin Service** or point to **Start**, **Settings**, **Control Panel**, **Administrative Tools**, **Services**, and then click **IIS Admin Service**).
2. Move to the directory where the ASP files reside.
3. Right-click the directory, and then click **Properties**.
4. When the next dialog box appears, on the **Directory Security** tab, in the **Anonymous Authentication** section, click **Edit**.
5. When the next dialog box appears, clear the **Anonymous Authentication** check box, select **Integrated Windows Authentication**, and then click **OK** to save these settings.

This sets that particular directory to use **Integrated Windows Authentication** instead of **Anonymous Authentication** without affecting any of your other directories. If there are other ASP files that require or allow **Anonymous Authentication** you may want to create a new directory in which you can turn off **Anonymous Authentication** and store the WMI ASPs there. Any script that calls **ExecMethod** from an ASP page should be set up to use **Integrated Windows Authentication** to verify the user trying to run the script.

Additionally, when using a "REFRESH" variable on a Web page and the page is being used to start and stop SNA service through ASP scripting, the Web browser client (Internet Explorer, for example) should set the **Every visit to the page** option, as shown in the following procedure.

To use a Web browser client to start and stop SNA services through ASP scripting

1. Click **Start**, point to **Programs**, and then click **Internet Explorer**.
2. In Internet Explorer, on the **Tools** menu, click **Internet Options**.
3. In the **Internet Options** dialog box, on the **General** tab, in the **Temporary Internet file** section, click **Settings**.
4. In the **Settings** dialog box, in the **Check for newer versions of stored pages** section, make sure that the option **Every visit to the page** is selected.
5. Click **OK**.

If this change is not made on the Web browser client, some ASP scripts do not run correctly because Internet Explorer is caching older results.

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Basic WMI Tasks for HIS

Regardless of what you may want to do with WMI, most actions you will perform with WMI are one of the following: logging on to WMI, getting or setting WMI properties, or calling WMI methods.

This section contains:

- Logging On to HIS through a WMI Provider
- Accessing an HIS Property through WMI
- Calling an HIS Method through WMI

Logging On to HIS through a WMI Provider

The first step that you must perform when you create a WMI application or script is to log on to WMI and set the security for your application. You can perform this action either by using the **SWbemLocator** locator object, or with a moniker.

To connect to WMI using SWbemLocator

1. Retrieve a locator object with a call to **CreateObject**.
2. Log on to the namespace with a call to **ConnectServer**.
3. Set the impersonation level with a call to **Security._ImpersonationLevel**.
4. Implement your task.

The following code sample shows how to connect to WMI using **SWbemLocator**:

```
    Set WmiLocator = CreateObject("WbemScripting.SWbemLocator")
    Set WmiNameSpace = WmiLocator.ConnectServer("","root\MicrosoftHIS","", "","", "",0,Nothin
g)

    if Err = 0 then
        'Retrieve the SNA_LU_Lua class
        Set ServerClass = WmiNamespace.Get("MsSNA_LuLua")
        Set Path = ServerClass.Path_
        ServerClass.Security_.impersonationLevel = 3
        Set LU3270 = ServerClass.Instances_
```

Another way you can connect to WMI is by using a moniker. A moniker is essentially a compact version of the above lines of code, and contains the WMI namespace and other connection information.

To connect to WMI using a moniker

1. Call **GetObject** with a moniker in the input parameter.
2. Implement your task.

The following example shows how to connect to WMI using a moniker:

```
    set objService = GetObject("winmgmts:root/microsofthis")
```

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Accessing an HIS Property through WMI

Getting and setting an instance is one of the most common retrieval procedures you are most likely to perform on Host Integration Server (HIS) using WMI. You can retrieve an instance using the **GetObject** method, and modify it using the various **Put_** methods.

This section contains:

- Retrieving an Instance
- Retrieving Multiple Instances
- Modifying or Updating an Instance

Retrieving an Instance

You can retrieve a local copy of the instance with a call to **GetObject** with the object path of the instance. The following example shows how to retrieve an IPDLC connection using WMI:

```
Set ObjClass = Namespace.Get("MsSna_ConnectionIpDlc")
```

Besides retrieving a single instance, you can also retrieve collections of WMI instances by querying the WMI database with a **SELECT** statement.

Retrieving Multiple Instances

You can retrieve a local copy of the collection with a call to **ExecQuery**. After you have retrieved an instance, you can modify and update the instance. The following example shows how to retrieve a collection:

```
Set colItems = objWMIService.ExecQuery("Select * from MSSnaStatus_Connection")
```

Modifying or Updating an Instance

After you have retrieved an instance, you can modify your local copy and update your changes to the server.

To modify or update an instance

1. Retrieve a local copy of the object with a call to **GetObject**.
2. If necessary, view the properties of the object with a call to the **Properties_** method.

   Although not required, you may want to know the value of the property before you change it.

3. Make any changes to the object properties with a call to the **SWbemProperty.Value** method.

   The **Value** method changes only the local copy. To save your changes to WMI, you must put the complete copy back in the WMI repository.

4. Put the object back in the WMI repository with a call to the **SWbemObject.Put_** or **SWbemObject.PutAsync_** methods.

   As the names imply, **Put_** updates synchronously while **PutAsync_** updates asynchronously. Either method copies over the original instance with your modified instance. However, to take advantage of asynchronous processing, you must create a **SWbemSink** object.

   The following example shows how to update an instance:

```
    Set ObjClass  = Namespace.Get("MsSna_LinkService_IpDlc")
' Create new link service instance
    Set NewInst   = ObjClass.SpawnInstance_
    ' Set instance properties
    NewInst.NetworkName = Left(strComputerName, 8)
    NewInst.CPName = "IPDLCLS"
    NewInst.NodeID = "05D.FFFFF"
    NewInst.AddressType = 2
    NewInst.LocalAddress = Trim(strLocalAddress)
    NewInst.LENNode = strLenNode
    NewInst.PrimaryNNS = strPrimaryNNS
    if (strBackupNNS <> Empty) then
        NewInst.BackupNNS = strBackupNNS
    end if
    ' Commit the instance
    NewInst.Put_
```

Calling an HIS Method through WMI

You have two options when calling methods through WMI: you may call a WMI method, or a provider method. A WMI method is supported by the WMI infrastructure, and provides general services such as query support or log on access. For example, Logging On to HIS through a WMI Provider and Accessing an HIS Property through WMI describe calling the **GetObject** and **ExecQuery** WMI methods. In contrast, a provider method is supported by the provider, and is unique to each service. Most HIS provider methods deal with controlling services. For example, the **WmiSna** provider supports the **MsSna_ServiceSNA** class, which in turn supports the **Start**, **Stop**, **Pause**, and **Resume** methods. The actual process of calling a WMI method or a provider method is the same as calling any other COM or scripting interface.

Advanced WMI Tasks for HIS

An advanced Windows Management Instrumentation (WMI) task is a task that uses the basic WMI programming tasks to perform an activity specific to Host Integration Server (HIS). Generally, an advanced task deals with setting up HIS on a server, controlling a service or connection, or monitoring an aspect of your enterprise.

This section contains:

- Configuring HIS with WMI
- Controlling Services and Connections with WMI
- Health Monitoring for HIS with WMI
- HIS Trace Capturing with WMI

Configuring HIS with WMI

One of the reasons WMI is implemented in HIS is to help in configuring and updating different technologies in your enterprise. As an extended sample, this section describes how to configure an IP-DLC link service. This sample is a command prompt script that takes as input the host you want to go against and configures an IP--DLC link service and independent session connection to the host.

To configure an IP-DLC link service

1. Retrieve the command prompt instructions.
2. If necessary, retrieve the adapter name.
3. Create the link service.
4. Create the independent session.

The following code sample describes how to configure an IP-DLC link service. The following table describes the relevant command prompt switches:

Command line switch	Description
-p	PrimaryNNS: the Primary Network Node Server
-b	(Optional) BackupNNS: Backup Network Node Server
-d	(Optional) device: Overrides the adapter name discovered
-l	(Optional) LenNode: Used to configure the LEN node (default is 1st)

```
       On Error Resume   Next
   'Declarations and Constants
       Dim strPrimaryNNS
       Dim strBackupNNS
       Dim strLocalAddress
       Dim strLenNode
       Dim strComputerName
       Dim wshEnvProc
   'Defaults
       strPrimaryNNS = ""
       strBackupNNS = ""
       strLocalAddress = ""
       strLenNode = "SNA Service"
   'Get the command line
       Set objArgs = WScript.Arguments
       For I = 0 to objArgs.Count - 1
          select case objArgs(I)
           Case "-p"
               I = I + 1
               strPrimaryNNS = objArgs(I)
           case "-b"
               I = I + 1
               strBackupNNS = objArgs(I)
           case "-d"
               I = I + 1
               strLocalAddress = objArgs(I)
           case "-l"
               I = I + 1
               strLenNode = objArgs(I)
           case else
               Wscript.Echo "Script Usage: "
               Wscript.Echo " -p Primary NNS (Required)"
               Wscript.Echo " -b Backup NNS (Optional)"
               wscript.echo " -d Device Name (Optional)"
               wscript.echo " -l Len Node (Optional)"
               return
          end select
       Next
   'NNS parameter is required
       if strPrimaryNNS = "" then
          Wscript.Echo "Please supply the -p (PrimaryNNS) parameter"
          return
```

```
    end if
'See if we need to get a device
    if strLocalAddress = "" then
       GetAdapterName()
    end if
' Two methods for creating the link service and independent session connection
    CreateIPDLCLinkService
    CreateIndependentSession
```

This section contains:

- Retrieving an Adapter Name
- Creating a Link Service
- Creating an Independent Session
- Handling Errors While Creating a Link Service

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Retrieving an Adapter Name

One of the tasks you must perform when setting up an IPDLC connection is to retrieve the name of the adapter you are connecting with.

To retrieve an adapter name

1. Connect to the namespace on the local computer using **GetObject**.
2. Retrieve the name of the adapter using **ExecMethod** with **GetAllNetworkAdapters** as the method to execute.

The following example shows how to retrieve the name of the first adapter on a system:

```
Private Sub GetAdapterName()
   Dim objService, outParam, objSD, MyArray, nArray
   set objService = GetObject("winmgmts:root/microsofthis")
   set outParam = objService.Execmethod("MsSna_LinkService_IPDLC",
"GetAllNetworkAdapters")
   objSD = Join(outParam.Adapters, ",")
   MyArray = Split(objSD, ",")
   nArray = Ubound(MyArray)
   if nArray < 0 then
      strLocalAddress = ""
   else
      strLocalAddress = MyArray(0)  'default to first one
   end if
End Sub
```

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Creating a Link Service

Another task you may want to perform when setting up an IPDLC connection is to create the link service.

To create a link service

1. Connect to the namespace on the local computer using **GetObject**.
2. Create the new link service instance using **SpawnInstance**.
3. Set the properties of the new link service.
4. Commit the new instance to memory using the **Put_** method.

The following example shows how to create a new link service:

```
private Sub CreateIPDLCLinkService
    on error resume next
' Connect to the namepsace on the local machine
    Set Namespace = GetObject("Winmgmts:root\MicrosoftHIS")
    Set ObjClass  = Namespace.Get("MsSna_LinkService_IpDlc")
' Create new link service instance
    Set NewInst   = ObjClass.SpawnInstance_
    ' Set instance properties
    NewInst.NetworkName = Left(strComputerName, 8)
    NewInst.CPName = "IPDLCLS"
    NewInst.NodeID = "05D.FFFFF"
    NewInst.AddressType = 2
    NewInst.LocalAddress = Trim(strLocalAddress)
    NewInst.LENNode = strLenNode
    NewInst.PrimaryNNS = strPrimaryNNS
    if (strBackupNNS <> Empty) then
        NewInst.BackupNNS = strBackupNNS
    end if
    ' Commit the instance
    NewInst.Put_
    if Err.Number <> 0 then
        PrintWMIErrorThenExit Err.Description, Err.Number
        Wscript.Echo "Link Service Creation Failed " & Err.Description
    Else
        Wscript.Echo "Link Serice Created Successfully"
    end if
End Sub
```

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Creating an Independent Session

After you have created the link service, you need to create an independent session to use.

To create an independent session

1. Create the "Independent Sessions Connection" record.
2. Validate that the session was created.
3. Define the properties of the new connection.

The following code sample shows how to create an independent session:

```
Private Sub CreateIndependentSession
    On error resume next
'Create the Independent Sessions Connection record.
    Set Namespace = GetObject("Winmgmts:root\MicrosoftHIS")
'Validate that the instance was created
    strQuery = "select * from MsSna_LinkService_IpDlc"
    ' this is our instance
    Set instset = Namespace.ExecQuery(strQuery)
    if ( instset.Count<>1) Then
        wscript.echo "No instances found for the link service query " & strQuery
    End If
    For each inst_ in instSet
        Set Inst = inst_ ' This is our new instance
    Next ' end of query workaround
    ' define independent sessions connection
    Set ObjClass = Namespace.Get("MsSna_ConnectionIpDlc")
    Set IndepConn = ObjClass.SpawnInstance_
    IndepConn.Activation = 0
    IndepConn.Adapter = "SNAIP1"
    IndepConn.AllowIncoming = TRUE
    IndepConn.BackupDLUSCPName = ""
    IndepConn.BackupDLUSNetName = ""
    IndepConn.BlockId = "05D"
    IndepConn.Comment = ""
    IndepConn.CompressionLevel = 0
    IndepConn.DLURRetryDelay = 0
    IndepConn.DLURRetryLimit = 0
    IndepConn.DLURRetryType = 0
    IndepConn.DynamicLuDef = TRUE
    IndepConn.IndepSess = TRUE
    IndepConn.LocalControlPoint = ""
    IndepConn.LocalNetName = ""
    IndepConn.Name = Inst.Name
    IndepConn.NodeId = "FFFFF"
    IndepConn.PartnerConnectionName = ""
    IndepConn.PeerRole = 1
    IndepConn.PrimDLUSCPName = ""
    IndepConn.PrimDLUSNetName = ""
    IndepConn.RemoteAddress = ""
    IndepConn.RemoteBlockId = ""
    IndepConn.RemoteControlPoint = ""
    IndepConn.RemoteEnd = 1
    IndepConn.RemoteNetName = ""
    IndepConn.RemoteNodeId = ""
    IndepConn.RetryDelay = 0
    IndepConn.RetryLimit = 0
    IndepConn.Service = strComputerName
    IndepConn.XIDFormat = 1
    IndepConn.Put_
    if Err.Number <> 0 then
        PrintWMIErrorThenExit Err.Description, Err.Number
    End If
End Sub
```

See Also

Creating a Link Service

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Handling Errors While Creating a Link Service

As with most scripts, you need to write functions to handle any errors. This error handler scans the Windows Management Instrumentation (WMI) error queue for any relevant error information and posts and displays the error to the user.

The following sample shows how to handle errors while you are creating a link service:

```
Sub PrintWMIErrorThenExit(strErrDesc, ErrNum)
    On Error Resume Next
    Dim objWMIError : Set objWMIError =    CreateObject("WbemScripting.SwbemLastError")
    wscript.echo TypeName(objWMIError)

    If ( TypeName(objWMIError) = "Empty" ) Then
    wscript.echo strErrDesc & " (HRESULT: " & Hex(ErrNum) & ")."
    Else
    wscript.echo "Extended error information:"
    wscript.echo objWMIError.Description
    Set objWMIError = nothing
    End If
    Exit sub
End Sub
```

Controlling Services and Connections with WMI

Another task that Windows Management Instrumentation (WMI) can perform is accessing services and connections throughout Host Integration Server (HIS). Two common procedures in this realm are displaying the status of all current connections, and retrieving information about a specified connection.

This section contains:

- Displaying Connection Status
- Retrieving Connection Information

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Displaying Connection Status

Retrieving the status of a connection is a common task that you might want to perform with WMI.

To display the status of a connection

1. Connect to the namespace using **GetObject** with a moniker in the parameter.
2. Enumerate **MsSnaStatus_Connections** using **ExecQuery**.
3. Display error codes if necessary.

The following example shows how to display the status of all the connections defined in Host Integration Server (HIS):

```
Private Function DisplayConnectionStatus ()
'Variables
   Dim objWMIService, colItems, iCounter, objItem, _
       strReport
'Connect to the namespace
   Set objWMIService = GetObject("winmgmts:\\" & strComputer & "\root\microsofthis")
'Enumerate the Class
   Set colItems = objWMIService.ExecQuery("Select * from MSSnaStatus_Connection")
   iCounter = colItems.Count
   if Err.Number = 0 then
      For Each objItem in colItems
         strReport = "Connection " & objItem.Name & " status is " & objItem.StatusText
         Wscript.Echo strReport
         strReport = ""
      Next
   else
      Wscript.Echo "An error occurred enumerating instances for status " & Err.Number & " " &
Err.Description
   End If
   DisplayConnectionStatus = true
End Function
```

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Retrieving Connection Information

Another common task you may want to perform with Windows Management Instrumentation (WMI) for Host Integration Server (HIS) is retrieving information regarding a connection.

To retrieve connection information

1. Connect to the namespace using **GetObject** with a moniker in the parameter.
2. Retrieve all connection information objects using **ExecQuery**.
3. Display the information as appropriate.

The following code sample shows how to retrieve information about an SDLC connection:

```
On Error Resume Next
strComputer = "."
Set objWMIService = GetObject("winmgmts:\\" & strComputer & "\root\MicrosoftHIS")
Set colItems = objWMIService.ExecQuery("Select * from MsSna_ConnectionSdlc",,48)
For Each objItem in colItems
    Wscript.Echo "Activation: " & objItem.Activation
    Wscript.Echo "Adapter: " & objItem.Adapter
    Wscript.Echo "AllowIncoming: " & objItem.AllowIncoming
    Wscript.Echo "BlockId: " & objItem.BlockId
    Wscript.Echo "Comment: " & objItem.Comment
    Wscript.Echo "CompressionLevel: " & objItem.CompressionLevel
    Wscript.Echo "DialData: " & objItem.DialData
    Wscript.Echo "DynamicLuDef: " & objItem.DynamicLuDef
    Wscript.Echo "LocalControlPoint: " & objItem.LocalControlPoint
    Wscript.Echo "LocalNetName: " & objItem.LocalNetName
    Wscript.Echo "MaxBtu: " & objItem.MaxBtu
    Wscript.Echo "Name: " & objItem.Name
    Wscript.Echo "NodeId: " & objItem.NodeId
    Wscript.Echo "PartnerConnectionName: " & objItem.PartnerConnectionName
    Wscript.Echo "PeerRole: " & objItem.PeerRole
    Wscript.Echo "RemoteBlockId: " & objItem.RemoteBlockId
    Wscript.Echo "RemoteControlPoint: " & objItem.RemoteControlPoint
    Wscript.Echo "RemoteEnd: " & objItem.RemoteEnd
    Wscript.Echo "RemoteNetName: " & objItem.RemoteNetName
    Wscript.Echo "RemoteNodeId: " & objItem.RemoteNodeId
    Wscript.Echo "RetryDelay: " & objItem.RetryDelay
    Wscript.Echo "RetryLimit: " & objItem.RetryLimit
    Wscript.Echo "SdlcContactLimit: " & objItem.SdlcContactLimit
    Wscript.Echo "SdlcContactTO: " & objItem.SdlcContactTO
    Wscript.Echo "SdlcDataRate: " & objItem.SdlcDataRate
    Wscript.Echo "SdlcDuplex: " & objItem.SdlcDuplex
    Wscript.Echo "SdlcEncoding: " & objItem.SdlcEncoding
    Wscript.Echo "SdlcIdleLimit: " & objItem.SdlcIdleLimit
    Wscript.Echo "SdlcIdleTO: " & objItem.SdlcIdleTO
    Wscript.Echo "SdlcLeasedLine: " & objItem.SdlcLeasedLine
    Wscript.Echo "SdlcMultiPrimary: " & objItem.SdlcMultiPrimary
    Wscript.Echo "SdlcPollAddress: " & objItem.SdlcPollAddress
    Wscript.Echo "SdlcPollLimit: " & objItem.SdlcPollLimit
    Wscript.Echo "SdlcPollRate: " & objItem.SdlcPollRate
    Wscript.Echo "SdlcPollTO: " & objItem.SdlcPollTO
    Wscript.Echo "SdlcStandby: " & objItem.SdlcStandby
    Wscript.Echo "SdlcSwitchTO: " & objItem.SdlcSwitchTO
    Wscript.Echo "Service: " & objItem.Service
    Wscript.Echo "StatusText: " & objItem.StatusText
    Wscript.Echo "XIDFormat: " & objItem.XIDFormat
Next
```

Health Monitoring for HIS with WMI

Health monitoring refers to viewing the current status of different aspects of Host Integration Server (HIS) through the **WmiSnaStatus** provider. You can access **WmiSnaStatus** provider in the same manner as you would any other instance and method provider. You use **ExecQuery** to query for the relevant information, and then display the information to screen or write the information to a log file. Some **WmiSnaStatus** classes also have methods that let you start and stop related services.

To monitor the health of HIS with WMI

1. Connect to the namespace using **GetObject** with a moniker in the parameter.
2. Retrieve the object representing the SNA Status provider using **ExecQuery**.
3. Use the information gathered from the **ExecQuery** as appropriate.

You can see an example of health monitoring in the Displaying Connection Status code sample.

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HIS Trace Capturing with WMI

Trace capturing refers to the process of viewing trace logs. For Host Integration Server (HIS), this typically refers to collating data stored in trace log objects into a single file and saving it to a specified location. You can capture SNA trace information in the same manner as you would retrieve any other information from WMI. You use **ExecQuery** to make a call to the relevant object, and then write the information to the location you want.

To capture a trace

1. Connect to the namespace using **GetObject** with a moniker in the parameter.
2. Retrieve the objects representing the SNA Application using **ExecQuery**.

   The core functionality of capturing a trace can be described in the following code:

   ```
   Set colItems = objWMIService.ExecQuery("Select * from MsHisTrace_SNAApplication",,48)
   Set colItems = objWMIService.ExecQuery("Select * from MsHisTrace_SNABase",,48)
   ```

   Everything else in this sample is to support logging to a file.

The following code sample shows how to capture a trace:

```
On Error Resume Next
strComputer = "."
Dim iCounter
'Initialize
    CreateLogFile
    Set objWMIService = GetObject("winmgmts:\\" & strComputer & "\root\MicrosoftHIS")

'Validate TraceSnaApplication
    iCounter = 0
    Set colItems = objWMIService.ExecQuery("Select * from MsHisTrace_SNAApplication",,48)
For Each objItem in colItems
    Wscript.Echo "APPCTrace: " & objItem.APPCTrace
    Wscript.Echo "CPICTrace: " & objItem.CPICTrace
    Wscript.Echo "CSVTrace: " & objItem.CSVTrace
    Wscript.Echo "EnabledTraces: " & objItem.EnabledTraces
    Wscript.Echo "InternalMessageTrace: " & objItem.InternalMessageTrace
    Wscript.Echo "LU62Trace: " & objItem.LU62Trace
    Wscript.Echo "LUATrace: " & objItem.LUATrace
    Wscript.Echo "T3270Trace: " & objItem.T3270Trace
    iCounter = iCounter + 1
Next

if iCounter > 0 then
    Wscript.Echo "Number of Instances found " & iCounter
else
    Wscript.Echo "No Instances Found"
End If

    iCounter = 0
    Set colItems = objWMIService.ExecQuery("Select * from MsHisTrace_SNABase",,48)
For Each objItem in colItems
    Wscript.Echo "EnabledTraces: " & objItem.EnabledTraces
    Wscript.Echo "InternalMessageTrace: " & objItem.InternalMessageTrace
    Wscript.Echo "LU62Trace: " & objItem.LU62Trace
    Wscript.Echo "T3270Trace: " & objItem.T3270Trace
    iCounter = iCounter + 1
Next

if iCounter > 0 then
    Wscript.Echo "Number of Instances found " & iCounter
else
    Wscript.Echo "No Instances Found"
End If
```

Programming Considerations for Using WMI with HIS

The following section discusses various issues that you need to know about when programming Windows Management Instrumentation (WMI) with Host Integration Server (HIS).

This section contains:

- Using HIS and WMI on a Backup Server
- Using Duplicate LU Pools with HIS and WMI

Using HIS and WMI on a Backup Server

There are some restrictions on using Windows Management Instrumentation (WMI) and Host Integration Server (HIS) 2004 regarding connections to backup servers. The Snabase works to synchronize the information in the COM.CFG configuration file on the primary server across all backup servers. Each backup server has a local copy of the COM.CFG file from this synchronization process. WMI has a limitation that it will not attempt to read the local backup server's copy of COM.CFG if the primary server is alive. This request will always be forwarded to the primary server.

A client that connects to a WMI provider running on a backup server cannot retrieve any information or make configuration changes. This is a limitation of DCOM which does not permit impersonation outside the local computer. When a client on one computer connects to a WMISNA provider on another computer that is a backup server, the client is using DCOM to connect to the backup HIS computer. When the WMI provider on the backup server tries to access the COM.CFG file from the primary server, this is not allowed by DCOM because the application is trying to impersonate the user across the computer boundary.

You can work around this limitation on Windows 2000 using delegation.

The limitation against accessing a remote COM.CFG file does not apply when the primary server is down. In this case the server will fail-over to a backup and use replicated copies.

Using Duplicate LU Pools with HIS and WMI

A VBScript ImportExport sample program written in Microsoft Visual Basic® Scripting Edition (VBScript) is provided as part of the Host Integration Server (HIS) SDK. This tool enables configuration information from HIS to be exported and saved to a text file using Windows Management Instrumentation (WMI) in MOF format. This text file can also be changed and imported using this sample program to change configuration information.

A potential problem using WMI can occur with duplicate LU pools that can be illustrated using this sample program. Typically, exporting and re-importing the MOF file would not create duplicates. However, the HIS WMI provider allows pool-to-workstation association instances to be duplicated because, by design, duplicates of this type of object are allowed. You can associate the same pool to the same workstation or user multiple times. This is used by emulators to create more sessions for clients. Therefore, you cannot identify one such association from another. The WMISNA provider, WMISNA.DLL, always creates new associations of these types, even if an association with the same pair (Pool, Wks) already exists. This object type is allowed only in this specific case. However, this can create a problem for applications developed using WMI (the Import/Export sample, for example) if the application does not know not to create the duplicates.

The follow sequence illustrates this issue using the ImportExport sample:

1. Use SNA Manager to create a pool workstation association.
2. Export the SNA configuration to a MOF file using the ImportExport utility.
3. Import that same MOF file again using the ImportExport utility.
4. Duplicate pool-workstation associations are created.

The result is that if a client uses the import/export sample or a similar application developed using WMI on a HIS configuration that has pool-to-workstation associations, then the number of associations will effectively double after running the sample. The workaround using the ImportExport sample would be as follows:

1. Export the configuration to a MOF file.
2. Remove the pool to workstation associations from the MOF file that was just created.
3. Re-import the MOF file.

When importing the configuration from one domain to another using the ImportExport sample or a similar application developed using WMI, then step 2 should be ignored. Typically, WMI applications should copy an existing configuration to a blank configuration file so this condition does not occur.

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Messaging Programmer's Guide

This section of the Microsoft® Host Integration Server 2004 SDK describes the extensions and components that make up Microsoft MSMQ-MQSeries Bridge.

For general information about developing for MSMQ-MQSeries Bridge, see Messaging Programmer's Reference.

For sample programs illustratating MSMQ-MQSeries Bridge, see Messaging Samples.

This section contains:

- MSMQ-MQSeries Bridge Programmer's Guide

MSMQ-MQSeries Bridge Programmer's Guide

The MSMQ-MQSeries Bridge provides the ability to send and receive messages between Microsoft® Message Queuing (also known as MSMQ) and IBM MQSeries easily and efficiently. The MSMQ-MQSeries Bridge Extensions enable a programmer to develop and control how these message transfers will occur and how properties of a message are translated.

The main programming issues when using the MSMQ-MQSeries Bridge Extensions fall into three areas:

- Queue addressing
- Message conversion
- Limitations to specific API functions

Queue addressing deals with how to specify the name of an MQSeries destination queue in an MSMQ API call, or the name of an MSMQ destination queue in an MQSeries API call. Message conversion deals with how the MSMQ-MQSeries Bridge converts MSMQ message properties to MQSeries message data structures, and how the MSMQ-MQSeries Bridge converts MQSeries message data structures to MSMQ properties. These topics are covered in detail in separate sections below. Limitations to the MSMQ-MQSeries Bridge Extensions are discussed in detail in the section on programming considerations.

This section contains:

- Platforms Supported by MSMQ-MQSeries Bridge Extensions
- Queue Addressing Using MSMQ-MQSeries Bridge
- Converting Messages Using MSMQ-MQSeries Bridge
- MSMQ-MQSeries Bridge Extensions Mechanism
- Programming Considerations Using MSMQ-MQSeries Bridge Extensions
- Registry Settings Used By MSMQ-MQSeries Bridge Extensions

Platforms Supported by MSMQ-MQSeries Bridge Extensions

The MSMQ-MQSeries Bridge Extensions can access message queues on IBM MQSeries systems through SNA LU 6.2 or TCP/IP using Microsoft® Host Integration Server 2004 and MSMQ-MQSeries Bridge:

On Windows 2000, The MSMQ-MQSeries Bridge requires that Message Queuing (also known as MSMQ) be set up as a Message Queuing server, not a workgroup, with routing enabled. MSMQ-MQSeries Bridge Manager, which is used to configure and manage MSMQ-MQSeries Bridge, can be installed on any of the platforms supported by Host Integration Server 2004.

For more information on platforms supported by the MSMQ-MQSeries Bridge, see the Host Integration Server 2004 Installation Guide topic Hardware and Software Requirements.

Queue Addressing Using MSMQ-MQSeries Bridge

This section explains how to specify the name of an MQSeries destination queue in a Message Queuing (also known as MSMQ) call, or the name of a Message Queuing destination queue in an MQSeries call. This information is needed to specify the destination queue where you are sending a message.

This section contains:

- Addressing an MQSeries Queue in Message Queuing
- Sending a Message Queuing Message to an MQSeries Queue
- Addressing a Message Queuing Queue in MQSeries
- Sending a Message to a Message Queuing Queue in MQSeries

Addressing an MQSeries Queue in Message Queuing

In Message Queuing, address MQSeries queues as if they are on the Message Queuing network. For the Message Queuing computer name, specify the MQSeries Queue Manager name. For the Message Queuing queue name, specify the MQSeries queue name.

For example, if the MQSeries Queue Manager is MQS1, and the queue name is **MQS_QUEUE4**, the Message Queuing path name is **MQS1\MQS_QUEUE4**.

Sending a Message Queuing Message to an MQSeries Queue

To send a message to an MQSeries queue, you follow the normal Message Queuing (also known as MSMQ) procedure, which is to determine the Message Queuing format name corresponding to the path name. More precisely, you must determine the format name of the Message Queuing foreign queue representing the MQSeries queue. If the foreign queue does not already exist, you can create it and determine its format name by calling **MQCreateQueue**. If the foreign queue already exists, you can call **MQPathNameToFormatName**, or you can determine the format name in Message Queuing Explorer.

Call **MQOpenQueue** with the format name argument to open the queue for send access.

Call **MQSendMessage** and specify the destination queue handle returned by **MQOpenQueue**.

In the MSMQ-to-MQSeries direction, MSMQ-MQSeries Bridge sends transacted messages using the MSMQ to MQS message pipe and untransacted messages using the MSMQ to MQS transactional message pipe.

Addressing a Message Queuing Queue in MQSeries

There are two ways to address a Message Queuing (also known as MSMQ) queue from MQSeries:

- By the Message Queuing format name
- By the Message Queuing path name

By either method, you specify the name in the object descriptor (MQOD structure) of the MQSeries message.

Note MSMQ-MQSeries Bridge supports the following types of format names:

```
PUBLIC=<GUID>
PRIVATE=<machine GUID>\<file number>
DIRECT=OS:<Path name>
```

Converting Messages Sent from MQSeries to Message Queuing

Sending a Message to a Message Queuing Queue in MQSeries

To send a message from MQSeries to Message Queuing (also known as MSMQ), you specify the Message Queuing format or path name of the destination queue in the object descriptor. Call **MQOPEN** to open the queue. Call **MQPUT** or **MQPUT1** to send the message.

The addressing syntax enables you to send a message by either MQS->Message Queuing message pipe or MQS->Message Queuing transactional message pipe.

Converting Messages Using MSMQ-MQSeries Bridge

This section describes how the MSMQ-MQSeries Bridge converts Message Queuing (also known as MSMQ) message properties to MQSeries message data structures and how MQSeries data structures are converted to Message Queuing message properties.

When the MSMQ-MQSeries Bridge transmits a message, it converts the message properties between the Message Queuing and MQSeries formats. When equivalent properties exist in the two systems, the MSMQ-MQSeries Bridge assigns the property values directly. For example, the Message Queuing **messagebody** property is converted to the MQSeries **messagebuffer**. The Message Queuing **messagebodylength** is converted to the MQSeries **messagebufferlength**.

When partially equivalent properties exist in the two systems, the MSMQ-MQSeries Bridge assigns the properties according to conversion rules. For example, the MQSeries property **MQMD.Report** is converted to the Message Queuing properties **PROPID_M_ACKNOWLEDGE** and **PROPID_M_JOURNAL**.

When a property has no equivalent, the MSMQ-MQSeries Bridge either ignores the property or assigns a default value. For example, the Message Queuing property **PROPID_M_AUTH_LEVEL** refers to a specific Message Queuing authentication method that is not supported by MQSeries. In a message sent from Message Queuing to MQSeries, this property is ignored. In a message received by Message Queuing from MQSeries, the MSMQ-MQSeries Bridge assigns the Message Queuing default value to the property.

You can supplement or override the conversions described here using the Message Queuing message extension property (**PROPID_M_EXTENSION**). For information about overriding the default conversions, see Using Message Extensions.

When you send a message from Message Queuing to IBM MQSeries, MSMQ-MQSeries Bridge converts the Message Queuing message properties to an MQSeries data structure. To do this, MSMQ-MQSeries Bridge maps the various message properties of the Message Queuing message as nearly as possible to equivalent MQSeries fields. The following sections describe the conversion rules by which this is done.

This section contains:

- Converting Messages Sent from Message Queuing to MQSeries
- Converting Messages Sent from MQSeries to Message Queuing

Converting Messages Sent from Message Queuing to MQSeries

The information in this section applies to messages that you send from Message Queuing (also known as MSMQ) to MQSeries. For messages sent from MQSeries to Message Queuing, see Converting Messages Sent from MQSeries to Message Queuing.

This section contains two main subsections, which provide essentially the same information but from complementary points of view.

The first section describes the conversion rules from the sender's point of view, and explains how MSMQ-MQSeries Bridge converts each Message Queuing property that you include in a message.

The second section explains the rules from the receiver's point of view. This section describes how MSMQ-MQSeries Bridge builds a complete MQSeries message containing all the needed fields, whether or not they have exact Message Queuing equivalents.

You can supplement or override the conversions described in this section by using the Message Queuing message extension property (**PROPID_M_EXTENSION**).

This section contains:

- Converting Message Queuing Properties
- Building an MQSeries Message

Converting Message Queuing Properties

This topic explains how MSMQ-MQSeries Bridge converts the Message Queuing (also known as MSMQ) properties that you include in a message to MQSeries. For information about MQSeries fields that have no Message Queuing equivalents, see Building an MQSeries Message.

This section contains:

- Message Body (PROPID_M_BODY)
- Queue Format Names (PROPID_M_..._QUEUE)
- Message Class (PROPID_M_CLASS)
- Message Expiration (PROPID_M_TIME...)
- Message Acknowledgment (PROPID_M_ACKNOWLEDGE)
- Other Message Queuing Properties with Equivalent Properties
- Unconverted Properties
- Transaction Properties

Message Body (PROPID_M_BODY)

The Message Queuing (also known as MSMQ) message body is equivalent to the MQPUT or MQGET message buffer of MQSeries. The length of the MQPUT buffer is the Message Queuing message body size.

The following table lists the Message Queuing properties and the MQSeries fields to which they are converted.

Message Queuing property	Converted to MQSeries field
PROPID_M_BODY	Message buffer
PROPID_M_BODY_SIZE	Message buffer length

Queue Format Names (PROPID_M_..._QUEUE)

Each Message Queuing (also known as MSMQ) message contains the format name of a destination queue, and optionally the format names of response or administration queues. The MSMQ-MQSeries Bridge converts the names to the equivalent MQSeries object and Queue Manager names.

If a message contains both a response queue and an administration queue, MSMQ-MQSeries Bridge ignores the administration queue.

The following table lists the Message Queuing properties and the MQSeries fields to which they are converted.

Message Queuing properties	Converted to MQSeries fields
PROPID_M_DEST_QUEUE and PROPID_M_DEST_QUEUE_LEN	MQOD.ObjectName and MQOD.ObjectQMgrName
PROPID_M_RESP_QUEUE and PROPID_M_RESP_QUEUE_LEN	MQMD.ReplyToQ and MQMD.ReplyToQMgr
PROPID_M_ADMIN_QUEUE and PROPID_M_ADMIN_QUEUE_LEN	MQMD.ReplyToQ and MQMD.ReplyToQMgr

Message Class (PROPID_M_CLASS)

MSMQ-MQSeries Bridge converts the Message Queuing (also known as MSMQ) message class (PROPID_M_CLASS) to the MQSeries message type and feedback. It translates the message class values according to the following table.

Value of Message Queuing property	**Converted to MQSeries value**	
PROPID_M_CLASS	MQMD.MsgType	MQMD.Feedback
MQMSG_CLASS_NORMAL	MQMT_REQUEST or MQMT_DATAGRAM	MQFB_NONE
MQMSG_CLASS_ACK_REACH_QUEUE	MQMT_REPORT	MQFB_COA
MQMSG_CLASS_ACK_RECEIVE		MQFB_COD
MQMSG_CLASS_NACK_RECEIVE_TIMEOUT		MQFB_EXPIRATION
MQMSG_CLASS_NACK_REACH_QUEUE_TIMEOUT		MQFB_EXPIRATION
MQMSG_CLASS_NACK_Q_EXCEED_QUOTA		MQRC_Q_FULL
MQMSG_CLASS_NACK_ACCESS_DENIED		MQRC_NOT_AUTHORIZED
MQMSG_CLASS_NACK_ERROR		MQFB_APPL_TYPE_ERROR
Any other value		MQFB_NONE

> **MQMSG_CLASS_NORMAL** is converted to **MQMD_REQUEST** if the message includes a response queue (**PROPID_M_RESP_QUEUE**) or if **PROPID_M_RESP_QUEUE** is missing, NULL, or an empty string.

Message Expiration (PROPID_M_TIME...)

Message Queuing (also known as MSMQ) provides two message expiration properties, **PROPID_M_TIME_TO_REACH_QUEUE** and **PROPID_M_TIME_TO_BE_RECEIVED**, both in units of seconds. MQSeries provides a single expiration field, **MQMD.Expiry**, whose units are tenths of a second.

MSMQ-MQSeries Bridge converts the values as listed in the following table.

Value of Message Queuing properties PROPID_M_TIME_TO_REACH_QUEUE and PROPID_M_TIME_TO_BE_RECEIVED	**Converted to MQSeries value of MQMD.Expiry**
Both values are INFINITE	MQEI_UNLIMITED
One or both values are not INFINITE	Ten times the smaller of the two Message Queuing values

> **Note** Message Queuing typically interprets **INFINITE** as 90 days. In practice, the MSMQ-MQSeries Bridge does not apply the **INFINITE** conversion because Message Queuing decrements the values slightly during transmission. If you need an **MQMD.Expiry** value of exactly **MQEI_UNLIMITED**, you should send this value in the message extension.

Message Acknowledgment (PROPID_M_ACKNOWLEDGE)

MSMQ-MQSeries Bridge supports the Message Queuing (also known as MSMQ) and MQSeries acknowledgment mechanisms. You can send a Message Queuing message to MQSeries and receive an automatic acknowledgment from the MQSeries Queue Manager.

To do this, set the Message Queuing acknowledgment property (**PROPID_M_ACKNOWLEDGE**) to a value that requests an acknowledgment. Also specify the administration or response queue name (**PROPID_M_ADMIN_QUEUE** or **PROPID_M_RESP_QUEUE**), to which the acknowledgment is sent. For more information about queue format names, see Queue Format Names (PROPID_M_..._QUEUE).

MSMQ-MQSeries Bridge converts the acknowledgment property to the MQSeries **MQMD.Report** field, as listed in the following table. When MQSeries receives the message, it returns the appropriate acknowledgment through MSMQ-MQSeries Bridge.

Value of Message Queuing property PROPID_M_ACKNOWLEDGE	Converted to MQSeries value of MQMD.Report
MQMSG_ACKNOWLEDGMENT_FULL_REACH_QUEUE	MQRO_EXCEPTION | MQRO_COA
MQMSG_ACKNOWLEDGMENT_FULL_RECEIVE	MQRO_EXCEPTION | MQRO_EXPIRATION | MQRO_COD
MQMSG_ACKNOWLEDGMENT_NACK_REACH_QUEUE	MQRO_EXCEPTION
MQMSG_ACKNOWLEDGMENT_NACK_RECEIVE	MQRO_EXCEPTION | MQRO_EXPIRATION
MQMSG_ACKNOWLEDGMENT_NONE	MQRO_NONE

If both PROPID_M_ACKNOWLEDGE and PROPID_M_JOURNAL are included in a Message Queuing message, the value of the MQSeries **MQMD.Report** field is computed by a bitwise or of the values converted from the two Message Queuing properties. For more information about other Message Queuing properties, see Other Message Queuing Properties with Equivalent Properties.

If the **MSMQ_PROPID_M_ACKNOWLEDGE** property has a value of **MQMSG_ACKNOWLEDGMENT_FULL_REACH_QUEUE**, the value of MQSeries **MQMD.Report** field is computed by a bitwise or **of MQRO_EXCEPTION** and **MQRO_COA**.

If the **MSMQ_PROPID_M_ACKNOWLEDGE** property has a value of **MQMSG_ACKNOWLEDGMENT_FULL_RECEIVE**, the value of MQSeries MQMD.Report field is computed by a bitwise or of **MQRO_EXCEPTION**, **MQRO_EXPIRATION**, and **MQRO_COD**.

If the Message Queuing **PROPID_M_ACKNOWLEDGE** property has a value of **MQMSG_ACKNOWLEDGMENT_NACK_RECEIVE**, the value of MQSeries MQMD.Report field is computed by a bitwise or of **MQRO_EXCEPTION** and **MQRO_EXPIRATION**.

Other Message Queuing Properties with Equivalent Properties

The following Message Queuing (also known as MSMQ) properties have MQSeries equivalents. The MSMQ-MQSeries Bridge converts the values of each property as listed in the table.

> **Note** To save space in the table, the prefixes PROPID_M_ and MQMD are omitted from the Message Queuing property names and the MQSeries field names, respectively. For example, the first row of data means that **PROPID_M_BODY_TYPE** is converted to MQMD.Format.

Message Queuing property		**Converted to MQSeries**	
PROPID_M_	**Value**	MQMD	**Value**
BODY_TYPE	VT_BSTR Any other value	Format	MQFMT_STRING MQFMT_NONE
CORRELATIONID	Value (20 bytes)	CorrelId	"FQ2Q" + value
DELIVERY	MQMSG_DELIVERY_ RECOVERABLE EXPRESS	Persistence	MQPER_ PERSISTENT NOT_PERSISTENT
JOURNAL	MQMSG_ DEADLETTER MQMSG_JOURNAL MQMSG_JOURNAL_NONE	Reporta	MQRO_ DEAD_LETTER_Q (Ignored) DISCARD_MSG
LABEL LABEL_LEN	Value	ApplIdentityData	Value (MQCHAR32)
MSGID	Value (20 bytes)	MsgId	"FQ2Q" + value
PRIORITY	0 1 2 3 4 5 6 7	Priority	1 3 4 5 6 7 8 9
SENTTIME	Seconds since Jan. 1, 1970	PutDate PutTime	YYYMMDD format HHMMSSTH format

If both **PROPID_M_ACKNOWLEDGE** and **PROPID_M_JOURNAL** are included in a Message Queuing message, the **MQSeries MQMD.Report** field is computed by a bitwise or of the values converted from the two Message Queuing queuing properties.

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Unconverted Properties

The following Message Queuing (also known as MSMQ) properties have no equivalents in MQSeries. The MSMQ-MQSeries Bridge ignores these properties and does not transmit them to MQSeries:

- **PROPID_M_APPSPECIFIC**
- **PROPID_M_ARRIVEDTIME**
- **PROPID_M_AUTH_LEVEL**
- **PROPID_M_AUTHENTICATED**
- **PROPID_M_CONNECTOR_TYPE**
- **PROPID_M_DEST_SYMM_KEY**
- **PROPID_M_DEST_SYMM_KEY_LEN**
- **PROPID_M_ENCRYPTION_ALG**
- **PROPID_M_HASH_ALG**
- **PROPID_M_PRIV_LEVEL**
- **PROPID_M_PROV_NAME**
- **PROPID_M_PROV_NAME_LEN**
- **PROPID_M_PROV_TYPE**
- **PROPID_M_SECURITY_CONTEXT**
- **PROPID_M_SENDER_CERT**
- **PROPID_M_SENDER_CERT_LEN**
- **PROPID_M_SENDERID**
- **PROPID_M_SENDERID_LEN**
- **PROPID_M_SENDERID_TYPE**
- **PROPID_M_SIGNATURE**
- **PROPID_M_SIGNATURE_LEN**
- **PROPID_M_SRC_MACHINE_ID**
- **PROPID_M_TRACE**
- **PROPID_M_VERSION**

Transaction Properties

The following Message Queuing (also known as MSMQ) properties are not converted to MQSeries fields or values:

- **PROPID_M_XACT_STATUS_QUEUE**
- **PROPID_M_XACT_STATUS_QUEUE_LEN**

For more information about transactions, see Transaction Support Using MSMQ-MQSeries Bridge.

Building an MQSeries Message

This section explains how the MSMQ-MQSeries Bridge builds a complete MQSeries message, including all needed fields whether or not they have Message Queuing (also known as MSMQ) equivalents. The conversion to MQSeries fields from Message Queuing properties is listed from the MQSeries perspective.

For information about these same conversion rules from the Message Queuing perspective, see Converting Message Queuing Properties.

This section contains:

- Message Buffer
- Object Descriptor (MQOD)
- Message Descriptor (MQMD)

Message Buffer

The MQPUT or MQGET message buffer of MQSeries is equivalent to the message body property of Message Queuing (also known as MSMQ). The length of the MQPUT buffer is the Message Queuing message body size.

The following table lists the MQSeries fields and the Message Queuing properties from which they are converted.

MQSeries fields	**Converted from Message Queuing property**
Message buffer	PROPID_M_BODY
Message buffer length	PROPID_M_BODY_SIZE

Object Descriptor (MQOD)

The MSMQ-MQSeries Bridge retrieves the MQSeries object descriptor fields from the Message Queuing (also known as MSMQ) format name of the destination queue.

The following table lists the MQSeries fields and the Message Queuing properties from which they are converted.

MQSeries fields	Converted from Message Queuing property
MQOD.ObjectName and MQOD.ObjectQMgrName	PROPID_M_DEST_QUEUE and PROPID_M_DEST_QUEUE_LEN

Message Descriptor (MQMD)

Some fields of the MQSeries message descriptor have no equivalent in Message Queuing (also known as MSMQ). The MSMQ-MQSeries Bridge assigns default values to these fields. Alternatively, you can pass explicit values of the MQMD fields using the Message Queuing message extension property (**PROPID_M_EXTENSION**).

The following table lists the MQSeries fields and the default value assigned by MSMQ-MQSeries Bridge.

MQSeries MQMD fields	Default value assigned by MSMQ-MQSeries Bridge
MQMD.AccountingToken	MQACT_NONE
MQMD.CodeCharSetId	MQCCSI_Q_MGR
MQMD.Encoding	MQENC_NATIVE
MQMD.PutApplName	NULL
MQMD.PutApplType	NULL
MQMD.StrucId	MQMD_STRUC_ID
MQMD.Version	MQMD_VERSION_1

Some fields of the MQSeries message descriptor have no equivalent in Message Queuing and the MSMQ-MQSeries Bridge does not assign default values to these fields. You can assign explicit values for these MQMD fields using the Message Queuing message extension property (**PROPID_M_EXTENSION**).

The following table lists the MQSeries fields for which no default value is assigned by MSMQ-MQSeries Bridge.

MQSeries MQMD fields	Default value assigned by MSMQ-MQSeries Bridge
MQMD.UserIdentifier	No default value is assigned

Many of the MQMD fields are equivalent to one or more Message Queuing properties. The conversion rules are listed in the following table.

You can override the conversion rules by passing explicit MQMD values in the Message Queuing message extension property.

To save space in the table, the prefix MQMD. is omitted from the MQSeries field names. For example, the first row of data means that MQMD.ApplIdentityData is built from the Message Queuing properties **PROPID_M_LABEL** and **PROPID_M_LABEL_LEN**.

MQSeries MQMD field	MQSeries MQMD field value	Converted from Message Queuing property
ApplIdentity	Value (MQCHAR32)	The value of PROPID_M_LABEL and PROPID_M_LABEL_LEN
CorrelId	"FQ2Q" + value	The value of PROPID_M_CORRELATIONID (20 bytes)
Expiry	MQEI_UNLIMITED	Both PROPID_M_TIME_TO_BE_RECEIVED and PROPID_M_TIME_TO_REACH_QUEUE have value of INFINITE
Expiry	10 times the smaller of the two Message Queuing values	PROPID_M_TIME_TO_BE_RECEIVED or PROPID_M_TIME_TO_REACH_QUEUE have a value that is not INFINITE
Feedback	MQFB_EXPIRATION	PROPID_M_CLASS has a value of MQMSG_CLASS_NACK_RECEIVE_TIMEOUT
Feedback	MQFB_APPL_TYPE_ERROR	PROPID_M_CLASS has a value of MQMSG_CLASS_NACK_REACH_QUEUE_TIMEOUT
Feedback	MQRC_Q_FULL	PROPID_M_CLASS has a value of MQMSG_CLASS_NACK_Q_EXCEED_QUOTA
Feedback	MQRC_NOT_AUTHORIZED	PROPID_M_CLASS has a value of MQMSG_CLASS_NACK_ACCESS_DENIED
Feedback	MQFB_COA	PROPID_M_CLASS has a value of MQMSG_CLASS_ACK_REACH_QUEUE
Feedback	MQFB_COD	PROPID_M_CLASS has a value of MQMSG_CLASS_ACK_RECEIVE
Feedback	MQFB_NONE	PROPID_M_CLASS has any other value
Format	MQFMT_STRING	PROPID_M_BODY_TYPE has a value of VT_BSTR
Format	MQFMT_NONE	PROPID_M_BODY_TYPE has any other value
MsgId	"FQ2Q" + value	The value of PROPID_M_MSGID (20 bytes)
MsgType	MQMT_DATAGRAM	PROPID_M_CLASS has a value of MQMSG_CLASS_NORMAL
MsgType	MQMT_REQUESTREPORT	PROPID_M_CLASS has any other value
Persistence	MQPER_PERSISTENT	PROPID_M_DELIVERY has a value of MQMSG_DELIVERY_RECOVERABLE
Persistence	MQPER_NOT_PERSISTENT	PROPID_M_DELIVERY has a value of MQMSG_DELIVERY_EXPRESS
Priority	1	PROPID_M_PRIORITY has a value of 0

Priority	3	PROPID_M_PRIORITY has a value of 1
Priority	4	PROPID_M_PRIORITY has a value of 2
Priority	5	PROPID_M_PRIORITY has a value of 3
Priority	6	PROPID_M_PRIORITY has a value of 4
Priority	7	PROPID_M_PRIORITY has a value of 5
Priority	8	PROPID_M_PRIORITY has a value of 6
Priority	9	PROPID_M_PRIORITY has a value of 7
PutDate	YYYMMDD format	The date from the Message Queuing PROPID_M_SENTTIME property which has a value of seconds since January 1, 1970
PutTime	HHMMSSTH format	The time from the Message Queuing PROPID_M_SENTTIME property which has a value of seconds since January 1, 1970
ReplyToQ	Retrieved from Message Queuing format name	The Message Queuing format name from PROPID_M_RESP_QUEUE if this property is included and is not NULL or an empty string
ReplyToQ	Retrieved from Message Queuing format name	The Message Queuing format name from PROPID_M_ADMIN_QUEUE if PROPID_M_RESP_QUEUE is not included or is NULL or an empty string
ReplyToQMgr	Retrieved from Message Queuing format name	The Message Queuing format name from PROPID_M_RESP_QUEUE if this property is included and is not NULL or an empty string
ReplyToQMgr	Retrieved from Message Queuing format name	The Message Queuing format name from PROPID_M_ADMIN_QUEUE if PROPID_M_RESP_QUEUE is not included or is NULL or an empty string
Report	MQRO_EXCEPTION|COA	PROPID_M_ACKNOWLEDGE has a value of MQMSG_ACKNOWLEDGMENT_FULL_REACH_QUEUE
Report	MQRO_EXCEPTION|EXPIRATION|COD	PROPID_M_ACKNOWLEDGE has a value of MQMSG_ACKNOWLEDGMENT_FULL_RECEIVE
Report	MQRO_EXCEPTION	PROPID_M_ACKNOWLEDGE has a value of MQMSG_ACKNOWLEDGMENT_NACK_REACH_QUEUE
Report	MQRO_EXCEPTION|EXPIRATION	PROPID_M_ACKNOWLEDGE has a value of MQMSG_ACKNOWLEDGMENT_NACK_RECEIVE
Report	MQRO_NONE	PROPID_M_ACKNOWLEDGE has a value of MQMSG_ACKNOWLEDGMENT_NONE
Report	MQRO_DEAD_LETTER_Q	PROPID_M_JOURNAL has a value of MQMSG_DEADLETTER
Report	The Message Queuing value is ignored	PROPID_M_JOURNAL has a value of MQMSG_JOURNAL
Report	MQRO_DISCARD_MSG	PROPID_M_JOURNAL has a value of MQMSG_JOURNAL_NONE

In practice, the MSMQ-MQSeries Bridge does not assign **MQEI_UNLIMITED** as value for MQMD.Expiry because Message Queuing interprets INFINITE values typically as 90 days and decrements them slightly during transmission. To assign an MQMD.Expiry value of exactly **MQEI_UNLIMITED**, send this value in the message extension.

The MSMQ-MQSeries Bridge assigns **MQMT_DATAGRAM** as value for MQMD.MsgType if the Message Queuing **PROPID_M_RESP_QUEUE** is missing, NULL, or an empty string. Otherwise a value of **MQMT_REQUEST** is assigned to MQMD.MsgType.

If both **PROPID_M_ACKNOWLEDGE** and **PROPID_M_JOURNAL** are included in a Message Queing message, MQMD.Report is computed by a bitwise or of the values converted from the two Message Queuing properties.

Converting Messages Sent from MQSeries to Message Queuing

When you send a message from IBM MQSeries to Microsoft® Message Queuing (also known as MSMQ), the MSMQ-MQSeries Bridge converts the message from an MQSeries data structure to a Message Queuing message property. o do this, MSMQ-MQSeries Bridge maps the various data fields of the MQSeries message as nearly as possible to equivalent Message Queuing message properties.

This section describes the conversion rules by which this is done. The information in this section applies to messages that you send from MQSeries to Message Queuing. For messages sent from Message Queuing to MQSeries, see Converting Messages Sent from Message Queuing to MQSeries.

The section contains two main subsections, which provide essentially the same information, but from complementary points of view. The first section describes the conversion rules from the sender's point of view, and explains how the MSMQ-MQSeries Bridge converts each MQSeries field that you include in a message. The second section explains the rules from the receiver's point of view. Use this section to learn how MSMQ-MQSeries Bridge builds a complete Message Queuing message containing all the needed properties, whether or not they have exact MQSeries equivalents.

Besides the conversions described in this section, the MSMQ-MQSeries Bridge transmits the original MQSeries message descriptor fields in the Message Queuing message extension property (**PROPID_M_EXTENSION**).

This section contains:

- Converting MQSeries Fields
- Building a Message Queuing Message

Converting MQSeries Fields

This section explains how the MSMQ-MQSeries Bridge converts the fields of an MQSeries message to Message Queuing (also known as MSMQ). For information about Message Queuing properties that have no MQSeries equivalents, see Building a Message Queuing Message.

This section contains:

- Message Buffer
- Object Descriptor (MQOD)
- Character Substitutions in Object Descriptor Conversion
- Format Name Method of Object Descriptor Conversion
- Path Name Method of Object Descriptor Conversion
- Queue Alias Method of Object Descriptor Conversion
- Examples of Object Descriptor Conversion
- Message Descriptor (MQMD)
- MQMD.Report Field
- MQMD.MsgType and MQMD.Feedback Fields
- MQMD.ReplyToQ and MQMD.ReplyToQMgr Fields
- Unconverted MQSeries MQMD Fields

Message Buffer

The MQGET or MQPUT buffer of MQSeries is equivalent to the message body property of Message Queuing (also known as MSMQ).

The following table lists the MQSeries fields and the Message Queuing properties to which they are converted.

MQSeries fields	**Converted to Message Queuing property**
Message buffer	PROPID_M_BODY
Message buffer length	PROPID_M_BODY_SIZE

Object Descriptor (MQOD)

The MSMQ-MQSeries Bridge converts the MQSeries remote Queue Manager and queue names to the Message Queuing (also known as MSMQ) destination queue name. The MQSeries fields are interpreted as a Message Queuing format name or path name.

The following table lists the MQSeries fields and the Message Queuing properties that they are converted to.

MQSeries fields	**Converted to Message Queuing property**
MQOD.ObjectName and MQOD.ObjectQMgrName	PROPID_M_DEST_QUEUE and PROPID_M_DEST_QUEUE_LEN

Character Substitutions in Object Descriptor Conversion

Certain characters are supported in Message Queuing (also known as MSMQ) format names, but not in MQSeries names. When you assign the MQSeries MQOD.ObjectName, the MSMQ-MQSeries Bridge performs character substitutions to the Message Queuing format names. The following table lists special characters in MQSeries names and what MSMQ-MQSeries Bridge converts these characters to in Message Queuing format names.

Characters in MQSeries MQOD field names	Characters substituted in Message Queuing format names
/ (forward slash))	: (colon) or \ (backslash)
_ (underscore)	- (hyphen) or = (equal)
P_ (at start of MQOD.ObjectName)	PRIVATE=

The MSMQ-MQSeries Bridge converts the characters back when it transmits the MQSeries message to Message Queuing. The characters are interpreted according to context to generate a legal Message Queuing name. For example, MSMQ-MQSeries Bridge converts the format name:

```
DIRECT_OS/MACHINE2/QUEUE4
```

to the following:

```
DIRECT=OS:MACHINE2\QUEUE4.
```

Note that this character substitution is only for format names, not for computer or path names. If you want to address Message Queuing path names, do not include hyphens or other characters not supported by MQSeries. For example, the path name:

```
MACHINE2\MY-QUEUE
```

is legal in Message Queuing, but you cannot specify the hyphen character in MQSeries.

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Format Name Method of Object Descriptor Conversion

Subject to the following conditions, the MSMQ-MQSeries Bridge interprets the MQSeries MQOD.ObjectName field as the format name of the Message Queuing (also known as MSMQ) destination queue:

- The MQOD.ObjectQMgrName is an MQSeries alias for a Message Queuing computer.
- The MQOD.ObjectName begins with PUBLIC_, P_, or DIRECT_OS/.

If these conditions apply, the MSMQ-MQSeries Bridge converts the MQSeries MQOD.ObjectName to the Message Queuing format name of the destination queue using one of the following methods based on the value of **MQOD.ObjectName**:

```
PUBLIC=<GUID>
PRIVATE=<machine GUID>\<file number>
DIRECT=OS:<path name>.
```

If you know the globally unique identifier (GUID) of the destination queue, the PUBLIC=<GUID> syntax gives better performance than the DIRECT=OS:<path name> syntax. Also note that nontransacted private queues are supported only on the computer running the MSMQ-MQSeries Bridge.

Path Name Method of Object Descriptor Conversion

If the conditions for the format name method do not hold, the MSMQ-MQSeries Bridge interprets MQOD.ObjectQMgrName\MQOD.ObjectName as a Message Queuing (also known as MSMQ) path name. The remote Queue Manager name must be an alias for a computer running Message Queuing that you have previously defined in MQSeries.

For example, if MQOD.ObjectQMgrName is MACHINE2 and MQOD.ObjectName is QUEUE4, the MSMQ-MQSeries Bridge sends the message to a Message Queuing queue having the path name MACHINE2\QUEUE4.

The MSMQ-MQSeries Bridge determines the Message Queuing format name corresponding to this path name to forward the message.

> **Note** The MQSeries name fields are limited to 48 characters each. If the path name is longer than this, use the format name method instead.

Queue Alias Method of Object Descriptor Conversion

Optionally, you can address a Message Queuing (also known as MSMQ) queue using an MQSeries queue alias. If you use this method, set MQOD.ObjectName to the queue alias. Leave MQOD.ObjectQMgrName blank, or set it to the MQSeries Queue Manager where the transmission queue is located.

Examples of Object Descriptor Conversion

In the following examples, you want to send a message to a Message Queuing (also known as MSMQ) destination having the following identifiers:

```
Machine name = MACHINE2
Queue name = QUEUE4
GUID = A56F41B4-9869-11D0-AF8F-0000E8D1C3A7
```

MSMQ-MQSeries Bridge is installed on a computer called BRIDGEMQ1. You have defined the aliases BRIDGEMQ1 and BRIDGEMQ1% for this computer in MQSeries. In the MSMQ-MQSeries Bridge Manager, you have configured BRIDGEMQ1 for MQS->Message Queuing message pipe and BRIDGEMQ1% for MQS->Message Queuing transactional message pipe.

You may address a message to this queue in any of the following ways:

Format name method

Using the format name method and MQS->Message Queuing message pipe, the MQSeries name would become:

```
MQOD.ObjectQMgrName = "BRIDGEMQ1"
MQOD.ObjectName = "PUBLIC_A56F41B4_9869_11D0_AF8F_0000E8D1C3A7"
```

- or -

```
MQOD.ObjectQMgrName = "BRIDGEMQ1"
MQOD.ObjectName = "DIRECT_OS/MACHINE2/QUEUE4"
```

Using the format name method and MQS->Message Queuing transactional message pipe, the MQSeries name would become:

```
MQOD.ObjectQMgrName = "BRIDGEMQ1%"
MQOD.ObjectName = "PUBLIC_A56F41B4_9869_11D0_AF8F_0000E8D1C3A7"
```

- or -

```
MQOD.ObjectQMgrName = "BRIDGEMQ1%"
MQOD.ObjectName = "DIRECT_OS/MACHINE2/QUEUE4"
```

Optionally, you can define the MQSeries aliases MACHINE2 and MACHINE2% for the Message Queuing destination computer. You now have two additional ways to address the queue.

Using the path name method and MQS->Message Queuing message pipe, the MQSeries name would become:

```
MQOD.ObjectQMgrName = "MACHINE2"
MQOD.ObjectName = "QUEUE4"
```

Using the path name method and MQS->Message Queuing transactional message pipe, the MQSeries name would become:

```
MQOD.ObjectQMgrName = "MACHINE2%";
MQOD.ObjectName = "QUEUE4"
```

In yet another option, you can define the MQSeries aliases QUEUE4 and QUEUE4% for the Message Queuing destination queues. If you do this, you can address the queue using the following syntax.

Using the queue alias method and normal service, the MQSeries name would become:

```
MQOD.ObjectQMgrName = ""
MQOD.ObjectName = "QUEUE4"
```

Using the queue alias method and high service, the MQSeries name would become:

```
MQOD.ObjectQMgrName = ""
MQOD.ObjectName = "QUEUE4%"
```

Message Descriptor (MQMD)

The MSMQ-MQSeries Bridge converts most of the MQSeries field values to Message Queuing (also known as MSMQ) property values.

MQMD.Report Field

The MSMQ-MQSeries Bridge supports the MQSeries and Message Queuing (also known as MSMQ) acknowledgment mechanisms. You can send a Message Queuing message to MQSeries and receive an automatic acknowledgment from the Message Queuing Queue Manager.

To do this, set the MQMD.Report field of the MQSeries message to a value that requests an acknowledgment. Also set the MQMD.ReplyToQ and MQMD.ReplyToQMgr fields, which specify where the acknowledgment is sent.

The MSMQ-MQSeries Bridge converts MQMD.Report to the Message Queuing acknowledgment property. When Message Queuing receives the message, it returns the appropriate acknowledgment thorough the MSMQ-MQSeries Bridge.

The MSMQ-MQSeries Bridge also supports the MQSeries and Message Queuing dead letter mechanism. For this purpose, MSMQ-MQSeries Bridge converts the MQMD.Report values to the Message Queuing journaling property.

The conversions are listed in the following table.

Value of MQSeries field MQMD.Report	**Converted to Message Queuing property and value**
MQRO_NONE	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_NONE
MQRO_EXCEPTION	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_NACK_REACH_QUEUE
MQRO_EXCEPTION_WITH_DATA (Note 1)	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_NACK_REACH_QUEUE
MQRO_EXCEPTION_WITH_FULL_DATA (Note 1)	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_NACK_REACH_QUEUE
MQRO_EXPIRATION	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_NACK_RECEIVE
MQRO_EXPIRATION_WITH_DATA (Note 1)	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_NACK_RECEIVE
MQRO_EXPIRATION_WITH_FULL_DATA (Note 1)	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_NACK_RECEIVE
MQRO_COA	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_FULL_REACH_QUEUE
MQRO_COA_WITH_DATA (Note 1)	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_FULL_REACH_QUEUE
MQRO_COA_WITH_FULL_DATA (Note 1)	The value of PROPID_M_ACKNOWLEDGE is set to MQMSG_ACKNOWLEDGMENT_FULL_REACH_QUEUE
MQRO_DEAD_LETTER_Q	The value of PROPID_M_JOURNAL is set to MQMSG_DEADLETTER
MQRO_DISCARD_MSG	The value of PROPID_M_JOURNAL is set to MQMSG_JOURNAL_NONE
MQRO_NEW_MSG_ID	(Not converted)
MQRO_PASS_MSG_ID	(Not converted)
MQRO_COPY_MSG_ID_TO_CORREL_ID	(Not converted)
MQRO_PASS_CORREL_ID	(Not converted)

> **Note** For these report values, the MSMQ-MQSeries Bridge duplicates part or all of the message buffer in the Message Queuing message extension (**PROPID_M_EXTENSION**). The increased message size may degrade performance.

MQMD.MsgType and MQMD.Feedback Fields

The values of the MQSeries MQMD.MsgType and MQMD.Feedback fields are converted to the Message Queuing (also known as MSMQ) message class property.

The conversions are listed in the following table based on the value of MQMD.MsgType when MQMD.Feedback is MQFB_NONE.

Value of MQSeries MQMD.MsgType	Converted to value of Message Queuing PROP_M_CLASS
MQMT_SYSTEM_FIRST	MQMSG_CLASS_NORMAL
MQMT_SYSTEM_LAST	MQMSG_CLASS_NORMAL
MQMT_DATAGRAM	MQMSG_CLASS_NORMAL
MQMT_REQUEST	MQMSG_CLASS_NORMAL
MQMT_REPLY	MQMSG_CLASS_NORMAL
MQMT_APPL_FIRST	MQMSG_CLASS_NORMAL
MQMT_APPL_LAST	MQMSG_CLASS_NORMAL

The conversions are listed in the following table based on the value of MQMD.Feedback when MQMD.MsgType is MQMT_REPORT.

Value of MQSeries MQMD.Feedback	Converted to value of Message Queuing PROP_M_CLASS
MQFB_EXPIRATION	MQMSG_CLASS_NACK_RECEIVE_TIMEOUT
MQFB_COA	MQMSG_CLASS_ACK_REACH_QUEUE
MQFB_COD	MQMSG_CLASS_ACK_RECEIVE
MQFB_APPL_TYPE_ERROR	MQMSG_CLASS_NACK_ERROR
MQFB_DATA_LENGTH_ZERO	MQMSG_CLASS_NACK_ERROR
MQFB_DATA_LENGTH_NEGATIVE	MQMSG_CLASS_NACK_ERROR
MQFB_DATA_LENGTH_TOO_BIG	MQMSG_CLASS_NACK_ERROR
MQFB_BUFFER_OVERFLOW	MQMSG_CLASS_NACK_ERROR
MQFB_LENGTH_OFF_BY_ONE	MQMSG_CLASS_NACK_ERROR
MQFB_NONE	(Not converted)
MQFB_SYSTEM_FIRST	(Not converted)
MQFB_SYSTEM_LAST	(Not converted)
MQFB_APPL_FIRST	(Not converted)
MQFB_APPL_LAST	(Not converted)
MQFB_TM_ERROR	(Not converted)
MQFB_IIH_ERROR	(Not converted)
MQFB_NOT_AUTHORIZED_FOR_IMS	(Not converted)
MQFB_IMS_ERROR	(Not converted)
MQFB_IMS_FIRST	(Not converted)
MQFB_IMS_LAST	(Not converted)
MQFB_QUIT	(Not supported)
MQRC_NOT_AUTHORIZED	MQMSG_CLASS_NACK_ACCESS_DENIED
MQRC_Q_FULL	MQMSG_CLASS_NACK_Q_EXCEED_QUOTA
MQRC_PERSISTENT_NOT_ALLOWED	MQMSG_CLASS_NACK_ERROR
MQRC_MSG_TOO_BIG_FOR_Q_MGR	MQMSG_CLASS_NACK_ERROR
MQRC_MSG_TOO_BIG_FOR_Q	MQMSG_CLASS_NACK_ERROR
MQRC_PUT_INHBITED	(Not converted)

MQMD.ReplyToQ and MQMD.ReplyToQMgr Fields

The MSMQ-MQSeries Bridge converts the MQSeries ReplyToQMgr and ReplyToQ fields to a Message Queuing (also known as MSMQ) format name. The name is assigned both to the response queue property and to the administration queue property of the new Message Queuing message.

The MSMQ-MQSeries Bridge interprets the **ReplyToQMgr** and the **ReplytoQ** fields in the same way as the destination queue name.

If MQMD.ReplyToQMgr is the MSMQ-MQSeries Bridge computer name and MQMD.ReplyToQ begins with PUBLIC_, P_, or DIRECT_OS/, MSMQ-MQSeries Bridge interprets MQMD.ReplyToQ as a Message Queuing format name.

Otherwise, the MSMQ-MQSeries Bridge interprets MQMD.ReplyToQMgr\MQMD.ReplyToQ as a Message Queuing path name and determines the Message Queuing format name.

The following table lists the MQSeries fields and the Message Queuing properties to which they are converted.

MQSeries fields	Converted to Message Queuing property
MQOD.ReplyToQMgr and MQOD.ReplyToQ	PROPID_M_RESP_QUEUE
MQOD.ReplyToQMgr and MQOD.ReplyToQ	PROPID_M_ADMIN_QUEUE (same value as PROPID_M_RESP_QUEUE)

Other MQMD Fields

The following table lists the conversions of additional MQMD fields, in addition to the ones described previously, to Message Queuing properties.

> **Note** To save space in the table, the prefixes MQMD and PROPID_M_ are omitted from the MQSeries field names and the Message Queuing property names, respectively. For example, the first row of data means that MQMD.ApplIdentityData is converted to **PROPID_M_LABEL** and **PROPID_M_LABEL_LEN**.

MQSeries field		**Converted to Message Queuing**	
MQMD.	**Value**	**PROPID_M_**	**Value**
ApplIdentityData	Value (MQCHAR32)	LABEL	Value
CorrelId	Value (MQBYTE24)	CORRELATIONID	Last 20 bytes of value
Expiry	MQEI_UNLIMITED Value > 0 (tenths of seconds)	TIME_TO_BE_RECEIVED	INFINITE Value/10 (seconds)
Format	MQFMT_STRING Any other value	BODY_TYPE	VT_BSTR Not converted
Persistence	MQPER_ PERSISTENT NOT_PERSISTENT	DELIVERY	MQMSG_DELIVERY_ RECOVERABLE EXPRESS
Priority	0, 1 2, 3 4 5 6 7 8 9	PRIORITY	0 1 2 3 4 5 6 7
UserIdentifier	Value	SENDERID	SID value (if the user is registered in Windows 2000 Not converted (if the user is not registered)

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http://go.microsoft.com/fwlink/?linkid=29507.

Unconverted MQSeries MQMD Fields

The following MQSeries fields have no equivalents in Message Queuing (also known as MSMQ). The MSMQ-MQSeries Bridge ignores these fields and does not transmit them to Message Queuing.

Like all MQMD fields, MSMQ-MQSeries Bridge stores the fields in the Message Queuing message extension property:

- MQMD.AccountingToken
- MQMD.ApplOriginData
- MQMD.BackoutCount
- MQMD.Encoding
- MQMD.MsgId
- MQMD.PutApplName
- MQMD.PutApplType
- MQMD.PutDate
- MQMD.PutTime
- MQMD.StrucId

When the value of MQMD.CodeCharSetID is **MQCCSI_Q_QMG**, the MSMQ-MQSeries Bridge ignores this field and does not transmit it to Message Queuing. When the value of MQMD.CodeCharSetID is **MQCCSI_Q_QMG**, The MSMQ-MQSeries Bridge does not support this value.

When the value of MQMD.Version is **MQPMO_VERSION_1**, the MSMQ-MQSeries Bridge ignores this field and does not transmit it to Message Queuing.

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Building a Message Queuing Message

This section explains how the MSMQ-MQSeries Bridge builds a complete Message Queuing (also known as MSMQ) message, including all needed properties, whether or not they have MQSeries equivalents.

Message Body (PROPID_M_BODY)

The Message Queuing (also known as MSMQ) message body is equivalent to the MQPUT or MQGET message buffer of MQSeries. The length of the MQPUT buffer is the Message Queuing message body size.

The following table lists the Message Queuing properties and the MQSeries fields from which they are converted.

Message Queuing property	Converted from MQSeries field
PROPID_M_BODY	Message buffer
PROPID_M_BODY_SIZE	Message buffer length

Queue Format Names (PROPID_M_..._QUEUE)

MSMQ-MQSeries Bridge retrieves the Message Queuing (also known as MSMQ) format names of the destination, response, and administration queues from the MQSeries queue and Queue Manager names.

The following table lists the Message Queuing properties and the MQSeries fields from which they are converted.

Message Queuing properties	Converted from MQSeries fields
PROPID_M_DEST_QUEUE and PROPID_M_DEST_QUEUE_LEN	MQOD.ObjectName and MQOD.ObjectQMgrName
PROPID_M_RESP_QUEUE and PROPID_M_RESP_QUEUE_LEN	MQMD.ReplyToQ and MQMD.ReplyToQMgr
PROPID_M_ADMIN_QUEUE and PROPID_M_ADMIN_QUEUE_LEN	MQMD.ReplyToQ and MQMD.ReplyToQMgr

Message Class (PROPID_M_CLASS)

The MSMQ-MQSeries Bridge assigns the Message Queuing (also known as MSMQ) message class based on the MQSeries MQMD.MsgType and MQMD.Feedback values. For detailed information, see MQMD.MsgType and MQMD.Feedback Fields.

The following table lists the Message Queuing properties and the MQSeries fields from which they are converted.

Message Queuing properties	Converted from MQSeries fields
PROPID_M_CLASS	MQMD.MsgType and MQMD.Feedback

Message Expiration (PROPID_M_TIME...)

The MSMQ-MQSeries Bridge converts the MQSeries MQMD.Expiry value (in tenths of seconds) to the Message Queuing (also known as MSMQ) **PROPID_M_TIME_TO_BE_RECEIVED** (in seconds). If MQMD.Expiry is set to **MQEI_UNLIMITED**, the value of Message Queuing **PROPID_M_TIME_TO_BE_RECEIVED** is set to INFINITE. For other values of MQMD.Expiry greater than zero, the value of Message Queuing **PROPID_M_TIME_TO_BE_RECEIVED** is converted by dividing MQMD.Expiry by 10. The MSMQ-MQSeries Bridge does not set **PROPID_M_TIME_TO_REACH_QUEUE**.

Value of Message Queuing properties	Converted from MQSeries fields
PROPID_M_TIME_TO_BE_RECEIVED	MQMD.Expiry

Message Acknowledgment and Journaling (PROPID_M_ACKNOWLEDGE, PROPID_M_JOURNAL)

The Message Queuing (also known as MSMQ) message acknowledgment and journaling are converted from values of MQMD.Report.

Message Queuing property	Converted from MQSeries
PROPID_M_ACKNOWLEDGE PROPID_M_JOURNAL	MQMD.Report

Other Message Queuing Properties (PROPID_M_...)

Some Message Queuing (also known as MSMQ) properties have no equivalent in MQSeries. The MSMQ-MQSeries Bridge assigns values to these properties as listed in the following table.

Message Queuing property	**Value assigned by MSMQ-MQSeries Bridge**
PROPID_M_APPSPECIFIC	None
PROPID_M_AUTH_LEVEL	Default
PROPID_M_CONNECTOR_TYPE	None
PROPID_M_DEST_QUEUE	Default
PROPID_M_DEST_QUEUE_LEN	Default
PROPID_M_DEST_SYMM_KEY	None
PROPID_M_ENCRYPTION_ALG	None
PROPID_M_HASH_ALG	None
PROPID_M_MSGID	Assigned by Message Queuing
PROPID_M_PRIV_LEVEL	Default
PROPID_M_PROV_NAME	None
PROPID_M_PROV_TYPE	None
PROPID_M_SECURITY_CONTEXT	Default
PROPID_M_SENDER_CERT	Default
PROPID_M_SENTTIME	Time when MSMQ-MQSeries Bridge transmits the message to Message Queuing
PROPID_M_SIGNATURE	None
PROPID_M_SRC_MACHINE_ID	GUID of the MSMQ-MQSeries Bridge machine
PROPID_M_TRACE	Default
PROPID_M_VERSION	0x0010

Equivalent Message Queuing Properties

The following Message Queuing (also known as MSMQ) properties have MQSeries equivalents. The MSMQ-MQSeries Bridge converts the values of each property as listed in the table.

> **Note** To save space in the table, the prefixes PROPID_M_ and MQMD. are omitted from the Message Queuing property names and the MQSeries field names, respectively. For example, the first row of data means that PROPID_M_BODY_TYPE is converted from MQMD.Format.

Message Queuing property		**Converted from MQSeries**	
PROPID_M_	**Value**	**MQMD.**	**Value**
BODY_TYPE	VT_BSTR Not converted (default)	Format	MQFMT_STRING Any other value
CORRELATIONID	Last 20 bytes of value	MsgId	Value (MQBYTE24)
DELIVERY	MQMSG_DELIVERY_ RECOVERABLE EXPRESS	Persistence	MQPER_ PERSISTENT NOT_PERSISTENT
LABEL LABEL_LEN	Value	ApplIdentityData	Value (MQCHAR32)
PRIORITY	0 1 2 3 4 5 6 7	Priority	0, 1 2, 3 4 5 6 7 8 9

SENDERID SENDERID_TYPE	SID value MQMSG_SENDERID_TYPE_SID Not converted MQMSG_SENDERID_TYPE_NONE	UserIdentifier	Value, if the user is registered in Windows 2000 If the user is not registered in Windows 2000

MSMQ-MQSeries Bridge Extensions Mechanism

Besides the automatic conversion of Microsoft® Message Queuing (also known as MSMQ) and IBM MQSeries messages, the MSMQ-MQSeries Bridge provides a mechanism for sending and receiving explicit MQSeries field values. The MSMQ-MQSeries Bridge Extension Property API supports the message extension property (**PROPID_M_EXTENSION**) of the Message Queuing server. The message extension property provides a way for applications to attach any type of data—in essence, custom properties—to a Message Queuing message.

Similar to the Message Queuing message body property (**PROPID_M_BODY**), the message extension can have any length. However, the message extension has a defined structure that lets an application label its data with a globally unique identifier (GUID) code. Applications can attach multiple extension fields, each labeled with its own GUID and all included in a single message extension property. This is done using the Message Queuing message extension property (**PROPID_M_EXTENSION**).

This section contains:

- Data Structure of a Message Extension
- How MSMQ-MQSeries Bridge Creates a Message Extension
- How MSMQ-MQSeries Bridge Converts a Message Extension
- Using Message Extensions
- Programming a Message Extension
- MSMQ-MQSeries Bridge Extension Property API

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Data Structure of a Message Extension

A message extension is a Message Queuing (also known as MSMQ) message property of arbitrary length. The property symbol of a message extension is **PROPID_M_EXTENSION** and its type indicator is VT_UI1|VT_VECTOR. A message extension is a sequential buffer containing any number of Message Queuing extension fields.

Each extension field comprises three subfields, as listed in the following table.

Subfield	Length of subfield (bytes)	Description
GUID	16	A GUID identifier, typically of the application that created the extension field.
Length	4	The length of the data subfield in bytes.
Data	Value of the length subfield	Any data that is part of the message extension.

For use with the MSMQ-MQSeries Bridge, the GUID identifier is set to the MSMQ-MQSeries Bridge GUID value.

The Message Queuing message extension length property, **PROPID_M_EXTENSION_LEN**, is of type indicator VT_UI4 and represents the overall size in bytes of all message extensions attached to a message. Message Queuing sets the message extension length automatically when you send a message. When you receive or peek at a message, you can look into the message extension length to detect whether the message contains any message extension fields and to determine the necessary receive buffer size.

The MSMQ-MQSeries Bridge Extension API functions work with an alternative data representation for a message extension, called an **EP** object. An **EP** object contains the same fields and subfields as a message extension, but in a format adapted for programming.

How MSMQ-MQSeries Bridge Creates a Message Extension

When the MSMQ-MQSeries Bridge processes a message from MQSeries, it creates a **PROPID_M_EXTENSION** property, which it includes in the message that it transmits to Message Queuing (also known as MSMQ).

This section contains:

- MQMD Extension Field
- Error Extension Field
- Other Extension Fields

MQMD Extension Field

Ordinarily, the message extension contains a single extension field with the following structure:

- The MSMQ-MQSeries Bridge globally unique identifier (GUID) code is stored in the GUID subfield of the extension.
- The size of MQMD is stored in the length subfield of the extension.
- The MQMD is copied byte-for-byte into the data buffer of the extension.

The MSMQ-MQSeries Bridge GUID is the value of the sg_MSMQExtMQMD constant which is defined in the Mqsrext.h include file found in the SDK\Include subdirectory.

The MQMD extension has the following GUID for MQMD version 2.

```
static const GUID sg_MSMQExtMQMDE =
{ 0x18ae68f5, 0x989b, 0x11d3,
    { 0x8d, 0xf9, 0x0, 0x0, 0xf8, 0x1a,  0xea, 0x1f }
};
```

Error Extension Field

If the MSMQ-MQSeries Bridge encounters an MQSeries error when it transmits a message from Message Queuing (also known as MSMQ), it records the error in the extension property and places the message on the dead letter queue.

To do this, the MSMQ-MQSeries Bridge adds an extension property to the Message Queuing message, if it does not already exist. Within the extension property, MSMQ-MQSeries Bridge creates an extension field containing the following data:

- The globally unique identifier (GUID) subfield contains a MSMQ-MQSeries Bridge error GUID (different from the GUID used for MQMD).
- The length subfield contains the value 4.
- The data subfield contains a reason code, identical to the codes returned by the MQSeries function MQPUT.

The MSMQ-MQSeries Bridge error GUID is the value of the sg_MSMQExtReasonCode constant, which is defined in the Mqsrext.h include file found in the SDK\Include subdirectory.

If wanted, a Message Queuing application can read messages from the dead letter queue and interpret the reason codes.

Other Extension Fields

If you send an MQSeries message having certain values of MQMD.Report, the MSMQ-MQSeries Bridge adds a second extension field to the new Message Queuing (also known as MSMQ) message. This field is for internal use only, not for use in your applications. The MSMQ-MQSeries Bridge distinguishes the Report extension field from the MQMD and error extension fields by labeling them with different globally unique identifiers (GUIDs).

For more information about other extension fields, see Converting Messages Sent from MQSeries to Message Queuing.

How MSMQ-MQSeries Bridge Converts a Message Extension

If you send a Message Queuing (also known as MSMQ) message including a message extension to MQSeries, the MSMQ-MQSeries Bridge converts the extension in the following way:

- The MSMQ-MQSeries Bridge looks for an extension field identified by the MSMQ-MQSeries Bridge GUID. If it finds one, it reads the MQMD structure from the extension field.
- MSMQ-MQSeries Bridge ignores any other extension fields that may be present in the message extension.
- MSMQ-MQSeries Bridge includes the MQMD structure that it reads from the extension field in the new MQSeries message.

The MQMD structure in the message extension overrides the default MQMD conversions, which are described in Converting Messages Sent from Message Queuing to MQSeries.

A few exceptions to these rules are described in the following sections.

This section contains:

- Sender and User Identifiers
- Version Identifiers

Sender and User Identifiers

MSMQ-MQSeries Bridge reads the value of **MQMD.UserIdentifier** stored in the message extension and assigns the value to the **MQMD.UserIdentifier** field in the new MQSeries message.

Version Identifiers

MQSeries uses the following fields for version identification:

- **MQMD.StrucId**
- **MQMD.Version**

When the MSMQ-MQSeries Bridge converts a message extension, it confirms that the values of these fields are for a version of MQSeries that the Bridge supports. If they are not, MSMQ-MQSeries Bridge places the message on the dead letter queue and does not transmit it to MQSeries.

For more information about the supported versions of MQSeries, see Platforms Supported by MSMQ-MQSeries Bridge Extensions. For more information about the permitted values of the version identification fields, see Converting Messages Sent from Message Queuing to MQSeries.

Using Message Extensions

This section suggests a few ways that you can use the message extension property in your messaging applications.

This section contains:

- Sending an MQSeries Message to Message Queuing
- Sending a Message Queuing Message to MQSeries

Sending an MQSeries Message to Message Queuing

MSMQ-MQSeries Bridge stores the complete MQMD structure of an MQSeries message in a Message Queuing (also known as MSMQ) message extension. A Message Queuing application can read the extension and retrieve the original MQMD structure.

In this way, a Message Queuing application can retrieve the original values of every MQMD field, regardless of the MSMQ-MQSeries Bridge conversions.

Sending a Message Queuing Message to MQSeries

When you send a Message Queuing (also known as MSMQ) message to MQSeries, you can include a message extension. This can be an extension that you originally received from MQSeries, or one that you created yourself. MSMQ-MQSeries Bridge reads the message extension and uses it to set the MQMD fields of the converted message that it sends to MQSeries.

You can use this feature for two purposes:

- To override the default conversions described in the section Converting Messages Sent from Message Queuing to MQSeries
- To supplement the default conversions by assigning MQMD fields that have no Message Queuing equivalent.

The following are some examples of fields that have no equivalents or only partial equivalents (different permitted values or length) among the Message Queuing message properties:

- **MQMD.AccountingToken**
- **MQMD.ApplOriginData**
- **MQMD.CorrelId**
- **MQMD.MsgId**
- **MQMD.MsgType**
- **MQMD.PutApplName**
- **MQMD.PutApplType**
- **MQMD.ReplyToQ**
- **MQMD.ReplyToQMgr**
- **MQMD.Report**

Suppose you want to send a message to an MQSeries application including an MQMD.MsgType value of MQMD_REPLY. The default message conversions provide no way to set this particular value. You can send the value by storing an MQMD data structure in a message extension.

Programming a Message Extension

In a Message Queuing (also known as MSMQ) application, you can program a message extension containing an arbitrary number of extension fields. For use with MSMQ-MQSeries Bridge, build the extension according to the following specifications.

It is recommended that you use MSMQ-MQSeries Bridge Extension Property API to construct the extension with the required syntax. Create a **PROPID_M_EXTENSION** property containing at least one extension field.

Store the MSMQ-MQSeries Bridge globally unique identifier (GUID) code in the GUID subfield of exactly one extension field. The GUID is the value of the sg_MSMQExtMQMD constant, which is defined in the Mqsrext.h include file of the Extension Property API. Store the size of MQMD in the length subfield. Copy a complete MQMD structure byte-for-byte into the data buffer subfield.

When you send the message to MQSeries, the MSMQ-MQSeries Bridge converts the extension field identified by the MSMQ-MQSeries Bridge GUID. Any other extension fields are ignored.

MSMQ-MQSeries Bridge Extension Property API

The MSMQ-MQSeries Bridge Extension Property API is recommended for programming and working with message extensions. The API provides a library of functions that help you create and interpret message extensions. The MSMQ-MQSeries Bridge Extension Property API is supplied as part of the Host Integration Server SDK.

Your Message Queuing (also known as MSMQ) applications can use the API to do the following:

- Read message extensions that you receive from MQSeries
- Create or modify message extensions that you send to MQSeries
- Read or create message extensions for any other Message Queuing messaging purpose

The MSMQ-MQSeries Bridge Extension Property API enables you to create and work with the Message Queuing message extension property. This section provides a few guidelines for using the API functions.

The MSMQ-MQSeries Bridge Extension Property API operates directly on the EP representation of a message extension. In particular, the API functions support the following programming approach:

- Creating or deleting an **EP** object.
- Creating, finding, reading, writing, or deleting extension fields in an **EP** object.
- Converting an **EP** object to a message extension. (**PROPID_M_EXTENSION**) that you can send in a Message Queuing message.
- Converting a message extension that you received in a Message Queuing message to an **EP** object.

You cannot send an **EP** object directly in a Message Queuing message. You must first convert it to a message extension (**PROPID_M_EXTENSION**).

To use the message extension API, include the MSMQext.h header file in your applications. This header files contains constants and function prototypes for the Extension Property API functions. This header file is located in the SDK\Include directory on the Host Integration Server CD and is installed when the SDK package is selected.

If you are using the API in conjunction with MSMQ-MQSeries Bridge, also include the Mqsrext.h header file located in the SDK\Include directory. This file defines the GUID that labels the extension fields.

The Extension Property API functions are handle-based. The following is a summary of the MSMQ-MQSeries Bridge Extension Property API functions. For complete details, see the individual function descriptions in MSMQ-MQSeries Bridge Extensions Reference.

Function	Description
EPAdd	Adds a new extension field to an **EP** object.
EPClose	Frees the extension handle and associated memory of an **EP** object.
EPDelete	Deletes an extension field from an **EP** object.
EPDeleteAll	Deletes all extension fields or all extensions fields matching a specific GUID from an **EP** object.
EPGet	Positions to and optionally retrieves a requested extension field from an **EP** object, storing the GUID, length, and data subfields in separate variables. **EPGet** can also be used to locate extension fields containing a specified GUID.
EPGetBuffer	Converts an **EP** object to a message extension and packs the message extension into the supplied buffer.
EPOpen	Creates an **EP** object and optionally unpacks the supplied message extension buffer into it.
EPUpdate	Writes new data to an existing extension field of an **EP** object.

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Programming Considerations Using MSMQ-MQSeries Bridge Extensions

The limitations of specific API functions result from the fact that MSMQ-MQSeries Bridge transmits messages, not API calls, between queuing systems. The MSMQ-MQSeries Bridge transmits messages across the MSMQ-MQSeries interface. The MSMQ-MQSeries Bridge does not transmit API calls across the interface. Thus, Microsoft® Message Queuing (also known as MSMQ) API calls operate only within the Message Queuing environment, and MQSeries API calls operate only within the MQSeries environment. This principle limits the ways in which you can create and access queues.

All Message Queuing API functions operate only within the Message Queuing environment, up to and including foreign computers and queues. For example, you can use the following functions:

- **MQLocateBegin**, **MQLocateNext**, and **MQLocateEnd** to search for foreign queues
- **MQGetMachineProperties**, **MQGetPrivateComputerInformation**, **MQGetQueueProperties**, and **MQGetQueueSecurity** functions to retrieve the properties of foreign queues
- **MQOpenQueue** to open a foreign queue
- **MQSetQueueProperties** and **MQSetQueueSecurity** to set the properties of foreign queues
- **MQCloseQueue** to close a foreign queue

When creating a queue, you can call the Message Queuing function **MQCreateQueue** to create a foreign queue representing an MQSeries queue, but you cannot create the actual MQSeries queue itself. Similarly, you cannot create a Message Queuing queue by calling the MQSeries function **MQOPEN**.

To communicate across the MSMQ-MQSeries interface, your Message Queuing and MQSeries applications should each create their own queues. Alternatively, you can use administration tools such as the Message Queuing Manager or the MQSeries command interface to create the queues.

For proper message delivery, you must ensure that the destination queue for each message actually exists.

You can use the Message Queuing **MQPathNameToFormatName** function to determine a Message Queuing format name for an MQSeries queue. The format name actually refers to the Message Queuing foreign queue. The MSMQ-MQSeries Bridge processes the format name that it finds in a message and directs the message to the MQSeries queue.

When opening a queue, a call to the Message Queuing function **MQOpenQueue** opens the foreign queue, not the MQSeries queue itself. The MSMQ-MQSeries Bridge opens the MQSeries queue as necessary when it transmits a message. If you are sending messages to more that one MQSeries queue, you must open each one separately using its own Message Queuing format name.

In the opposite direction, the MQSeries function **MQOPEN** opens the transmission queue for the Message Queuing computer. The MSMQ-MQSeries Bridge opens the Message Queuing queue when it transmits a message.

When sending a Message Queuing message to a foreign queue with MQSendMessage, Message Queuing delivers the message to the connector queue in the MSMQ-MQSeries Bridge computer. The MSMQ-MQSeries Bridge converts and transmits the message to MQSeries queue. MQSeries delivers a message sent by **MQPUT** to a transmission queue. The MSMQ-MQSeries Bridge reads the message from the MQSeries transmission queue. After converting the message from MQSeries to Message Queuing message properties, MSMQ-MQSeries Bridge transmits the message to the destination Message Queuing queue.

When receiving a message, the MSMQ-MQSeries Bridge does not transmit receive requests across the MSMQ-MQSeries interface. A Message Queuing application can receive a message only from a native Message Queuing queue (the **MQReceiveMessage** function). An MQSeries application can receive only from a native MQSeries queue (the **MQGET** function).

When sending a message from MQSeries to Message Queuing, if you want the MQSeries message to have a value for MQMD.ApplIdentityData, you need the set both of the following:

- Set the **Open** option with **MQOO_SET_IDENTITY_CONTEXT**
- Set the **Put** option with **MQPMO_SET_IDENTITY_CONTEXT**

When a message is retrieved from Message Queuing, the MSMQ-MQSeries Bridge will have converted the Message Queuing **PROPID_M_LABEL** and **PROPID_M_LABEL_LEN** properties from the MQSeries MQMD.ApplIdentityData field value.

The MQMDE extension has the following GUID for MQMD version 2.

```
static const GUID sg_MSMQExtMQMDE =
{ 0x18ae68f5, 0x989b, 0x11d3,
      { 0x8d, 0xf9, 0x0, 0x0, 0xf8, 0x1a,  0xea, 0x1f }
  };
```

This section contains:

- Transaction Support Using MSMQ-MQSeries Bridge
- Security Using MSMQ-MQSeries Bridge
- Troubleshooting MSMQ-MQSeries Bridge Extensions

Transaction Support Using MSMQ-MQSeries Bridge

The MSMQ-MQSeries Bridge supports both Message Queuing (also known as MSMQ) and MQSeries transactions. The procedure for sending a group of transacted messages is similar in either direction, from Message Queuing to MQSeries or from MQSeries to Message Queuing. Your application should follow these three basic procedures:

- Open a transaction
- Send the messages
- Commit the transaction

At this point, the group of messages reaches the Message Queuing connector queue or the MQSeries transmission queue. Only then does the MSMQ-MQSeries Bridge transmit the messages to the other messaging system. If your application stops the transaction instead of committing, MSMQ-MQSeries Bridge does not handle the messages at all.

Even after you commit a transaction, it is still possible that MSMQ-MQSeries Bridge cannot transmit all the messages. This may occur, for example, if some of the messages are addressed to queues that do not exist in the recipient messaging system. MSMQ-MQSeries Bridge places any undeliverable messages on its dead letter queue.

In the Message Queuing-to-MQSeries direction, the MSMQ-MQSeries Bridge sends transacted messages by a transactional message pipe and untransacted messages by regular message pipe. In the MQSeries-to-Message Queuing direction, MQS->Message Queuing message pipe, and MQS->Message Queuing transactional message pipe do not depend on transaction status.

Security Using MSMQ-MQSeries Bridge

Message authentication and message body encryption are supported from the Message Queuing (also known as MSMQ) sending application up to MSMQ-MQSeries Bridge. Authentication and message body encryption from MSMQ-MQSeries Bridge to MQSeries, or from MQSeries to Message Queuing, are not currently supported.

Troubleshooting MSMQ-MQSeries Bridge Extensions

The MSMQ-MQSeries Bridge generally ignores warnings that it receives from Message Queuing (also known as MSMQ) or MQSeries, but errors are not ignored. Where possible, the MSMQ-MQSeries Bridge transmits messages despite any warnings.

If the MSMQ-MQSeries Bridge is unable to transmit a message to Message Queuing or MQSeries, it places the message on one of its dead letter queues. This can happen, for example, if a message contains an unsupported Message Queuing or MQSeries version identifier or if MSMQ-MQSeries Bridge encounters an error in the recipient messaging system.

The dead letter queues are Message Queuing queues located on the MSMQ-MQSeries Bridge computer. There are two dead letter queues used for this purpose with the following names.

Dead letter queue names	Comments
MQBridge dead letter	Used for untransacted messages when errors occur.
MQBridge xact dead letter	Used for transacted messages when errors occur.

Note that these are different from the Message Queuing and MQSeries dead letter queues, where the messaging systems place expired or incorrectly addressed messages.

You can determine whether there are messages on the dead letter queues using the MSMQ-MQSeries Bridge Manager.

If the MSMQ-MQSeries Bridge cannot deliver a message to MQSeries, it records the error in the extension property **PROPID_M_EXTENSION** of the original Message Queuing message and places the message on the dead letter queue. This extension property can be examined to determine the nature of the error encountered.

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Registry Settings Used By MSMQ-MQSeries Bridge Extensions

The MSMQ-MQSeries Bridge Extensions uses a number of registry settings for configuration and proper operation. The configuration registry settings are located under the **HKEY_LOCAL_MACHINE\Software\Microsoft\SNA Server\CurrentVersion\Setup** key. These registry settings include the subkeys listed in the following table.

Subkey	Comment
RootDir	Stores the path to the root directory where the Host Integration Server was installed. The system directory below this root directory is the location where the MSMQ-MQSeries Bridge Extensions dynamic link library (DLL) and other support DLLs are installed.

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Single Sign-On Programmer's Guide

This section provides information about Enterprise Single Sign-On (SSO) technology.

For API references and other technical information about SSO, see the Single Sign-On Programmer's Reference section of the SDK.

This section contains:

- About Programming Single Sign-On
- Programming with Enterprise Single Sign-On

About Programming Single Sign-On

A business process that relies on several different applications is likely to face the challenge of dealing with several different security domains. Accessing an application on a Microsoft® Windows® operating system may require one set of security credentials, while accessing an application on an IBM mainframe may require different credentials. Dealing with this profusion of credentials is hard for users, and it can pose an even greater challenge for automating processes. To address this problem, Microsoft Host Integration Server 2004 includes Enterprise Single Sign-On (SSO).

SSO provides a way to map a Windows user ID to non-Windows user credentials. This service can simplify business processes that use applications on diverse systems.

To use SSO, an administrator defines affiliated applications, each of which represents a non-Windows system or application. An affiliated application might be a Customer Information Control System (CICS) application running on an IBM mainframe, an SAP ERP system running on Unix, or any other kind of software. Each of these applications has its own mechanism for authentication, and so each requires its own unique credentials.

SSO stores an encrypted mapping between the Windows user ID of a user and the associated credentials for one or more affiliated applications. These linked pairs are stored in a Credentials database. SSO uses the Credentials database in two ways. The first way, called Windows-initiated Single Sign-On, uses the user ID to determine to which affiliated applications the user has access. For example, a Windows user account may be linked with credentials that grant access to a DB2 database running on a remote AS/400 server. The second way, called host-initiated Single Sign-On, acts in reverse: determining what remote applications have access to a specified user ID, and the privileges that go with that account. For example, a remote application may be linked with credentials that grant access to a user account that has administration privileges on a Windows network.

Note that SSO also includes administration tools to perform various operations. All operations performed on the Credential database are audited; for example, tools are provided that enable an administrator to monitor these operations and set various audit levels. Other tools enable an administrator to disable a particular affiliated application, turn on and off an individual mapping for a user, and perform other functions. There is also a client program that enables end users to configure their own credentials and mappings.

One of the administrative requirements for Single Sign-On is that your local system must be aware of the credentials necessary to log onto a remote system. Similarly, the remote system must be aware of the credentials on your local system. Thus, when you update your credentials, such as when you update your password on your local machine, you must also inform the remote systems that you have done so. The component you design that synchronizes passwords across an enterprise is called a password sync adapter.

This section contains:

- About the Single Sign-On Interface
- About Single Sign-On Applications
- What you Need To Know Before Programming Single Sign-On
- Supported Platforms for Single Sign-On

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About the Single Sign-On Interface

The Single Sign-On (SSO) interface was originally created for Microsoft® BizTalk® Server 2004, and as such still exists in the BizTalk namespace. The following table describes the .COM and .NET interfaces that make up the Single Sign-On interface.

.NET	COM	Description
ISSOAdmin	ISSOAdmin	Sets up and maintains the SSO server database. This database contains the names and descriptions of the various affiliated applications currently exposed on the enterprise.
ISSOConfigStore	ISSOConfigStore	Gets and sets information in the SSO configuration store.
ISSOLookup1	ISSOLookup1	Enables you to look up the external credentials on a specified application for the current user.
ISSOLookup2	ISSOLookup2	As above, but also enables you to look up the Windows® credentials for a specified external user.
ISSOMapper	ISSOMapper	Mainly acts as a set of **Get** methods to expose the properties of **ISSOAdmin** and **ISSOMapping**, but also enables you to set the external credentials for the current user for a specified application.
ISSOMapping	ISSOMapping	Creates and maintains the map between users and affiliated applications.
ISSOTicket	ISSOTicket	Creates the ticket that contains the appropriate security information. This ticket is then sent on with the appropriate message from your application.

In addition, Microsoft Host Integration Server supports the Password Sync Helper (PS Helper) component. You can use PS Helper when designing password synchronization components. The following table describes the COM interface exposed by PS Helper.

COM Object	Description
ISSONotification	Handles password changes to and from non-Windows operating systems.
SExternalAccount	Describes an external account.
SPasswordChange	Describes a password change.
SPasswordChangeComplete	Describes the completion of a password change.
SStatus	Describes an error or event.
SAdapterInGroup	Describes the adapters in a given group.
SAdapter	Describes a specific adapter.

See Also

Single Sign-On Programmer's Reference

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About Single Sign-On Applications

From a programming perspective, you will write two different kinds of applications using Single Sign-On: a traditional Single Sign-On application that uses the Single Sign-On interface to interact with remote applications, and a password sync adapter that uses the Password Sync (PS) Helper interface to synchronize passwords across your enterprise.

This section contains:

- About Traditional Single Sign-On Applications
- About Password Sync Adapters

About Traditional Single Sign-On Applications

The Single Sign-On programming architecture contains a mapping component exists to map between applications and users, a lookup component enables you to look up credentials for a specified use, and an administration component enables you to perform administrative tasks. The main difference is that you are creating an application that uses many of the features that an administrator maintains.

Mapping

Mapping is the process of linking a specified user with a specified application. You can map between affiliate applications and users using ISSOMapping and ISSOMapper. With **ISSOMapping**, you can create, delete, enable, and disable mappings. With **ISSOMapper**, you can get and set mapping data for the current user. For more information about how to programmatically perform mapping, see Mapping Single Sign-On Credentials and Determining Current Single Sign-On Access.

Lookup

The core of the Single Sign-On programming interface is the ability to look up credentials for specified users. You can look up credentials using ISSOLookup1 and ISSOLookup2. **ISSOLookup1** enables you to look up the credentials of a local user for a remote affiliate application. In contrast, **ISSOLookup2** also enables you to look up the credentials of a remote user for a local affiliate application. The former is necessary for a traditional Single Sign-On application, while the latter is useful when writing a host-initiated Single Sign-On application. For information on how to programmatically look up credentials for both local and remote users, see Logging on to a Remote or Local Application.

Administration

You can perform many of the administrative capabilities programmatically through ISSOAdmin Interface and ISSOConfigStore. Such tasks include Configuring Single Sign-On and Creating and Describing an Application to Single Sign-On.

Communication and ticketing

Your application will most likely issue messages so that your user can communicate with a remote application. To communicate with a remote application securely, you will need to issue and redeem an SSO ticket. You can actually issue and redeem tickets programmatically using the techniques described in Issuing and Redeeming a Single Sign-On Ticket.

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About Password Sync Adapters

A password sync adapter is a component that propagates password changes to and from a non-Windows system. A password sync adapter is similar to a traditional Single Sign-On application, with several differences: they are administered using a specialized interface, they are described using a specialized XML format in the configuration store, and Microsoft Host Integration Server uses a specialized feature to organize adapters in the configuration store.

This section contains:

- About Password Sync Programming Architecture
- About Adapter Programming Administration
- About Adapter Programming Configuration
- About Adapter Groups and Group Adapters

About Password Sync Programming Architecture

A password sync adapter uses a pull model for interacting with the rest of the Enterprise Single Sign-On system: that is, the adapter actively receives password changes from the Enterprise Single Sign-On (ENTSSO) service as well as the non-Windows system. Similarly, the adapter pushes password changes received from one system to the other. With this model, your adapter interacts with three architectural components: the ENTSSO architecture, the Password Sync (PS) Helper component, and a specified non-Windows system.

Enterprise Single Sign-On architecture

ENTSSO is the service that implements the Enterprise Single Sign-On technology, and runs as a local service on the same system as your adapter. Therefore, communication between the adapter and ENTSSO is always local. However, a password sync adapter runs in a separate process from the ENTSSO service.

ENTSSO uses the configuration store to store configuration information for an adapter. The Application Users account of a configuration store application corresponds to the access account. When an adapter calls into ENTSSO, ENTSSO checks that the adapter is within the configured access account for that adapter. The access account must be a (local or domain) group account.

Because ENTSSO stores information about an adapter, the adapter can identify itself to ENTSSO by its adapter name. The adapter name corresponds to the configuration store application name and the configuration store identifier used to store the adapter properties. Therefore, adapters only must know their adapter name (configured at adapter installation time) to access configuration information and to correctly identify themselves to the ENTSSO system at run time.

Password Sync Helper

Password Sync (PS) Helper is a COM component provided by ENTSSO. PS Helper runs in-process with the password sync adapter, and exposes the ISSONotification Interface. Your adapter can call **ISSONotification** to communicate with the ENTSSO service. The PS Helper passes communications to and from ENTSSO using encrypted (packet privacy) lighweight remote procedure call (LRPC). While the communications are mainly for password updates, you can also use **ISSONotification** to pass other types of notifications between the adapter and ENTSSO. Because PS Helper runs as a singleton value per process, it is possible for multiple adapters to call the same PS Helper object from within the same adapter process. For more information on using PS Helper programmatically, see Synchronizing a Password.

Non-Windows system

The non-Windows system is the remote computer your adapter interacts with. How you interact with the non-Windows system is up to you. However, you will likely use Transaction Integrator to do so. For more information on Transaction Integrator and writing applications that interact with remote host systems, see the Transaction Integrator Programmer's Guide.

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About Adapter Programming Administration

An adapter is a special type of configuration store application: that is, an adapter is a component that shares a namespace with other Single Sign-On and configuration store applications. Therefore, you can access information about an adapter using ISSOConfigStore. However, you do not perform administrative functions on an adapter, such as creating, updating and deleting the adapter, using ISSOAdmin Interface. Instead, you administer an adapter through ISSONotification. The reason for a specialized adapter administration interface is so that Host Integration Server 2004 can coordinate other activities with the configuration store.

See Also

About Adapter Programming Configuration

About Adapter Groups and Group Adapters

About Adapter Programming Configuration

Every type of password sync adapter has different configuration requirements, depending on what non-Windows system you design the adapter for. Like affiliate applications, you can use the Enterprise Single Sign-On configuration store to store configuration properties centrally and securely. As with other configuration store applications, an administrator can use the Enterprise Single Sign-On management user interface to locate and read an XML file that describes the configuration properties for your adapter. The management tools use the XML file to render a property page to gather the required property values, for the specified adapter. You can also use ISSOConfigStore to load and read a XML name/value combinations to and from the configuration store, or you can use the SSOPS tool. You can also use the Enterprise Single Sign-On administration tools to enable and disable an adapter. On initial creation, an adapter is disabled.

About Adapter Groups and Group Adapters

An adapter group is an administration mechanism you can use to collect and organize a set of adapters. In contrast, a group adapter is a component that services all adapters in an adapter group. For example, you may write a set of adapters that all use the same COM component to transmit password synchronizations over TCP/IP. Your set of adapters is called the adapter group, while the component that services them all is called a group adapter. Adapter groups are described in the configuration store. You can retrieve information and updates on an adapter group using ISSONotification.ReceiveNotification.

A group adapter has the same name as the adapter group. Other than the naming restriction, a group adapter is otherwise identical to a normal adapter. For example, a group adapter can have can have independent access groups and configuration properties, as described by its configuration file. A group adapter will most likely be on the same computer as any adapters in the adapter group. However, this is not currently enforced. Likewise all adapters in the same adapter group may be expected to be on the same computer.

Using InitializeAdapter, you can access and initialize a group adapter during startup. When you initialize a group adapter, Host Integration Server 2004 informs the group adapter of all adapters in the adapter group on the current system. In addition, HIS will send notifications to the group adapter any time an adapter is added, deleted, enabled, or disabled in the adapter group. However, the group adapter does not receive any password change notifications.

Adapter groups and group adapters are optional using the Administration tool.

What you Need To Know Before Programming Single Sign-On

In order to user the Single Sign-On Programming Guide effectively, you should be familiar with the following:

- Microsoft® Host Integration Server 2004, including how to set up and administer Single Sign-On.
- Microsoft Windows Server ™ 2003, Microsoft Windows® XP, or Microsoft Windows 2000 Server operating systems. You should be particularly familiar with Windows Security features.
- Administrative features of Enterprise Single Sign-On, especially how to perform administrative actions using the user interface.

Depending on the API and development used, you should also be familiar with the following interfaces:

- COM
- .NET Framework and the common language runtime
- Windows Networking, and in particular how to send and receive tickets

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Supported Platforms for Single Sign-On

Enterprise Single Sign-On ships with Microsoft® Host Integration Server 2004, and as such is supported by all platforms that support it as well.

- Microsoft Windows Server™ 2003
- Microsoft Windows XP Professional
- Microsoft Windows® 2000 Server
- Microsoft Windows 2000 Advanced Server
- Microsoft Windows 2000 Datacenter Server
- Microsoft Windows 2000 Professional

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Programming with Enterprise Single Sign-On

Enterprise Single Sign-On (SSO) is a technology implemented in the Enterprise Single Sign-On service (ENTSSO) that enables users to access multiple remote services without having to work their way through additional sign-on screens.

This section contains:

- Determining Current Single Sign-On Access
- Configuring Single Sign-On
- Creating and Describing an Application to Single Sign-On
- Mapping Single Sign-On Credentials
- Logging on to a Remote or Local Application
- Issuing and Redeeming a Single Sign-On Ticket
- Synchronizing a Password

Determining Current Single Sign-On Access

One of the first tasks you may need to perform for a user is to determine what affiliated applications have already been set up for the current user. You can perform this query with a call to ISSOMapper.GetApplications.

To query the Single Sign-On database for the application affiliated with the current user

1. Create a new instance of ISSOMapper.

   In general, **ISSOMapper** is an interface designed to retrieve information from SSO. You will most likely be using **ISSOMapper** in many similar queries.

2. Retrieve all of the applications affiliated with the current user with a call to **ISSOMapper.GetApplications**.

   ISSOMapper.GetApplications automatically returns only the affiliated applications of the current user.

The following code sample describes how to query the Single Sign-On (SSO) database.

```
private static string[] Applications=null;
. . .
public static string[] GetCurrentUserApplications()
{
   if(Applications==null)
   {
      string[] descs;
      string[] contacts;
      ISSOMapper mapper=new ISSOMapper();
      mapper.GetApplications(out Applications, out descs, out contacts);
   }
   return Applications;
}
```

Configuring Single Sign-On

Before accessing Single Sign-On (SSO), you should make sure that Single Sign-On is set correctly for the current user. For most configurations, you are using one of two interfaces. ISSOAdmin Interface is the general administration interface that enables you to create new affiliation applications. However, using the ISSOAdmin.GetGlobalInfo and UpdateGlobalInfo, you can set a variety of flags and administration values. One possible task, as described below, is ensuring that SSO ticketing has been enabled.

To enable ticketing

1. Create a new instance of **ISSOAdmin**.
2. Retrieve the current settings through **ISSOAdmin.GetGlobalInfo**.

   If necessary, you may wish to confirm that the flags are set to the correct values at this point.

3. Change any relevant flags using **ISSOAdmin.UpdateGlobalInfo**.

   In this particular case, all the flags are being set to validate and enable tickets. Note that Microsoft Host Integration Server currently supports only the SSO_FLAG_ENABLED. For a complete listing of all the available flags for SSO, see Enterprise Single Sign-On Flags.

The following example describes how to enable ticketing using Single Sign-On.

```
public static bool EnableTickets()
{
   try
   {
      ISSOAdmin admin=new ISSOAdmin();
      int flags=0;
      int appDeleteMax=-1;
      int mappingDeleteMax=-1;
      int ntpLookupMax=-1;
      int xplLookupMax=-1;
      int ticketTimeout=-1;
      int cacheTimeout=-1;
      string secretServer=null;
      string ssoAdminGroup=null;
      string affiliateAppMgrGroup=null;
      // Get current default settings
      admin.GetGlobalInfo(out flags, out appDeleteMax, out mappingDeleteMax, out ntpLookupMax
, out xplLookupMax, out ticketTimeout, out cacheTimeout, out secretServer, out ssoAdminGroup,
out affiliateAppMgrGroup);
      // Update global settings
      admin.UpdateGlobalInfo(SSOFlag.SSO_FLAG_ALLOW_TICKETS | SSOFlag.SSO_FLAG_VALIDATE_TICKE
TS, SSOFlag.SSO_FLAG_ALLOW_TICKETS | SSOFlag.SSO_FLAG_VALIDATE_TICKETS, ref appDeleteMax, ref
mappingDeleteMax, ref ntpLookupMax, ref xplLookupMax, ref ticketTimeout, ref cacheTimeout, nu
ll, null, null);
   }
   catch
   {
      return false;
   }
return true;
}
```

Creating and Describing an Application to Single Sign-On

Another common administrative task you may need to perform is adding an affiliate application into the Single Sign-On (SSO) database. Adding an affiliate application to the SSO database enables you to associate users and credentials with the affiliated application. Note that creating an affiliated application requires administrative privileges, and can be done through the user interface as well.

To create and describe an application in the SSO database

1. Create a new ISSOAdmin object.
2. Create a new application with a call to ISSOAdmin.CreateApplication.
3. Add the relevant fields describing the application with a call to ISSOAdmin.CreateFieldInfo.

   It is during this step that you tell the database that an application has users and associated passwords.

4. Push the newly created description out to the server with a call to ISSOAdmin.UpdateApplication.
5. Purge the local cache for the changes you made using a call to ISSOAdmin.PurgeCacheForApplication.

   Purging the local cache is a security measure that prevents having the names and passwords that you describe in step three to exist in an unsecured location.

The following sample describes how to create an application and add field information.

```
  public static bool AddApplication(string name, string admins, string users)
      {
         try
         {
            ISSOAdmin admin=new ISSOAdmin();
            // Create application
            admin.CreateApplication(name, "SSO Sample Application", "administrator@ssoaffilia
teapplication.com", users, admins, SSOFlag.SSO_WINDOWS_TO_EXTERNAL | SSOFlag.SSO_FLAG_ALLOW_T
ICKETS | SSOFlag.SSO_FLAG_VALIDATE_TICKETS, 2);
            // Add fields
            admin.CreateFieldInfo(name, "User Id", SSOFlag.SSO_FLAG_NONE);
            admin.CreateFieldInfo(name, "Password", SSOFlag.SSO_FLAG_FIELD_INFO_MASK);
            // Enable application
            admin.UpdateApplication(name, null, null, null, null, SSOFlag.SSO_FLAG_ENABLED, S
SOFlag.SSO_FLAG_ENABLED);
            // Purge changes
            admin.PurgeCacheForApplication(name);
         }
         catch
         {
            return false;
         }
         return true;
      }
```

Mapping Single Sign-On Credentials

Once you know you have affiliated applications in your Single Sign-On (SSO) database, you can map the credentials for a user to that application. Mapping the credentials of the current user to an affiliated application requires you use a combination of the ISSOMapper and ISSOMapping interfaces.

To map between an affiliated application and user credentials

1. Create new instances of **ISSOMapper** and **ISSOMapping**.
2. Set the **ISSOMapping** properties to the relevant values.

   The relevant properties for **ISSOMapping** are the Microsoft® Windows® domain name of the user, the Windows user name, the name of the affiliated application, and the logon name the user goes by for the affiliated application.

3. Make sure the mapping exists using a call to ISSOMapping.Create.

   Calling **ISSOMapping.Create** propagates the local copy of mapping out to the SSO server.

4. Set the credentials on the mapping with a call to ISSOMapper.SetExternalCredentials.

   It is necessary to set the credentials with a separate call due to security reasons.

5. Enable the mapping with a call to ISSOMapping.Enable.

   Calling **ISSOMapping.Enable** exposes your created map to the enterprise. Without calling this step, your map would remain private on the server, and thus unusable.

The following sample describes how to add mapping between a specified SSO application and a user.

```
public static bool AddMapping(string application, string user, string XU, string XP)
{
   try
   {
      // Set mapping
      ISSOMapper mapper=new ISSOMapper();
      ISSOMapping mapping=new ISSOMapping();
     string username=user.Substring(user.IndexOf('\\')+1);
      string userdomain=user.Substring(0, user.IndexOf('\\'));
      mapping.WindowsDomainName=userdomain;
      mapping.WindowsUserName=username;
      mapping.ApplicationName=application;
      mapping.ExternalUserName=XU;
      mapping.Create(0);
      // Set credentials
      string[] credentials=new string[]{XP};
      mapper.SetExternalCredentials(application, XU, ref credentials);
      mapping.Enable(0);
   }
   catch
   {
      return false;
   }
   return true;
      }
```

Logging on to a Remote or Local Application

After you have finished setting affiliate credentials for your user, you can use Enterprise Single Sign-On service (ENTSSO) to provide access to applications. If the user is local, you can use ENTSSO to retrieve credentials for a non-Windows application. In contrast, if the user is remote, you can use ENTSSO to retrieve credentials for a local application.

This section contains:

- Logging a Local User on to a non-Windows Application
- Logging a Remote User on to a Local Application

Logging a Local User on to a non-Windows Application

Once you have set up your user with an affiliate application, you can use Single Sign-on to access the external user name and credentials of the current user. Using these credentials, you can then use Transaction Integrator (TI) to log your user on to the affiliate application running on a host server.

To log a local user on to a host application

1. Receive the request to log the current user on to an application running on the host server.

   It is your responsibility to determine how the current user requests to be logged on to a host application.

2. Retrieve the credentials for the current user using ISSOLookup1.GetCredentials or ISSOLookup2.GetCredentials.

   You must supply the name of the host application along with any relevant flags. **GetCredentials** returns the associated username and credentials for the host application.

   Note that you may use either **ISSOLookup1** or **ISSOLookup2**. The only difference is that ISSOLookup2 also has a method for logging a remote user on to a local windows application.

3. Use the external user name and credentials to log on to the host application.

   It is your responsibility to determine how to use the credentials to log on to the host application. However, you will most likely use a Transaction Integrator (TI) interface.

See Also

Logging a Remote User on to a Local Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Logging a Remote User on to a Local Application

The other main feature of Enterprise Single Sign-On service (ENTSSO) is supporting a host-initiated process (HIP). ENTSSO interacts with HIP when a remote user attempts to access a local Windows resource. Using Host Integration Sever 2004 and ENTSSO, you can receive the request from the host user and request access to the local Windows application.

To log a remote user on to a local Windows application

1. Receive the request from the remote user.

   It is your responsibility to determine how to retrieve a request from the remote user. Most likely, you will use a Transaction Integrator (TI) interface, but that is not strictly necessary.

2. Request that the remote user be given access to the specified affiliate application, using IssoLookup2.LogonExternalUser.

   LogonExternalUser passes in the name of the application the external user wishes to access, the name of the user, the associated credentials for the user, and any relevant flags. If successful, **LogonExternalUser** will return a Windows handle.

   Note that the remote user must already be identified in the Single Sign-On database, be associated with an affiliate application, and have his credentials on file. Otherwise, **LogonExternalUser** will return an error.

   You can keep the user names and credentials up to date using Password Sync.

3. Use the Windows handle returned from **LogonExternalUser** to grant access to your remote user.

   To continue keeping your application secure, you can use SSO to issue and redeem tickets. For more information, see Issuing and Redeeming a Single Sign-On Ticket.

   As with the original request to log on, it is your responsibility to determine how the remote host will use the Windows handle.

See Also

Logging a Local User on to a non-Windows Application

Issuing and Redeeming a Single Sign-On Ticket

Once you have linked together a user and an affiliate application, you can issue tickets to ensure security while maintaining communications. Single Sign-On ticketing works as other ticketing technologies: prior to sending the message off, you append the SSO ticket to the message as a string. The server receives your message, decodes the ticket, and uses the information as appropriate. The server then acknowledges that it received the message by sending a return ticket, which you can decode and redeem.

To issue a Single Sign-On ticket

1. Create a new ticket object with a call to ISSOTicket.
2. Issue the ticket with a call to SSOTicket.IssueTicket.

   IssueTicket does not currently accept any valid parameters. Therefore, you must assign the returned encoded string only to the relevant message. The affiliate application you send the message to uses the encoded SSO ticket to determine to what parts of the application you have access.

To redeem an Single Sign-On ticket

1. Create a new ticket object with a call to **SSOTicket**.
2. Redeem the ticket with a call to SSOTicket.RedeemTicket or IBTSTicket.ValidateAndRedeemTicket.

The following code sample describes how to redeem an SSO ticket using **IBTSTicket**.

```
public class SSOResult
    {
        private string userName;
        private string[] result;
        public SSOResult (IBaseMessage message, string affiliateApplication)
        {
            string   userName = null;
            string[] result   = null;
            IBTSTicket ticket = new IBTSTicket();
            result = ticket.ValidateAndRedeemTicket(
                message,
                affiliateApplication,
                0,
                out userName);
            this.userName = userName;
            this.result   = result;
        }
        public string UserName
        {
            get { return userName; }
        }
        public string[] Result
        {
            get { return result; }
        }
    }
```

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Synchronizing a Password

Synchronizing a password is performed through a password sync adapter. A password sync adapter is an application you create that is registered with the configuration store. This application ought to be capable of communicating with a specific, remote, non-Windows system, and should also be capable of instructing that system to update password information.

This section contains:

- Creating a Password Sync Adapter
- Registering and Configuring a Password Sync Adapter

Creating a Password Sync Adapter

A password sync (PS) adapter is an application that uses the Password Sync Helper component to pass notifications to and from Enterprise Single Sign-On (SSO). Note that although the PS Helper component exposes a COM interface, your adapter does not necessarily have to be a COM component. You can design your adapter as a stand-alone process, a COM+ application, or a Windows service.

To create a password sync adapter

1. Inform Enterprise Single Sign-On service (ENTSSO) that your provider is active using ISSONotification.InitializeAdapter.

   InitializeAdapter informs ENTSSO that a provider (usually the same provider that is making the call) is currently turned on, and therefore will be communicating password updates to and from the system. You can also use **InitializeAdapter** to activate other resources such as group adapters.

2. Send password updates to ENTSSO using ISSONotification.SendNotification.

   It is up to you to determine how you receive password updates from your non-Windows system: most likely, you will be using a Transaction Integrator (TI) interface. Once you have received the update, you can pass the information on to ENTSSO using **SendNotification**. Note that **SendNotification** is not limited to sending password updates: the architecture of **SendNotification** allows you to send other types of notifications as well.

3. Request password updates from ENTSSO using ISSONotification.ReceiveNotification.

   Because the password sync adapter is a pull technology, ENTSSO will never call your adapter. Instead, your adapter will periodically call **ReceiveNotification** to see if any password updates are available. You can choose to set the WAIT flag on **ReceiveNotification**. Setting WAIT will block the thread until a notification is available.

   Note that ENTSSO delivers a password change to your adapter in plain text. It is the responsibility of the adapter to protect that password information against incorrect disclosure. It is also the responsibility of the adapter to protect itself against spoofing or attacks from other invalid sources, including spoofing of the Password Sync Helper component.

   Once you receive a password update from ENTSSO through the *pReceiveNotification* parameter, you must pass this information on to your non-Windows system. As with **SendNotification**, it is up to you to determine the best means of communicating with the remote server. Most likely however, you will use a variation of Transaction Integrator (TI).

4. Turn off your adapter using ISSONotification.ShutdownAdapter.

   ShutdownApplication should be the last method called by an adapter, and indicates that the adapter will no longer be sending or receiving password updates to ENTSSO.

   Note that ENTSSO buffers any password changes a user makes while the adapter is shut down, up to a buffer size limit.

See Also

COM Mapper Programmer's Reference

Registering and Configuring a Password Sync Adapter

Once you are finished creating your password sync adapter, you must load your adapter on to a system. Further, you must inform Enterprise Single Sign-On and the configuration store that your application is a password sync adapter. You must register with the configuration store for security purposes: your adapter will request updates to passwords and other credentials. Therefore, ENTSSO must know that a given adapter is allowed to ask for such permissions.

To register and use a password sync adapter

- Register your adapter with the configuration store using the **ssops** tool.

  Using **ssops**, you load an XML configuration file that describes your application to Enterprise Single Sign-On.

Programmer's Reference

This section of the Microsoft® Host Integration Server 2004 software development kit (SDK) provides reference information for the programmer writing applications for Host Integration Server 2004.

This section contains:

- Transaction Integrator Programmer's Reference
- Data Integration Programmer's Reference
- Network Integration Programmer's Reference
- Administration and Management Programmer's Reference
- Messaging Programmer's Reference
- Security Programmer's Reference

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Transaction Integrator Programmer's Reference

This section of the Microsoft® Host Integration Server 2004 Programmer 's Reference describes the objects, methods, properties, controls, and other interfaces that enable you to integrate Host Integration Server technologies into your application.

For general information about programming for Transaction Integrator, see the Transaction Integrator Programmer's Guide section of the SDK.

For sample code using Transaction Integrator, see the Transaction Integrator Samples section of the SDK.

This section contains:

- COMTIContext Interface
- COMTIContext Keywords
- TI Component Properties
- Standard Transaction Request and Reply Messages
- CICS Enhanced Listener Request and Reply Messages
- Microsoft Concurrent Server

COMTIContext Interface

Use the **ICOMTIContext** interface to add, remove, and query information in the Transaction Integrator (TI Context). The following methods implement the **ICOMTIContext** interface:

- ClearAllContext
- ClosePersistentConnection
- CountContext
- DeleteContext
- GetConnectionInfo
- QueryContextInfo
- ReadContext
- UpdateContextInfo
- WriteContext

ClearAllContext

Use the **ClearAllContext** method to remove all the entries in a TI Context array.

```
HRESULT ClearAllContext (
[in] SAFEARRAY(VARIANT)*    prgContextArray
    );
```

Parameters

prgContextArray
This SAFEARRAY parameter contains the TI Context that is to be cleared.

Return Codes

S_OK
The method call completed successfully.
E_INVALIDARG
One or more of the parameters passed are invalid.
E_FAIL
An internal processing error occurred.

See Also

ClosePersistentConnection

CountContext

DeleteContext

GetConnectionInfo

QueryContextInfo

ReadContext

UpdateContextInfo

WriteContext

Persistent Connections with the Mainframe

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ClosePersistentConnection

Use the **ClosePersistentConnection** method to close the persistent connection by contacting the COM+ or .NET application object without the need for a call to the server object.

```
HRESULT ClosePersistentConnection (
[in, out] SAFEARRAY(VARIANT)*COMTIContextArray
    );
```

Parameters

COMTIContextArray
This SAFEARRAY contains the state of the connection.

Return Codes

S_OK
The method call completed successfully.
E_INVALIDARG
One or more of the parameters passed are invalid.
E_FAIL
An internal processing error occurred.

See Also

ClearAllContext

CountContext

DeleteContext

GetConnectionInfo

QueryContextInfo

ReadContext

UpdateContextInfo

WriteContext

Persistent Connections with the Mainframe

CountContext

Use the **CountContext** method to acquire a count of the entries in a TI Context array.

```
HRESULT CountContext (
[in] SAFEARRAY(VARIANT)*    prgContextArray,
[out] ULONG*                pulContextEntriesCount
    );
```

Parameters

prgContextArray
  This SAFEARRAY parameter contains TI Context entries that are passed to and returned from COM+ objects.
pulContextEntriesCount
  Upon successful completion of the call, this integer parameter contains a count of the number of entries in the specified TI Context array.

Return Codes

S_OK
  The method call completed successfully.
E_INVALIDARG
  One or more of the parameters passed are invalid.
E_FAIL
  An internal processing error occurred.

See Also

ClearAllContext

ClosePersistentConnection

DeleteContext

GetConnectionInfo

QueryContextInfo

ReadContext

UpdateContextInfo

WriteContext

Persistent Connections with the Mainframe

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DeleteContext

Use the **DeleteContext** method to remove an entry in a TI Context array.

```
HRESULT DeleteContext (
[in] BSTR                       bstrContextEntryName,
[in,out] SAFEARRAY(VARIANT)*    prgContextArray
    );
```

Parameters

bstrContextEntryName
This string parameter contains the name of the TI Context entry to be removed.
prgContextArray
This SAFEARRAY parameter contains the TI Context entries that are passed to and returned from COM+ objects.

Return Codes

S_OK
The method call completed successfully.
E_INVALIDARG
One or more of the parameters passed are invalid.
E_FAIL
An internal processing error occurred.

See Also

ClearAllContext

ClosePersistentConnection

CountContext

GetConnectionInfo

QueryContextInfo

ReadContext

UpdateContextInfo

WriteContext

Persistent Connections with the Mainframe

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

GetConnectionInfo

Use the **GetConnectionInfo** method to query the state of the persistent connection.

```
HRESULT GetConnectionInfo (
[in] SAFEARRAY(VARIANT)*COMTIContextArray,
[out] BOOL* pfConnectionIsPersistent,
[out] BOOL* pfConnectionIsViable
    );
```

Parameters

COMTIContextArray
This SAFEARRAY contains the state of the connection.
pfConnectionIsPersistent
This BOOL parameter is set to TRUE if the connection is persistent and active.
pfConnectionIsViable
This BOOL parameter is set to TRUE if the connection is active.

Return Codes

S_OK
The method call completed successfully.
E_INVALIDARG
One or more of the parameters passed are invalid.
E_FAIL
An internal processing error occurred.

See Also

ClearAllContext

ClosePersistentConnection

CountContext

DeleteContext

QueryContextInfo

ReadContext

UpdateContextInfo

WriteContext

Persistent Connections with the Mainframe

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

QueryContextInfo

Use the **QueryContextInfo** method to acquire a count of the entries in a TI Context array, the names of the context entries, and the data types of the context entries.

```
HRESULT QueryContextInfo (
[in, out] SAFEARRAY(VARIANT)*   prgContextArray,
[out] ULONG*                    pulContextEntriesCount,
[out] SAFEARRAY(BSTR)*          prgContextNameArray,
[out] SAFEARRAY(SHORT)*         prgContextTypeArray
    );
```

Parameters

prgContextArray
This SAFEARRAY parameter contains the TI Context entries that are passed to and returned from COM+ objects.
pulContextEntriesCount
Upon successful completion of the call, this integer parameter contains a count of the entries in the specified TI Context array.
prgContextNameArray
This SAFEARRAY of strings parameter contains the TI Context entry names.
prgContextTypeArray
This SAFEARRAY of integers parameter contains the TI Context entry data types.

Return Codes

S_OK
The method call completed successfully.
E_INVALIDARG
One or more of the parameters passed are invalid.
E_FAIL
An internal processing error occurred.

See Also

ClearAllContext

ClosePersistentConnection

CountContext

DeleteContext

GetConnectionInfo

ReadContext

UpdateContextInfo

WriteContext

Persistent Connections with the Mainframe

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ReadContext

Use the **ReadContext** method to acquire the value of an entry in a TI Context array.

```
HRESULT ReadContext (
[in] BSTR                   bstrContextEntryName,
[out] VARIANT*              pvarContextEntryValue,
[in] SAFEARRAY(VARIANT)*    prgContextArray
    );
```

Parameters

bstrContextEntryName
This string parameter contains the name of the TI Context entry to be retrieved.
pvarContextEntryValue
This VARIANT parameter contains the value of the context entry identified by bstrContextEntryName.
prgContextArray
This SAFEARRAY parameter contains the TI Context entries that are passed to and returned from COM+ objects.

Return Codes

S_OK
The method call completed successfully.
E_INVALIDARG
One or more of the parameters passed are invalid.
E_FAIL
An internal processing error occurred.

See Also

ClearAllContext

ClosePersistentConnection

CountContext

DeleteContext

GetConnectionInfo

QueryContextInfo

UpdateContextInfo

WriteContext

Persistent Connections with the Mainframe

UpdateContextInfo

Use the **UpdateContextInfo** method to update the client **COMTIContext** array with the current state of the connection.

```
HRESULT UpdateContextInfo (
[in, out] SAFEARRAY(VARIANT)*COMTIContextArray
    );
```

Parameters

COMTIContextArray
This SAFEARRAY contains the state of the connection.

Return Codes

S_OK
The method call completed successfully.
E_INVALIDARG
One or more of the parameters passed are invalid.
E_FAIL
An internal processing error occurred.

See Also

ClearAllContext

ClosePersistentConnection

CountContext

DeleteContext

GetConnectionInfo

QueryContextInfo

ReadContext

WriteContext

Persistent Connections with the Mainframe

WriteContext

Use the **WriteContext** function to add or replace an entry in a TI Context array.

```
HRESULT WriteContext (
[in] BSTR                     bstrContextEntryName,
[in] VARIANT                  varContextEntryValue,
[in, out] SAFEARRAY(VARIANT)   prgContextArray
    );
```

Parameters

bstrContextEntryName
This string parameter contains the name under which the TI Context entry will be stored and accessed. Some context entry names are predefined by Microsoft. You are free to define your own (although there is no way to deal with such in the COM+ application).
varContextEntryValue
This VARIANT parameter contains the value to be stored for the context entry identified by bstrContextEntryName.
prgContextArray
This SAFEARRAY parameter contains the TI Context entries that are passed to and returned from COM+ objects.

Return Codes

S_OK
The method call completed successfully.
E_INVALIDARG
One or more of the parameters passed are invalid.
E_FAIL
An internal processing error occurred.

See Also

ClearAllContext

ClosePersistentConnection

CountContext

DeleteContext

GetConnectionInfo

QueryContextInfo

ReadContext

UpdateContextInfo

Persistent Connections with the Mainframe

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

COMTIContext Keywords

Use the COMTIContext keywords as commands to override the contents of a transaction request message (TRM).

This section contains:

- REOverride
- TPNameOverride
- ProgNameOverride
- USERID
- PASSWORD
- IMS_LTERM
- TRMIN
- TRMOUT
- CONNTIMEOUT
- CONNTYPE

REOverride

Use the **REOverride** keyword to override the type library assignment of the method call to a remote environment (RE) and to assign the call to a newly specified RE. The COMTIContext context name is **REOverride**; the value must be a valid remote environment name.

See Also

TPNameOverride

ProgNameOverride

USERID

PASSWORD

IMS_LTERM

TRMIN

TRMOUT

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

TPNameOverride

Use the **TPNameOverride** keyword to override the transaction ID assigned within the type library and to specify the new transaction ID to be sent to the host. The COMTIContext context name is **TPNameOverride**; the value must be a string that contains a valid mainframe transaction ID.

See Also

REOverride

ProgNameOverride

USERID

PASSWORD

IMS_LTERM

TRMIN

TRMOUT

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

ProgNameOverride

Use the **ProgNameOverride** keyword to override the program name assigned within the type library and to specify a different program name to be sent to the host. The COMTIContext context name is **ProgNameOverride**; the value must be a string that contains a valid mainframe program name.

See Also

REOverride

TPNameOverride

USERID

PASSWORD

IMS_LTERM

TRMIN

TRMOUT

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

USERID

Use the **USERID** keyword, combined with **PASSWORD**, to provide explicit security without the need for a callback. The COMTIContext context name is **USERID**; the value must be a string that contains a valid mainframe security user ID.

See Also

REOverride

TPNameOverride

ProgNameOverride

PASSWORD

IMS_LTERM

TRMIN

TRMOUT

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

PASSWORD

Use the **PASSWORD** keyword, combined with **USERID**, to provide explicit security without the need for a callback. The COMTIContext context name is **PASSWORD**; the value must be a string that contains a valid mainframe security password.

See Also

REOverride

TPNameOverride

ProgNameOverride

USERID

IMS_LTERM

TRMIN

TRMOUT

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

IMS_LTERM

Use the **IMS_LTERM** to override the default LTERM that an Information Management Systems (IMS) connect call uses while processing the host transaction within IMS. The COMTIContext context name is **IMS_LTERM**, and its value must be from one through eight alphanumeric characters.

> **Note** If the **IMS_LTERM** is assigned more than eight characters, the **IMS_LTERM** value is not passed to the host transaction and the host transaction continues to use the system provided default LTERM.

See Also

REOverride

TPNameOverride

ProgNameOverride

USERID

PASSWORD

TRMIN

TRMOUT

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

TRMIN

Use the **TRMIN** keyword to override the default transaction request message (TRM) containing the transaction program ID, user ID, password, and other administrative data sent to the host. The COMTIContext context name is **TRMIN**. The TRM must be defined as a user-defined type (UDT), and the name of that UDT must begin with the characters TRMIN.

See Also

TPNameOverride

ProgNameOverride

USERID

PASSWORD

IMS_LTERM

TRMOUT

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

TRMOUT

Use the **TRMOUT** keyword to override the default transaction request message (TRM) containing the transaction program ID, user ID, password, and other administrative data sent from the host. The COMTIContext context name is **TRMOUT**. The TRM must be defined as a user-defined type (UDT), and the name of that UDT must begin with the characters TRMOUT.

See Also

TPNameOverride

ProgNameOverride

USERID

PASSWORD

IMS_LTERM

TRMIN

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

CONNTIMEOUT

Use the CONNTIMEOUT keyword to reclaim orphaned persistent connections. **CONNTIMEOUT** takes an integer value specifying, in seconds, how long to wait before a persistent connection is considered abandoned and then automatically closed. The timing starts as the client call processing is completed by the COM+ or .NET generic object.

See Also

TPNameOverride

ProgNameOverride

USERID

PASSWORD

IMS_LTERM

TRMIN

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

CONNTYPE

CONNTYPE

Use the CONNTYPE keyword to establish a persistent connection by setting **CONNTYPE** to **OPEN**. If a call with **CONNTYPE** set to **OPEN** completes successfully, the returned **COMTIContext** array **CONNTYPE** keyword has a value of **USE**. To make a call and terminate the persistent connection, set the **CONNTYPE** keyword to **CLOSE**. If a call with **CONNTYPE** set to **CLOSE** completes successfully, the returned **COMTIContext** array **CONNTYPE** keyword has a value of **NONPERSISTENT**.

See Also

TPNameOverride

ProgNameOverride

USERID

PASSWORD

IMS_LTERM

TRMIN

Using Custom TRMs and ELMs with COMTIContext

Sample Client Application That Passes a Custom TRM

CONNTIMEOUT

TI Component Properties

In the Microsoft® Visual Studio® .NET 2003 environment, Transaction Integrator (TI) component properties appear and are edited in the **Properties** pane. When you select an entity in the Visual Studio tree view or list view, its properties appear in categories in the **Properties** pane. When you select multiple items, the intersection of their properties appear to allow for bulk edit.

> **Warning** The properties of the TI components are not intended to be set or changed programmatically. Setting or changing the properties programmatically may cause the component to function incorrectly.

See Also

Properties (TI Project)

Standard Transaction Request and Reply Messages

To support the TCP transaction request message (TRM) Link programming model and the TCP TRM User Data programming model, Transaction Integrator (TI) supports two variations of the CICS Standard Listener TRM.

This section contains:

- TRM Format for the TCP TRM Link Programming Model
- TRM Format for the TCP TRM User Data Programming Model

TRM Format for the TCP TRM Link Programming Model

This topic describes the format and content of the transaction request message (TRM) used by the TCP TRM Link programming model.

Request Message

The following table shows the contents of the request message.

TranID	Comma	Client in data
4	1	35

TranID
Transaction ID of the Concurrent Server to be started by the Listener.

Comma
A comma (,) separates the transaction ID from the Client in data.

Client in data
35 bytes of data used by the CICS TCP/IP security exit and passed to the Concurrent Server in the transaction initiation message (TIM).

Client in data for Microsoft Security Exit format

The following code block describes the format of the client in data for the Microsoft security exit.

```
struct CLIENT_IN_DATA {
   BYTE    bUserID[8];
   BYTE    bPassword[8];
   BYTE    bLinkToName[8];
   USHORT  usCommareaLen;
   BYTE    bReserved[9];
} UNALIGNED;
```

Client in data for IBM Security Exit format

The following code block describes the format of the client in data for the IBM security exit.

```
struct CLIENT_IN_DATA2 {
   BYTE    bSecFlag;
   BYTE    bPassword[8];
   BYTE    bUserID[8];
   BYTE    bLinkToName[8];
   USHORT  usCommareaLen;
   BYTE    bReserved[8];
} UNALIGNED;
```

Reply Message

The following table shows the contents of the reply message.

TRM reply msg length	Formatted field length	Formatted field code	*Data*
4	4	1	*0-n*

Note The formatted field length, formatted field code, and data can be repeated multiple times in a single message.

TRM reply msg length
The total length of the TRM reply message. This length is the sum of all the lengths of the formatted fields that follow in the message and does not include the length of the TRM reply msg length field itself.

Formatted field length
The total length of the formatted field. This length is the length of the individual formatted field that follows in the message and does not include the length of the Formatted field length itself.

Formatted field code
A 1-byte code that describes the information passed from the Concurrent Server back to the client.

Data

This area contains 0 or more bytes of information that is associated with a specific formatted field. The length of the data is determined by the formula (formatted field length minus the size of formatted field code).

Normal codes

The following table shows the meaning of the normal codes.

Code	Type	Meaning
0x01	Info	Version ID for Microsoft® Transaction Integrator Concurrent Server
0x02	Info	User Data

Error codes

The following table shows the meaning of the error codes.

Code	Type	Meaning
0x03	Error	Invalid ProgID
0x04	Error	Invalid TranID
0x05	Error	Inquiry Failed
0x06	Error	Inquiry Status
0x07	Error	Execution OK
0x08	Error	Program ABEND
0x09	Error	Execution Failed
0x0A	Error	Invalid TRM

For more information about the format of the TRM, see the TRM definition file at <drive>:\Program Files\Microsoft Host Integration Server\System\TIM\MicrosoftTRMDefs.tim. Use Microsoft Visual Studio® .NET 2003 to view the file.

See Also

TRM Format for the TCP TRM User Data Programming Model

TRM Format for the TCP TRM User Data Programming Model

This section describes the format and content of the transaction request message (TRM) used by the TCP TRM User Data programming model.

Request Message

The following table shows the contents of the request message.

TranID	Comma	Client in data
4	1	35

TranID

Transaction ID of the Concurrent Server to be started by the Listener.

Comma

A comma (,) separates the transaction ID from the Client in data.

Client in data

35 bytes of data used by the CICS TCP/IP security exit and passed to the Concurrent Server in the transaction initiation message (TIM).

Client in data for Microsoft Security Exit format

The following code block describes the format of the client in data for the Microsoft security exit.

```
struct CLIENT_IN_DATA {
   BYTE    bUserID[8];
   BYTE    bPassword[8];
   BYTE    bReserved[19];
} UNALIGNED;
```

Client in data for IBM Security Exit format

The following code block describes the format of the client in data for the IBM security exit.

```
struct CLIENT_IN_DATA2 {
   BYTE    bSecFlag;
   BYTE    bPassword[8];
   BYTE    bUserID[8];
   BYTE    bReserved[18];
} UNALIGNED;
```

Reply Message

The following table shows the contents of the reply message.

TRM reply msg length	Formatted field length	Formatted field code	*Data*
2	4	1	*0-n*

Note The formatted field length, formatted field code, and data can be repeated multiple times in a single message.

TRM reply msg length

The total length of the TRM reply message. This length is the sum of all the lengths of the formatted fields that follow in the message and does not include the length of the TRM reply msg length field itself.

Formatted field length

The total length of the formatted field. This length is the length of the individual formatted field that follows in the message and does not include the length of the Formatted field length itself.

Formatted field code

A 1-byte code that describes the information passed from the Concurrent Server back to the client.

Data

This area contains 0 or more bytes of information that is associated with a specific formatted field. The length of the data is determined by the formula (formatted field length minus the size of formatted field code).

Normal codes

The following table shows the meaning of the normal codes.

Code	Type	Meaning
0x01	Info	Version ID for Microsoft® Transaction Integrator Concurrent Server
0x02	Info	User Data

Error codes

The following table shows the meaning of the error codes.

Code	Type	Meaning
0x03	Error	Invalid ProgID
0x04	Error	Invalid TranID
0x05	Error	Inquiry Failed
0x06	Error	Inquiry Status
0x07	Error	Execution OK
0x08	Error	Program ABEND
0x09	Error	Execution Failed
0x0A	Error	Invalid TRM

For more information about the format of the TRM, see the TRM definition file at <drive>:\Program Files\ Microsoft Host Integration Server\System\TIM\MicrosoftTRMDefs.tim. Use Microsoft Visual Studio® .NET 2003 to view the file.

See Also

TRM Format for the TCP TRM Link Programming Model

CICS Enhanced Listener Request and Reply Messages

To support the CICS TCP enhanced listener message (ELM) Link programming model and the TCP ELM User Data programming model, Transaction Integrator (TI) supports two variations of the CICS Enhanced Listener TRM.

This section contains:

ELM Format for the TCP ELM Link Programming Model

ELM Format for the TCP ELM User Data Programming Model

Enhanced Listener CICS Administration

ELM Format for the TCP ELM Link Programming Model

This section describes the format and content of the enhanced listener message (ELM) used by the TCP ELM Link programming model.

Request Message

The following table shows the contents of the request message.

Client in data
35

Client in data
35 bytes of data used by the CICS TCP/IP security exit and passed to the Concurrent Server in the Transaction Integrator metadata (TIM) file.

Client in data for Microsoft Security Exit format

The following code block describes the format of the client in data for the Microsoft security exit.

```
struct CLIENT_IN_DATA {
   BYTE    bUserID[8];
   BYTE    bPassword[8];
   BYTE    bLinkToName[8];
   USHORT  usCommareaLen;
   BYTE    bReserved[9];
} UNALIGNED;
```

Client in data for IBM Security Exit format

The following code block describes the format of the client in data for the IBM security exit.

```
struct CLIENT_IN_DATA2 {
   BYTE    bSecFlag;
   BYTE    bPassword[8];
   BYTE    bUserID[8];
   BYTE    bLinkToName[8];
   USHORT  usCommareaLen;
   BYTE    bReserved[8];
} UNALIGNED;
```

Reply Message

The following table shows the contents of the reply message.

ELM reply msg length	**Formatted field length**	**Formatted field code**	***Data***
4	4	1	*0-n*

> **Note** The formatted field length, formatted field code, and data can be repeated multiple times in a single message.

ELM reply msg length
The total length of the ELM reply message. This length is the sum of all the lengths of the formatted fields that follow in the message and does not include the length of the ELM reply msg length field itself.

Formatted field length
The total length of the formatted field. This length is the length of the individual formatted field that follows in the message and does not include the length of the Formatted field length itself.

Formatted field code
A 1-byte code that describes the information passed from the Concurrent Server back to the client.

Data
This area contains 0 or more bytes of information that is associated with a specific formatted field. The length of the data is determined by the formula (formatted field length minus the size of formatted field code).

Normal codes

The following table shows the meaning of the normal codes.

Code	Type	Meaning
0x01	Info	Version ID for Microsoft® Transaction Integrator Concurrent Server
0x02	Info	User Data

Error codes

The following table shows the meaning of the error codes.

Code	Type	Meaning
0x03	Error	Invalid ProgID
0x04	Error	Invalid TranID
0x05	Error	Inquiry Failed
0x06	Error	Inquiry Status
0x07	Error	Execution OK
0x08	Error	Program ABEND
0x09	Error	Execution Failed
0x0A	Error	Invalid ELM

For more information about the format of the TRM, see the TRM definition file at <drive>:\Program Files\ Microsoft Host Integration Server\System\TIM\MicrosoftTRMDefs.tim. Use Microsoft Visual Studio® .NET 2003 to view the file.

See Also

ELM Format for the TCP ELM User Data Programming Model

Enhanced Listener CICS Administration

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ELM Format for the TCP ELM User Data Programming Model

This section describes the format and content of the enhanced listener message (ELM) used by the TCP ELM User Data programming model.

Request Message

The following table shows the contents of the request message.

Client in data
35

Client in data
: 35 bytes of data used by the CICS TCP/IP security exit and passed to the Concurrent Server in the transaction initiation message (TIM).

Client in data for Microsoft Security Exit format

The following code block describes the format of the client in data for the Microsoft security exit.

```
struct CLIENT_IN_DATA {
   BYTE    bUserID[8];
   BYTE    bPassword[8];
   BYTE    bReserved[19];
} UNALIGNED;
```

Client in data for IBM Security Exit format

The following code block describes the format of the client in data for the IBM security exit.

```
struct CLIENT_IN_DATA2 {
   BYTE    bSecFlag;
   BYTE    bPassword[8];
   BYTE    bUserID[8];
   BYTE    bReserved[18];
} UNALIGNED;
```

Reply Message

The following table shows the contents of the reply message.

ELM reply msg length	**Formatted field length**	**Formatted field code**	***Data***
4	4	1	*0-n*

Note The formatted field length, formatted field code, and data can be repeated multiple times in a single message.

ELM reply msg length
: The total length of the ELM reply message. This length is the sum of all the lengths of the formatted fields that follow in the message and does not include the length of the ELM reply msg length field itself.

Formatted field length
: The total length of the formatted field. This length is the length of the individual formatted field that follows in the message and does not include the length of the Formatted field length itself.

Formatted field code
: A 1-byte code that describes the information passed from the Concurrent Server back to the client.

Data
: This area contains 0 or more bytes of information that is associated with a specific formatted field. The length of the data is determined by the formula (formatted field length minus the size of formatted field code).

Normal codes

The following table shows the meaning of the normal codes.

Code	Type	Meaning
0x01	Info	Version ID for Microsoft Transaction Integrator Concurrent Server
0x02	Info	User Data

Error codes

The following table shows the meaning of the error codes.

Code	Type	Meaning
0x03	Error	Invalid ProgID
0x04	Error	Invalid TranID
0x05	Error	Inquiry Failed
0x06	Error	Inquiry Status
0x07	Error	Execution OK
0x08	Error	Program ABEND
0x09	Error	Execution Failed
0x0A	Error	Invalid ELM

For more information about the format of the TRM, see the TRM definition file at <drive>:\Program Files\ Microsoft Host Integration Server\System\TIM\MicrosoftTRMDefs.tim. Use Microsoft Visual Studio® .NET 2003 to view the file.

See Also

ELM Format for the TCP ELM Link Programming Model

Enhanced Listener CICS Administration

Enhanced Listener CICS Administration

The following code defines a CICS Enhanced Listener. There are several new keywords available for use with the Enhanced Listener. The parameter definitions describe how these new Listener configuration values are used for support the TI Enhanced Listener feature.

```
      EZACICD TYPE=LISTENER,  Listener record definition               X
             FORMAT=ENHANCED,  Enhanced Listener                       X
             APPLID=XYZ12345,  Application ID of CICS region           X
             TRANID=CSKM,      Transaction name for Listener           X
             PORT=1234,        Port number for Listener                X
             IMMED=YES,        Listener starts up at initialization?   X
             NUMSOCK=50,       Number of sockets supported by Listener X
             ACCTIME=30,       Timeout value for Accept                X
             GIVTIME=30,       Timeout value for Givesocket            X
             REATIME=30,       Timeout value for Read                  X
             CSTRAN=MSCS,      Name of child server transaction        X
             CSSTTYPE=KC,       Child server startup type              X
             CSDELAY=000000,   Child server delay interval             X
             MSGLEN=35,        Length of input message                 X
             PEEKDATA=NO,       Peek option                            X
             MSGFORM=EBCDIC,   Output message format                   X
```

CSTRANID

This parameter is specific to the enhanced version of the Listener and specifies the default child server transaction that the Listener starts.

For enhanced listener message (ELM) Link support, this value should be set to MSCS to conform to the samples that Microsoft delivers with the product. The MSCS transaction code should be associated with the mscmtics.cbl program that supports the Standard and Enhanced Listener protocols. Otherwise, this parameter is the transaction ID that will be executed for each request made to the designated port.

CSSTTYPE

This parameter is specific to the enhanced version of the Listener and specifies the default start method for the child server task. This parameter can be overridden by the security/transaction exit. Possible values are IC, KC, and TD.

IC

Indicates that the child server task is started using EXEC CICS START with the value specified by CSDLYINT (or an overriding value from the security/transaction exit) as the delay interval.

KC

Indicates that the child server task is started using EXEC CICS START with no delay interval.

TD

Indicates that the child server task is started using the EXEC CICS WRITEQ TD command, which uses transient data to trigger the child server task.

CSDLYINT

This parameter is specific to the enhanced version of the Listener and is applicable only if CSSTTYPE is IC. It specifies the delay interval to be used on the EXEC CICS START command, in the form hhmmss (hours/minutes/seconds).

MSGFORM

This parameter is specific to the enhanced version of the Listener and indicates whether an error message returned to the client should be in ASCII or Extended Binary Coded Decimal Interchange Code (EBCDIC) format. ASCII is the default. MSGFORM is displayed as MSGFORMat on the IBM-supplied CICS Transaction screens.

For TI Enhanced Listener support, this value must be set to EBCDIC.

MSGLEN

This parameter is specific to the enhanced version of the Listener and specifies the length of the data to be received from the client by the Listener. The valid range is from 0 through 999. If the value is 0, the Listener does not read in any data from the client.

For TI Enhanced Listener support, this value must be the size of the ELM that is delivered. The size of the ELM is 35.

PEEKDATA

This parameter is specific to the enhanced version of the Listener and applies only if MSGLEN is not 0.

A value of NO indicates that the Listener performs a normal read of the client data. The child server application accesses this data in the data area-2 portion of the transaction initiation message (TIM).

A value of YES indicates that the Listener reads the data using the Peek option. The data remains queued in TCP/IP and the child server applications read it in rather than accessing it through the TIM.

For TI Enhanced Listener support, this value must be set to NO. Setting this value to NO instructs the Enhanced Listener to read the ELM (35 bytes) and place it in the TIM in the data area-2 field.

The mscmtics.cbl Concurrent Server uses the information in this area to determine what server program to link to.

ELM definition file at <drive>:\Program Files\Microsoft Host Integration Server\System\TIM\MicrosoftELMDefs.tim. Use Microsoft Visual Studio® .NET 2003 to view the file.

See Also

ELM Format for the TCP ELM Link Programming Model

ELM Format for the TCP ELM User Data Programming Model

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Microsoft Concurrent Server

The MSCS transaction (program mscmtics.cbl) samples support both the Standard and the Enhanced Listener. The transaction program can be started by either the Enhanced or Standard Listener.

Each listener passes a unique transaction initiation message (TIM) to the transaction program when the Concurrent Server is started. The Standard Listener formats and passes the TIM shown in the following code sample. The length of this TIM is 72 bytes.

```
01  TRANSACTION-INITIATION-MESSAGE.
    05  GIVE-TAKE-SOCKET    PIC 9(8) COMP.
    05  LSTN-NAME           PIC X(8).
    05  LSTN-SUBNAME        PIC X(8).
    05  CLIENT-IN-DATA      PIC X(35).
    05  FILLER              PIC X(1).
    05  SOCKADDR-IN-PARM.
        15 SIN-FAMILY       PIC 9(4) COMP.
        15 SIN-PORT         PIC 9(4) COMP.
        15 SIN-ADDRESS      PIC 9(8) COMP.
        15 SIN-ZERO         PIC X(8).
```

The Enhanced Listener formats and passes the TIM shown in the following code sample. The length of this TIM is 189 bytes.

```
01  TRANSACTION-INITIATION-MESSAGE.
    05  GIVE-TAKE-SOCKET    PIC 9(8) COMP.
    05  LSTN-NAME           PIC X(8).
    05  LSTN-SUBNAME        PIC X(8).
    05  CLIENT-IN-DATA      PIC X(35).
    05  FILLER              PIC X(1).
    05  SOCKADDR-IN-PARM.
        15 SIN-FAMILY       PIC 9(4) COMP.
        15 SIN-PORT         PIC 9(4) COMP.
        15 SIN-ADDRESS      PIC 9(8) COMP.
        15 SIN-ZERO         PIC X(8).
    05  FILLER              PIC X(80).
    05  DATA-AREA-2-LEN     PIC 9(4) COMP.
    05  DATA-AREA-2         PIC X(35).
```

The mscmtics.cbl sample Concurrent Server can determine whether the Standard or the Enhanced Listener was used by evaluating the length of the TIM received.

In a scenario where the Enhanced Listener started the Microsoft Concurrent Server, the mscmtics.cbl program looks at the Client-in-data that is contained in the ELM found in the TIM data area-2 field. The Client-in-data contains the name of the CICS Server program to be executed and the length of the request data to be received from the client. The following code sample shows the contents of this data area.

```
       01 CLIENT-IN-DATA                      PIC X(35).
       01 FILLER REDEFINES CLIENT-IN-DATA.
          05 CID-USERID                       PIC X(8).
          05 CID-PASSWORD                     PIC X(8).
          05 CID-LINK-TO-PROG                 PIC X(8).
          05 CID-COMMAREA-LEN                 PIC S9(4) COMP.
          05 CID-DATA-LEN                     PIC S9(8) COMP.
          05 CID-VERSION                      PIC X.
             88 CID-VERSION-1                 VALUE X'00'.
             88 CID-VERSION-2                 VALUE X'01'.
          05 CID-FLAGS                        PIC X(2).
             88 CID-FLAGS-PERSISTENT-NONE     VALUE X'0001'.
             88 CID-FLAGS-PERSISTENT-OPEN     VALUE X'0002'.
             88 CID-FLAGS-PERSISTENT-USE      VALUE X'0004'.
             88 CID-FLAGS-PERSISTENT-CLOSE    VALUE X'0008'.
          05 CID-RESERVED                     PIC X.
          05 CID-FORMAT                       PIC X.
             88 CID-FORMAT-NOTSET             VALUE X'00'.
             88 CID-FORMAT-MS                 VALUE X'01'.
```

```
                88 CID-FORMAT-IBM              VALUE X'02'.
```

See Also

Standard Transaction Request and Reply Messages

CICS Enhanced Listener Request and Reply Messages

Data Integration Programmer's Reference

This section of the Microsoft® Host Integration Server 2004 Developer's Guide describes the objects, methods, properties, controls, and other interfaces that enable you to integrate data into your Host Integration Server application.

For general information about programming for data integration, see Data Integration Programmer's Guide section of the SDK.

For sample code using data integration, see Data Integration Samples section of the SDK.

This section contains:

- OLE DB Providers Programmer's Reference
- ODBC Driver for DB2 Programmer's Reference
- Managed Provider for DB2 Programmer's Reference
- Data Access Library Programmer's Reference
- ActiveX Controls Programmer's Reference
- ADO Programmer's Reference

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OLE DB Providers Programmer's Reference

The OLE DB specification version 2.0 defines a number of objects and interfaces.

Microsoft® OLE DB Provider for AS/400 and VSAM supports the OLE DB objects and interfaces appropriate for an OLE DB data provider accessing a non-SQL host file system.

Microsoft OLE DB Provider for DB2 supports the OLE DB objects and interfaces appropriate for an OLE DB data provider accessing an SQL database.

This section also provides a comparison of the objects and interfaces supported by OLE DB Provider for AS/400 and VSAM and OLE DB Provider for DB2.

> **Note** Do not use double or real columns when specifying **UPDATE** or **DELETE** statements on the MsDb2DataAdapter. These rows will not be found and will throw the concurrency violation exception.

This section contains:

- OLE DB Object Support Comparison
- OLE DB Interface Support Comparison
- OLE DB Object Support in the OLE DB Provider for AS/400 and VSAM
- OLE DB Object Support in the OLE DB Provider for DB2

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OLE DB Object Support Comparison

The following table compares the OLE DB version 2.0 objects that are supported by the current version of Microsoft® OLE DB Provider for AS/400 and VSAM and Microsoft OLE DB Provider for DB2.

OLE DB object	OLE DB Provider for AS/400 and VSAM	OLE DB Provider for DB2
Command	Yes, most interfaces	Yes, most interfaces
CustomErrorObject	No	Yes, all interfaces
DataSource	Yes, most interfaces	Yes, some interfaces
Enumerator	No	No
ErrorObject	Yes, all interfaces	Yes, all interfaces
ErrorRecord	Yes, all interfaces	Yes, all interfaces
Index	Yes, all interfaces	No
MultipleResults	No	No
Rowset	Yes, most interfaces	Yes, some interfaces
Session	Yes, some interfaces	Yes, some interfaces
Transaction	No	Yes, some interfaces
TransactionOptions	No	Yes, all interfaces
View	Yes, all interfaces	No

OLE DB Interface Support Comparison

The following table compares the OLE DB version 2.0 interfaces that are supported by the current version of Microsoft® OLE DB Provider for AS/400 and VSAM and Microsoft OLE DB Provider for DB2.

Object	Interface	OLE DB Provider for AS/400 and VSAM	OLE DB Provider for DB2
Command	**IAccessor**	Yes	Yes
	IColumnsInfo	Yes	Yes
	IColumnsRowset	No	No
	ICommand	Yes	Yes
	ICommandPersist	No	No
	ICommandPrepare	No	Yes
	ICommandProperties	Yes	Yes
	ICommandText	Yes	Yes
	ICommandWithParameters	No	Yes
	IConvertType	Yes	Yes
	ISupportErrorInfo	Yes	Yes
CustomErrorObject	**IErrorLookup**	No	Yes
	ISQLErrorInfo	No	Yes
DataSource	**IDBAsynchStatus**	No	No
	IConnectionPointContainer	No	No
	IDBCreateSession	Yes	Yes
	IDBDataSourceAdmin	No	No
	IDBInfo	No	Yes
	IDBInitialize	Yes	Yes
	IDBProperties	Yes	Yes
	IPersist	Yes	No
	IPersistFile	Yes	No
	ISupportErrorInfo	Yes	Yes
Enumerator	**IDBInitialize**	No	No
	IDBProperties	No	No
	IParseDisplayName	No	No
	ISourcesRowset	No	No
	ISupportErrorInfo	No	No
ErrorObject	**IErrorRecords**	Yes	Yes
ErrorRecord	**IErrorInfo**	Yes	Yes
Index	**IAccessor**	Yes	No
	IColumnsInfo	Yes	No
	IConvertType	Yes	No
	IRowset	Yes	No
	IRowsetChange	Yes	No
	IRowsetFind	Yes	No
	IRowsetIdentity	Yes	No
	IRowsetIndex	Yes	No
	IRowsetInfo	Yes	No
	IRowsetLocate	Yes	No
	IRowsetRefresh	Yes	No
	IRowsetScroll	Yes	No
	IRowsetUpdate	Yes	No
	IRowsetView	Yes	No
	ISupportErrorInfo	Yes	No
MultipleResults	**IMultipleResults**	No	No
	ISupportErrorInfo	No	No

Rowset	**IAccessor**	Yes	Yes
	IChapteredRowset	Yes	No
	IColumnsInfo	Yes	Yes
	IColumnsRowset	Yes	No
	IConnectionPointContainer	No	No
	IConvertType	Yes	Yes
	IDBAsynchStatus	No	No
	IRowset	Yes	Yes
	IRowsetChange	Yes	Yes
	IRowsetChapterMember	No	No
	IRowsetFind	Yes	No
	IRowsetIdentity	Yes	No
	IRowsetIndex	Yes	No
	IRowsetInfo	Yes	Yes
	IRowsetLocate	Yes	No
	IRowsetRefresh	Yes	No
	IRowsetScroll	No	No
	IRowsetUpdate	Yes	Yes
	IRowsetView	Yes	No
	ISupportErrorInfo	Yes	Yes
Session	**IAlterIndex**	No	No
	IAlterTable	No	No
	IDBCreateCommand	Yes	Yes
	IDBSchemaRowset	Yes	Yes
	IGetDataSource	Yes	Yes
	IIndexDefinition	No	No
	IOpenRowset	Yes	Yes
	ISessionProperties	Yes	Yes
	ISupportErrorInfo	Yes	Yes
	ITableDefinition	No	No
	ITransaction	No	Yes
	ITransactionJoin	No	No
	ITransactionLocal	No	Yes
	ITransactionObject	No	Yes
Transaction	**IConnectionPointContainer**	No	No
	ISupportErrorInfo	No	No
	ITransaction	No	No
TransactionOptions	**ISupportErrorInfo**	No	Yes
	ITransactionOptions	No	Yes
View	**IAccessor**	Yes	No
	IColumnsInfo	Yes	No
	ISupportErrorInfo	Yes	No
	IViewChapter	Yes	No
	IViewFilter	Yes	No
	IViewRowset	Yes	No
	IViewSort	Yes	No

OLE DB Object Support in the OLE DB Provider for AS/400 and VSAM

The following table summarizes the OLE DB version 2.0 objects that are supported by the current version of Microsoft® OLE DB Provider for AS/400 and VSAM.

OLE DB object	**Support**
Command Object	Yes, most interfaces
CustomErrorObject	No
DataSource Object	Yes, most interfaces
Enumerator	No
ErrorObject Object	Yes, all interfaces
ErrorRecord Object	Yes, all interfaces
Index Object	Yes, all interfaces
MultipleResults	No
Rowset Object	Yes, most interfaces
Session Object	Yes, some interfaces
Transaction	No
TransactionOptions	No
View Object	Yes, all interfaces

This section contains:

- OLE DB Interface Support in the OLE DB Provider for AS/400 and VSAM
- Command Object (OLE DB Provider for AS/400 and VSAM)
- DataSource Object (OLE DB Provider for AS/400 and VSAM)
- ErrorObject Object (OLE DB Provider for AS/400 and VSAM)
- ErrorRecord Object (OLE DB Provider for AS/400 and VSAM)
- Index Object (OLE DB Provider for AS/400 and VSAM)
- Rowset Object (OLE DB Provider for AS/400 and VSAM)
- Session Object (OLE DB Provider for AS/400 and VSAM)
- View Object (OLE DB Provider for AS/400 and VSAM)
- OLE DB Property Support in the OLE DB Provider for AS/400 and VSAM

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OLE DB Interface Support in the OLE DB Provider for AS/400 and VSAM

The following table summarizes the OLE DB version 2.0 interfaces that are supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM.

Object	**Interface**	**Support**
Command Object	**IAccessor**	Yes
	IColumnsInfo	Yes
	IColumnsRowset	No
	ICommand	Yes
	ICommandPersist	No
	ICommandPrepare	No
	ICommandProperties	Yes
	ICommandText	Yes
	ICommandWithParameters	No
	IConvertType	Yes
	ISupportErrorInfo	Yes
CustomErrorObject	**IErrorLookup**	No
	ISQLErrorInfo	No
DataSource Object	**IDBAsynchStatus**	No
	IDBConnectionPointContainer	No
	IDBCreateSession	Yes
	IDBDataSourceAdmin	No
	IDBInfo	No
	IDBInitialize	Yes
	IDBProperties	Yes
	IPersist	Yes
	IPersistFile	Yes
	ISupportErrorInfo	Yes
Enumerator	**IDBInitialize**	No
	IDBProperties	No
	IParseDisplayName	No
	ISourcesRowset	No
	ISupportErrorInfo	No
ErrorObject Object	**IErrorRecords**	Yes
ErrorRecord Object	**IErrorInfo**	Yes
Index Object	**IAccessor**	Yes
	IColumnsInfo	Yes
	IConvertType	Yes
	IRowset	Yes
	IRowsetChange	Yes
	IRowsetFind	Yes
	IRowsetIdentity	Yes
	IRowsetIndex	Yes
	IRowsetInfo	Yes
	IRowsetLocate	Yes
	IRowsetRefresh	Yes
	IRowsetScroll	Yes
	IRowsetUpdate	Yes
	IRowsetView	Yes
	ISupportErrorInfo	Yes
MultipleResults	**IMultipleResults**	No

	ISupportErrorInfo	No
Rowset Object	**IAccessor**	Yes
	IChapteredRowset	Yes
	IColumnsInfo	Yes
	IColumnsRowset	Yes
	IConnectionPointContainer	No
	IConvertType	Yes
	IDBAsynchStatus	No
	IRowset	Yes
	IRowsetChange	Yes
	IRowsetChapterMember	No
	IRowsetFind	Yes
	IRowsetIdentity	Yes
	IRowsetIndex	Yes
	IRowsetInfo	Yes
	IRowsetLocate	Yes
	IRowsetRefresh	Yes
	IRowsetScroll	No
	IRowsetUpdate	Yes
	IRowsetView	Yes
	ISupportErrorInfo	Yes
Session Object	**IAlterIndex**	No
	IAlterTable	No
	IDBCreateCommand	Yes
	IDBSchemaRowset	Yes
	IGetDataSource	Yes
	IIndexDefinition	No
	IOpenRowset	Yes
	ISessionProperties	Yes
	ISupportErrorInfo	Yes
	ITableDefinition	No
	ITransaction	No
	ITransactionJoin	No
	ITransactionLocal	No
	ITransactionObject	No
Transaction	**IConnectionPointContainer**	No
	ISupportErrorInfo	No
	ITransaction	No
TransactionOptions	**ISupportErrorInfo**	No
	ITransactionOptions	No
View Object	**IAccessor**	Yes
	IColumnsInfo	Yes
	ISupportErrorInfo	Yes
	IViewChapter	Yes
	IViewFilter	Yes
	IViewRowset	Yes
	IViewSort	Yes

Command Object (OLE DB Provider for AS/400 and VSAM)

The **Command** object is created by an OLE DB consumer, or by a service provider on behalf of a consumer. A **Command** object is used to execute a distributed data management (DDM)-specific command on a remote DDM server. The **Command** object currently supports executing Command Language commands on AS/400 DDM servers.

It is important not to confuse a command, which is an OLE COM object, and its command text, which is a string. Commands are generally used for data definition, such as creating a table or granting privileges, and data manipulation, such as updating or deleting rows. A special case of data manipulation using the **Command** object is opening a rowset (a table).

Before a consumer can use a command, it must determine if commands are supported. To do this, the consumer calls **QueryInterface** for **IDBCreateCommand** on a session. If this interface is exposed, the provider supports commands. To create a command, the consumer then calls **IDBCreateCommand::CreateCommand** on the session. A single session can be used to create multiple commands.

When the command is first created, it does not contain a command text. The consumer sets the command text with **ICommandText::SetCommandText**. Because the text command syntax is provider-specific, the consumer passes the globally unique identifier (GUID) of the syntax to use. For use with Microsoft OLE DB Provider for AS/400 and VSAM, the GUID is DBGUID_DBSQL. Note that under OLE DB Provider for AS/400 and VSAM, this GUID does not signify that the text command is a superset of ANSI SQL. The level at which the provider supports ANSI SQL is specified by the DBPROP_SQLSUPPORT property. This property is a bitmask specifying the level of support for SQL. OLE DB Provider for AS/400 and VSAM sets this property to DBPROPVAL_SQL_NONE, indicating that SQL is not supported.

The syntax supported by OLE DB Provider for AS/400 and VSAM for command text is as follows:

```
EXEC COMMAND DDMCmd
```

where *DDMCmd* represents a valid OS/400 control language (CL) command. Note that only OS/400 CL commands are supported. These commands enable you to request functions from the OS/400 operating system. Some examples are the Delete File (DLTF) or Display File Description DSPFFD) commands. These are the same commands that could be issued at the command prompt if you were connected to an AS/400 through a 5250 terminal session. For a detailed list of possible commands, see the OS/400 CL reference for your platform.

The syntax supported by OLE DB Provider for AS/400 and VSAM to open a rowset (table) using command text is as follows:

```
EXEC OPEN FileName
```

where *FileName* represents one of the following host file naming conventions listed in the following table.

Host file type	File naming convention
VSAM Data Sets	DATASETNAME.FILENAME
Partitioned Data Sets	DATASETNAME.FILENAME(MEMBER)
OS/400 Files	LIBRARY/FILE
OS/400 Files	LIBRARY/FILENAME
OS/400 File Members	LIBRARY/FILE(MEMBER)
OS/400 File Members	LIBRARY.FILENAME(MEMBER)

Note that if a member of a library contains a dot in the member name, the member name must be surrounded by double quotes. For example, if the member name is NAMES.DAT, the proper syntax used to open a rowset using command text is as follows:

```
EXEC OPEN LIBRARY/FILE("NAMES.DAT")
```

To execute the command, the consumer calls **ICommand::Execute**. If the command text specifies the command to open a rowset, (an **EXEC OPEN** command), **Execute** instantiates the rowset and returns an interface pointer to it.

The following interfaces of the **Command** object are supported by the current version of OLE DB Provider for AS/400 and VSAM:

- **IAccessor**
- **IColumnsInfo**
- **ICommand**
- **ICommandProperties**

- **ICommandText**
- **IConvertType**
- **ISupportErrorInfo**

DataSource Object (OLE DB Provider for AS/400 and VSAM)

The **DataSource** object is created by an OLE DB consumer. The **DataSource** object contains the knowledge and ability to connect to an IBM mainframe or AS/400 computer over Advanced Program-to-Program Communications (APPC) and LU 6.2 (through Microsoft Host Integration Server 2004) or over TCP/IP. The **DataSource** object is used to create one or more **Session** objects.

The following interfaces of the **DataSource** object are supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM:

- **IDBCreateSession**
- **IDBInitialize**
- **IDBProperties**
- **IPersist**
- **IPersistFile**
- **ISupportErrorInfo**

ErrorObject Object (OLE DB Provider for AS/400 and VSAM)

The **ErrorObject** object is created by any interface on any SNA OLE DB object. The **ErrorObject** object is used to retrieve additional information when an error occurs.

The following interface of the **ErrorObject** object is supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM:

- **IErrorRecords**

The **IErrorRecords** interface returns **ErrorRecord** objects with detailed information about the error that occurred.

ErrorRecord Object (OLE DB Provider for AS/400 and VSAM)

The **ErrorRecord** object is created by calling the **IErrorRecord** interface on the **ErrorObject** object. An **ErrorObject** is created on any interface on any SNA OLE DB object when an error occurs. The **ErrorRecord** object is used to retrieve additional information when an error occurs.

The following interface of the **ErrorRecord** object is supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM:

- **IErrorInfo**

OLE DB interface methods return error information in two ways. The error code returned by an interface method, known as the **return code**, indicates the overall success or failure of a method. Error records provide detailed information about the error, such as a text description of the error, the globally unique identifier (GUID) of the interface that defined the error, and provider-specific error information. Error objects in OLE DB are an extension of the error objects in Automation. They use many of the same mechanisms, and can be used as Automation error objects.

OLE DB error return codes are of type HRESULT. There are two general classes of return codes: success and warning codes, and error codes.

Success and warning codes begin with S_ or DB_S_ and indicate that the method successfully completed. The standard OLE DB error codes are defined in the OLEDBERR.H include file.

If the return code is other than S_OK or S_FALSE, it is likely that an error occurred from which the method was able to recover. For example, **IRowset::GetNextRows** returns DB_S_ENDOFROWSET when it is unable to return the requested number of rows due to reaching the end of the rowset. If a single warning condition occurs, the method returns the code for that condition. If multiple warning conditions occur, the method describes the hierarchy of warning return codes indicating which warning code should be returned when given a choice between multiple warning return codes.

Error codes begin with E_ or DB_E_ and indicate that the method failed completely and was unable to do any useful work. For example, **GetNextRows** returns E_INVALIDARG when the pointer in which it is to return a pointer to an array of row handles (*prghRows*) is null. An exception to this is that some of the methods that return DB_E_ERRORSOCCURRED allocate memory in which to return additional information about these errors. Consumers must free this memory. For information about which methods allocate memory in this case, see the methods that return DB_E_ERRORSOCCURRED. Although error codes can indicate run-time errors, such as running out of memory, they generally indicate programming errors. If multiple errors occur, the code that is returned is provider-specific. If both errors and warnings occur, the method fails and returns an error code.

All methods can return S_OK, E_FAIL, and E_OUTOFMEMORY. The E_OUTOFMEMORY code applies only to those methods which allocate memory that is returned to the consumer. In some cases, the E_OUTOFMEMORY code might be eliminated by calling the method requesting fewer returned values, such as fewer rows from **GetNextRows**.

Index Object (OLE DB Provider for AS/400 and VSAM)

An OLE DB index, also known as an **index rowset**, is a rowset built over an index in a data source. It is generally used in conjunction with a rowset built over a base table in the same data source. Each row of the index rowset contains a bookmark that points to a row in the base-table rowset. Thus, an OLE DB consumer can traverse the index rowset and use it to access rows in the base-table rowset.

Indexes are created using the index interfaces of the **Rowset** object. Index rowsets allow an application to read records efficiently by means of a key.

The following index interfaces of the **Rowset** object are supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM when applied to AS/400 keyed physical files, AS/400 logical files, VSAM KSDS files with unique keys, and VSAM RRDS files with unique keys:

- **IAccessor**
- **IColumnsInfo**
- **IConvertType**
- **IRowset**
- **IRowsetChange**
- **IRowsetFind**
- **IRowsetIdentity**
- **IRowsetIndex**
- **IRowsetInfo**
- **IRowsetLocate**
- **IRowsetRefresh**
- **IRowsetScroll**
- **IRowsetUpdate**
- **IRowsetView**
- **ISupportErrorInfo**

OLE DB Provider for AS/400 and VSAM supports integrated indexes using the **IRowsetIndex** interface based on the underlying rowset.

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Rowset Object (OLE DB Provider for AS/400 and VSAM)

Rowset objects are created by **Session** objects. The **Rowset** object exposes data in tabular format.

The following interfaces of the **Rowset** object are supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM:

- **IAccessor**
- **IChapteredRowset**
- **IColumnsInfo**
- **IColumnsRowset**
- **IConvertType**
- **IRowset**
- **IRowsetChange**
- **IRowsetFind**
- **IRowsetIdentity**
- **IRowsetIndex**
- **IRowsetInfo**
- **IRowsetLocate**
- **IRowsetRefresh**
- **IRowsetUpdate**
- **IRowsetView**
- **ISupportErrorInfo**

> **Note** The **IRowsetFind** interface is only supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM when applied to AS/400 keyed physical files, AS/400 logical files, VSAM KSDS files with unique keys, and VSAM RRDS files with unique keys.

Session Object (OLE DB Provider for AS/400 and VSAM)

The **Session** object is created by a **DataSource** object. The **Session** object is used to create one or more **Rowset** objects.

The following interfaces of the **Session** object are supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM:

- **IDBCreateCommand**
- **IDBSchemaRowset**
- **IGetDataSource**
- **IOpenRowset**
- **ISessionProperties**
- **ISupportErrorInfo**

Consumers can get information about a data store without knowing its structure by using the **IDBSchemaRowset** methods. The methods on this interface can be used to retrieve advanced schema information. OLE DB Provider for AS/400 and VSAM organizes this information into a set of schemas that contain tables for each schema. These schema rowsets are identified by globally unique identifiers (GUIDs).

The following schema rowset GUIDs are supported by OLE DB Provider for AS/400 and VSAM:

- DBSCHEMA_COLUMNS
- DBSCHEMA_INDEXES
- DBSCHEMA_PROVIDER_TYPES
- DBSCHEMA_TABLES

The following table lists these GUIDs and the columns for which restrictions can be specified on the schema rowset when using OLE DB Provider for AS/400 and VSAM. The number of restriction columns for each schema rowset are defined as constants prefixed with CRESTRICTIONS_ in the OLE DB header files. Restriction values are treated as literals rather than as search patterns. For example, the restriction value "A_C" matches "A_C" but not "ABC".

GUID	Number of restrictions	Restriction columns
DBSCHEMA_COLUMNS	4	TABLE_CATALOG TABLE_SCHEMA TABLE_NAME COLUMN_NAME
DBSCHEMA_INDEXES	5	TABLE_CATALOG TABLE_SCHEMA INDEX_NAME TYPE TABLE_NAME
DBSCHEMA_PROVIDER_TYPES	2	DATA_TYPE BEST_MATCH
DBSCHEMA_TABLES	4	TABLE_CATALOG TABLE_SCHEMA TABLE_NAME TABLE_TYPE

The **IDBSchemaRowset** interface allows an application to pass at run time the target library of a partitioned data set (PDS), a dataset, or a member name when using the **IDBSchemaRowset:GetSchemas** function to retrieve the schema.

This following example illustrates using a target library to retrieve a table schema:

```
hr = pIDBSchemaRowset->GetRowset(
        NULL,                         // punkOuter
        DBSCHEMA_TABLES,              // schema IID
         2L,                          // # of restrictions
         rgRestrictions,              // array of restrictions
         IID_IRowset,                 // rowset interface
         0L,                          // # of properties
         NULL,                        // properties
         (IUnknown**)&pIRowset);      // rowset pointer
```

The variable *rgRestrictions* is an array containing two restriction values. The first array entry is VT_EMPTY and the second array entry is the target library name.

View Object (OLE DB Provider for AS/400 and VSAM)

The **View** object is created on a **Rowset** object. The **View** object is used to expose simple operations, such as sorting and filtering a rowset by applying a view. Views can be applied when opening a **Rowset** object or applied to an existing **Rowset** object.

The following interfaces of the **View** object are supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM when applied to AS/400 keyed physical files, AS/400 logical files, VSAM KSDS files with unique keys, and VSAM RRDS files with unique keys:

- **IAccessor**
- **IColumnsInfo**
- **ISupportErrorInfo**
- **IViewChapter**
- **IViewFilter**
- **IViewRowset**
- **IViewSort**

OLE DB Property Support in the OLE DB Provider for AS/400 and VSAM

The following table summarizes the provider-specific OLE DB version 2.0 properties in the SNAOLEDB_DBPROPSET_DBINIT property set that are supported by the current version of Microsoft OLE DB Provider for AS/400 and VSAM.

OLE DB Property ID	Description
DBPROP_SNAOLEDB_APPCMODE	When logical unit (LU) 6.2 (SNA) is selected for the Network Transport Library (DBPROP_SNAOLEDB_NETTYPE), this property is the Advanced Program-to-Program Communications (APPC) mode and must be set to a value that matches the host configuration and SNA server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bidirectional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This VT_BSTR type property normally defaults to QPCSUPP.
DBPROP_SNAOLEDB_BINASCHAR	This property indicates whether to process binary fields (Character Code Set Identifier or CCSID of 65535) as character data type fields on a per data source basis. The host CCSID and PC Code Page values are required input parameters when this parameter is true. This VT_BOOL type property defaults to VARIANT_FALSE, do not process binary fields as character fields.
DBPROP_SNAOLEDB_HCDPATH	The fully qualified file name of the distributed data management (DDM) host column description (HCD) file. This parameter can be an UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the SNA system directory. This VT_BSTR type property is required when connecting to mainframe systems and is optional when connecting to OS/400.
DBPROP_SNAOLEDB_HOSTCCSID	The CCSID matching the data as represented on the host. This property is required when processing binary data as character data. Unless the DBPROP_SNAOLEDB_BINASCHAR property is set to **true**, character data is converted based on the host column CCSID and default ANSI code page. This VT_I4 property defaults to U.S./Canada (37).
DBPROP_SNAOLEDB_LIBRARY	The default AS/400 library to be accessed. This VT_BSTR property is not required for mainframe access and is optional when connecting to AS/400 files.
DBPROP_SNAOLEDB_LOCALLU	When LU 6.2 (SNA) is selected for the Network Transport Library, this property is the name of the local LU alias configured in the SNA server.
DBPROP_SNAOLEDB_NETADDRESS	When TCP/IP has been selected for the Network Transport Library, this property is used to locate the target host computer. This parameter indicates the IP address or TCP/IP host name alias associated with the DDM server on the host. The network address is required when connecting through TCP/IP.

DBPROP_SNAOLEDB_NETPORT	When TCP/IP has been selected for the Network Transport Library, this property is used to locate the target DDM service access port when connecting by using TCP/IP. This parameter represents the TCP/IP port used for communication with the DDM service on the host. The default value for the VT_BSTR type property is 446.
DBPROP_SNAOLEDB_NETTYPE	This property which represents the dynamic link library used for transport designates whether the provider connects by using SNA LU 6.2 or TCP/IP for network communication. The possible values for this parameter are TCP/IP or SNA. If TCP/IP is selected, values for Network Address (DBPROP_SNAOLEDB_NETADDRESS) and Network Port (DBPROP_SNAOLEDB_NETPORT) are required. TCP/IP connectivity to the mainframe is not supported by OLE DB Provider for AS/400 and VSAM. If SNA is selected, values for APPC Local LU Alias (DBPROP_SNAOLEDB_LOCALLU), APPC Mode Name (DBPROP_SNAOLEDB_APPCMODE), and APPC Remote LU Alias (DBPROP_SNAOLEDB_REMOTELU) are required. This value for this VT_BSTR property defaults to SNA.
DBPROP_SNAOLEDB_PCCODEPAGE	The PC Code Page property ID indicates the code page to be used on the computer for character code conversion. This property is required when processing binary data as character data. Unless DBPROP_SNAOLEDB_BINASCHAR is set to true, character data is converted based on the default ANSI code page configured in Windows. If this parameter is set to Binary or 65535, no character code conversions will take place. The default value for this VT_I4 type property is 1252 (Latin-1).
DBPROP_SNAOLEDB_REMOTELU	When LU 6.2 (SNA) is selected for the Network Transport Library (DBPROP_SNAOLEDB_NETTYPE), this property ID is the name of the remote LU alias configured in the SNA server.
DBPROP_SNAOLEDB_REPAIRKEY	This property ID provides for repair of invalid key offsets received from OS/400 when keys have been defined using the Digital Data System (DDS) "RENAME" clause. This parameter indicates whether the OLE DB provider should repair any host key values set in the registry. This VT_BOOL type property defaults to VARIANT_FALSE.
DBPROP_SNAOLEDB_STRICTVAL	This property indicates whether strict validation should be used. This VT_BOOL type property defaults to VARIANT_FALSE.

OLE DB Object Support in the OLE DB Provider for DB2

The following table summarizes the OLE DB version 2.0 objects that are supported by the current version of Microsoft® OLE DB Provider for DB2.

OLE DB object	**Support**
Command Object	Yes, most interfaces
CustomErrorObject	Yes, all interfaces
DataSource Object	Yes, some interfaces
Enumerator	No
ErrorObject Object	Yes, all interfaces
ErrorRecord Object	Yes, all interfaces
Index	No
MultipleResults	No
Rowset Object	Yes, some interfaces
Session Object	Yes, some interfaces
Transaction Object	Yes, some interfaces
TransactionOptions	Yes, all interfaces
View	No

This section contains:

- OLE DB Interface Support in the OLE DB Provider for DB2
- Command Object (OLE DB Provider for DB2)
- CustomErrorObject Object (OLE DB Provider for DB2)
- DataSource Object (OLE DB Provider for DB2)
- ErrorObject Object (OLE DB Provider for DB2)
- ErrorRecord Object (OLE DB Provider for DB2)
- Rowset Object (OLE DB Provider for DB2)
- Session Object (OLE DB Provider for DB2)
- Transaction Object (OLE DB Provider for DB2)
- OLE DB Property Support in the OLE DB Provider for DB2

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OLE DB Interface Support in the OLE DB Provider for DB2

The following table summarizes the OLE DB version 2.0 interfaces that are supported by the current version of Microsoft OLE DB Provider for DB2.

Object	**Interface**	**Support**
Command Object	**IAccessor**	Yes
	IColumnsInfo	Yes
	IColumnsRowset	No
	ICommand	Yes
	ICommandPersist	No
	ICommandPrepare	Yes
	ICommandProperties	Yes
	ICommandText	Yes
	ICommandWithParameters	Yes
	IConvertType	Yes
	ISupportErrorInfo	Yes
CustomErrorObject Object	**IErrorLookup**	Yes
	ISQLErrorInfo	Yes
DataSource Object	**IDBAsynchStatus**	No
	IConnectionPointContainer	No
	IDBCreateSession	Yes
	IDBDataSourceAdmin	No
	IDBInfo	Yes
	IDBInitialize	Yes
	IDBProperties	Yes
	IPersist	Yes
	IPersistFile	Yes
	ISupportErrorInfo	Yes
Enumerator	**IDBInitialize**	No
	IDBProperties	No
	IParseDisplayName	No
	ISourcesRowset	No
	ISupportErrorInfo	No
ErrorObject Object	**IErrorRecords**	Yes
ErrorRecord Object	**IErrorInfo**	Yes
Index	**IAccessor**	No
	IColumnsInfo	No
	IConvertType	No
	IRowset	No
	IRowsetChange	No
	IRowsetFind	No
	IRowsetIdentity	No
	IRowsetIndex	No
	IRowsetInfo	No
	IRowsetLocate	No
	IRowsetRefresh	No
	IRowsetScroll	No
	IRowsetUpdate	No
	IRowsetView	No
	ISupportErrorInfo	No
MultipleResults	**IMultipleResults**	No
	ISupportErrorInfo	No
Rowset Object	**IAccessor**	Yes

	IChapteredRowset	No
	IColumnsInfo	Yes
	IColumnsRowset	No
	IConnectionPointContainer	No
	IConvertType	Yes
	IDBAsynchStatus	No
	IRowset	Yes
	IRowsetChange	Yes
	IRowsetChapterMember	No
	IRowsetFind	No
	IRowsetIdentity	No
	IRowsetIndex	No
	IRowsetInfo	Yes
	IRowsetLocate	No
	IRowsetRefresh	No
	IRowsetScroll	No
	IRowsetUpdate	Yes
	IRowsetView	No
	ISupportErrorInfo	Yes
Session Object	**IAlterIndex**	No
	IAlterTable	No
	IDBCreateCommand	Yes
	IDBSchemaRowset	Yes
	IGetDataSource	Yes
	IIndexDefinition	No
	IOpenRowset	Yes
	ISessionProperties	Yes
	ISupportErrorInfo	Yes
	ITableDefinition	No
	ITransaction	Yes
	ITransactionJoin	No
	ITransactionLocal	Yes
	ITransactionObject	Yes
Transaction Object	**IConnectionPointContainer**	No
	ISupportErrorInfo	Yes
	ITransaction	Yes
TransactionOptions	**ISupportErrorInfo**	Yes
	ITransactionOptions	Yes
View	**IAccessor**	No
	IColumnsInfo	No
	ISupportErrorInfo	No
	IViewChapter	No
	IViewFilter	No
	IViewRowset	No
	IViewSort	No

Command Object (OLE DB Provider for DB2)

The **Command** object is created by an OLE DB consumer, or by a service provider on behalf of a consumer. A **Command** object is used to execute a distributed data management (DDM)-specific command on a remote DDM server. The **Command** object currently supports executing Command Language commands on AS/400 DDM servers.

It is important not to confuse a command, which is an OLE COM object, and its command text, which is a string. Commands are generally used for data definition, such as creating a table or granting privileges, and data manipulation, such as updating or deleting rows. A special case of data manipulation using the **Command** object is the creation of rowsets based on DB2 tables. When using the command text with DB2/400 on the AS/400 computer, table names specified in a command are by default passed as uppercase. If a table name uses mixed case, the table name must be passed in a quoted string.

Before a consumer can use a command, it must determine if commands are supported. To do this, the consumer calls **QueryInterface** for **IDBCreateCommand** on a session. If this interface is exposed, the provider supports commands. To create a command, the consumer then calls **IDBCreateCommand::CreateCommand** on the session. A single session can be used to create multiple commands.

When the command is first created, it does not contain a command text. The consumer sets the command text with **ICommandText::SetCommandText**. Because the text command syntax is provider-specific, the consumer passes the globally unique identifier (GUID) of the syntax to use. For use with Microsoft OLE DB Provider for DB2, the GUID is DBGUID_DBSQL. Note that under OLE DB Provider for DB2, this GUID signifies that the text command is a superset of ANSI SQL. The level at which the provider supports ANSI SQL is specified by the DBPROP_SQLSUPPORT property. This property is a bitmask specifying the level of support for SQL.

The syntax supported by OLE DB Provider for DB2 for command text is as Entry-Level ANSI SQL 92 (with some exceptions based on the DB2 server host platform).

Legal SQL commands are documented in the following publications published by IBM:

- *AS/400 Advanced Series: DB2 for AS/400 SQL Reference Version 4* (Document Number SC41-5612-00)
- *DB2 for OS/390 Version 5: SQL Reference* (Document Number SC26-8966)

To execute the command, the consumer calls **ICommand::Execute**. If the command text specifies the command to open a rowset, **Execute** instantiates the rowset and returns an interface pointer to it.

The following interfaces of the **Command** object are supported by the current version of OLE DB Provider for DB2:

- **IAccessor**
- **IColumnsInfo**
- **ICommand**
- **ICommandPrepare**
- **ICommandProperties**
- **ICommandText**
- **ICommandWithParameters**
- **IConvertType**
- **ISupportErrorInfo**

When using the **ICommand** object, Microsoft OLE DB Provider for DB2 cannot derive parameter type information from the data store. The OLE DB client application must supply the native parameter type information through **ICommandWithParameters::SetParameterInfo** function. The OLE DB provider uses the type information specified by **SetParameterInfo** to determine how to convert parameter data from the type supplied by the consumer (as indicated by the wType value in the binding structure) to the native type used by the data store. When the consumer specifies a data type with known precision, scale, and size values, any information supplied by the consumer for precision, scale, or size is ignored by OLE DB Provider for DB2.

The information that the consumer supplies must be correct and must be supplied for all parameters. OLE DB Provider for DB2 cannot verify the supplied information against the parameter metadata, although the OLE DB provider can determine that the specified values are legal values for the provider. The result of executing a command using incorrect parameter information or passing parameter information for the wrong number of parameters is undefined. For example, if the parameter type is **LONG** and the consumer specifies a type indicator of DBTYPE_STR in **ICommandWithParameters::SetParameterInfo**, OLE DB Provider for DB2 converts the data to a string before sending it to the data store. Because the data store is not expecting a **LONG**, this will likely result in an error.

CustomErrorObject Object (OLE DB Provider for DB2)

The **CustomErrorObject** object is created by a **Command** object when a command error occurs. The **CustomErrorObject** object is used to retrieve additional information when an error occurs.

The following interfaces of the **CustomErrorObject** object are supported by the current version of Microsoft OLE DB Provider for DB2:

- **IErrorLookup**
- **ISQLErrorInfo**

DataSource Object (OLE DB Provider for DB2)

The **DataSource** object is created by an OLE DB consumer. The **DataSource** object contains the knowledge and ability to connect to DB2 over Advanced Program-to-Program Communications (APPC) and LU 6.2 (through Microsoft Host Integration Server 2004) or over TCP/IP. The **DataSource** object is used to create one or more **Session** objects.

The following interfaces of the **DataSource** object are supported by the current version of Microsoft OLE DB Provider for DB2:

- **IDBCreateSession**
- **IDBInfo**
- **IDBInitialize**
- **IDBProperties**
- **IPersist**
- **IPersistFile**
- **ISupportErrorInfo**

ErrorObject Object (OLE DB Provider for DB2)

The **ErrorObject** object is created by any interface on any DB2 OLE DB object. The **ErrorObject** object is used to retrieve additional information when an error occurs.

The following interface of the **ErrorObject** object is supported by the current version of Microsoft OLE DB Provider for DB2:

- **IErrorRecords**

The **IErrorRecords** interface returns **ErrorRecord** objects with detailed information on the error that occurred.

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ErrorRecord Object (OLE DB Provider for DB2)

The **ErrorRecord** object is created by calling the **IErrorRecord** interface on the **ErrorObject** object. An **ErrorObject** is created on any interface on any SNA OLE DB object when an error occurs. The **ErrorRecord** object is used to retrieve additional information when an error occurs.

The following interface of the **ErrorRecord** object is supported by the current version of Microsoft OLE DB Provider for DB2:

- **IErrorInfo**

OLE DB interface methods return error information in two ways. The error code returned by an interface method, known as the **return code**, indicates the overall success or failure of a method. Error records provide detailed information about the error, such as a text description of the error, the globally unique identifier (GUID) of the interface that defined the error, and provider-specific error information. Error objects in OLE DB are an extension of the error objects in Automation. They use many of the same mechanisms, and can be used as Automation error objects.

OLE DB error return codes are of type HRESULT. There are two general classes of return codes: success and warning codes, and error codes.

Success and warning codes begin with S_ or DB_S_ and indicate that the method successfully completed. The standard OLE DB error codes are defined in the OLEDBERR.H include file.

If the return code is other than S_OK or S_FALSE, it is likely that an error occurred from which the method was able to recover. For example, **IRowset::GetNextRows** returns DB_S_ENDOFROWSET when it is unable to return the requested number of rows due to reaching the end of the rowset. If a single warning condition occurs, the method returns the code for that condition. If multiple warning conditions occur, the method describes the hierarchy of warning return codes, indicating which warning code should be returned when given a choice between multiple warning return codes.

Error codes begin with E_ or DB_E_ and indicate that the method failed completely and was unable to do any useful work. For example, **GetNextRows** returns E_INVALIDARG when a null pointer in which the OLE DB provider returns a pointer to an array of row handles (*prghRows*). An exception to this is that some of the methods that return DB_E_ERRORSOCCURRED allocate memory to return additional information about these errors. Consumers must free this memory. For information about which methods allocate memory in this case, see the methods that return DB_E_ERRORSOCCURRED.

Although error codes can indicate run-time errors, such as running out of memory, they generally indicate programming errors. If multiple errors occur, the code that is returned is provider-specific. If both errors and warnings occur, the method fails and returns an error code.

All methods can return S_OK, E_FAIL, and E_OUTOFMEMORY. The E_OUTOFMEMORY code applies only to those methods which allocate memory that is returned to the consumer. In some cases, the E_OUTOFMEMORY code might be eliminated by calling the method requesting fewer returned values, such as fewer rows from **GetNextRows**.

Rowset Object (OLE DB Provider for DB2)

Rowset objects are created by **Session** objects. The **Rowset** object exposes data in tabular format.

The following interfaces of the **Rowset** object are supported by the current version of Microsoft OLE DB Provider for DB2.

- **IAccessor**
- **IColumnsInfo**
- **IConvertType**
- **IRowset**
- **IRowsetChange**
- **IRowsetInfo**
- **IRowsetUpdate**
- **ISupportErrorInfo**

Session Object (OLE DB Provider for DB2)

The **Session** object is created by a **DataSource** object. The **Session** object is used to create one or more **Rowset** objects.

The following interfaces of the **Session** object are supported by the current version of Microsoft OLE DB Provider for DB2:

- **IDBCreateCommand**
- **IDBSchemaRowset**
- **IGetDataSource**
- **IOpenRowset**
- **ISessionProperties**
- **ISupportErrorInfo**
- **ITransaction**
- **ITransactionLocal**
- **ITransactionObject**

Consumers can get information about a data store without knowing its structure by using the **IDBSchemaRowset** methods. The methods on this interface can be used to retrieve advanced schema information. OLE DB Provider for DB2 organizes each DB2 database server in a set of schemas that contain tables for each schema. These schema rowsets are identified by globally unique identifiers (GUIDs).

The following schema rowset GUIDs are supported by OLE DB Provider for DB2:

- DBSCHEMA_COLUMNS
- DBSCHEMA_INDEXES
- DBSCHEMA_PRIMARY_KEYS
- DBSCHEMA_PROCEDURES
- DBSCHEMA_PROCEDURE_PARAMETERS
- DBSCHEMA_PROVIDER_TYPES
- DBSCHEMA_TABLES

The following table lists these GUIDs and the columns for which restrictions can be specified on the schema rowset when using OLE DB Provider for DB2. The number of restriction columns for each schema rowset are defined as constants prefixed with CRESTRICTIONS_ in the OLE DB header files. Restriction values are treated as literals rather than as search patterns. For example, the restriction value "A_C" matches "A_C" but not "ABC".

GUID	Number of restrictions	Restriction columns
DBSCHEMA_COLUMNS	4	TABLE_CATALOG TABLE_SCHEMA TABLE_NAME COLUMN_NAME
DBSCHEMA_INDEXES	4	TABLE_CATALOG TABLE_SCHEMA INDEX_NAME TABLE_NAME
DBSCHEMA_PRIMARY_KEYS	3	TABLE_CATALOG TABLE_SCHEMA TABLE_NAME
DBSCHEMA_PROCEDURES	4	PROCEDURE_CATALOG PROCEDURE_SCHEMA PROCEDURE_NAME PROCEDURE_TYPE
DBSCHEMA_PROCEDURE_PARAMETERS	4	PROCEDURE_CATALOG PROCEDURE_SCHEMA PROCEDURE_NAME PARAMETER_NAME
DBSCHEMA_PROVIDER_TYPES	2	DATA_TYPE BEST_MATCH

DBSCHEMA_TABLES	4	TABLE_CATALOG TABLE_SCHEMA TABLE_NAME TABLE_TYPE

Note that the TYPE restriction on the DBSCHEMA_INDEXES GUID is not supported by OLE DB Provider for DB2.

The PROCEDURE_SCHEMA restriction on the DBSCHEMA_PROCEDURE GUID and the DBSCHEMA_PROCEDURE_PARAMETERS GUID is not supported when connecting to DB/2 on OS/390 platforms.

Transaction Object (OLE DB Provider for DB2)

The **Transaction** object is created by a **Session** object. The **Transaction** object is used to manage transactions on one or more **Rowset** objects.

The following interfaces of the **Transaction** object are supported by the current version of Microsoft OLE DB Provider for DB2:

- **ISupportErrorInfo**
- **ITransaction**

The current implementation of OLE DB Provider for DB2 services all OLE DB **Session**, **Command**, and **Rowset** objects present in a given instance of the **DataSource** object through a single Advanced Program-to-Program Communications (APPC) conversation or TCP/IP connection. One implication of this design is that if two **Rowset** objects, each created from a different OLE DB **Session** object, use explicit commitment control through the **ITransaction** interface, they will interfere with each other. When a **Commit** or **Abort** for one instance is invoked, all work for the **DataSource** object will be either committed or aborted. This may yield undesirable results. The work around to this problem is to instantiate two instances of the **DataSource** object.

OLE DB Property Support in the OLE DB Provider for DB2

OLE DB Provider for DB2 included with Host Integration Server 2004 supports a different set of provider-specific properties than the earlier OLE DB Provider for DB2 supplied with SNA Server 4.0. The sections below provide information about provider-specific and standard OLE DB properties supported by the current and the previous version of OLE DB provider.

This section contains:

- OLE DB Provider-Specific Property Support in the OLE DB Provider for DB2
- OLE DB Data Source Property Support in the OLE DB Provider for DB2

OLE DB Provider-Specific Property Support in the OLE DB Provider for DB2

The following table summarizes the provider-specific OLE DB version 2.0 properties in the DB2OLEDB_DBPROPSET_DBINIT property set that are supported by the version of Microsoft OLE DB Provider for DB2 included with Host Integration Server 2004.

OLE DB Property ID	Description
DBPROP_DB2OLEDB_APPCMODE	When logical unit (LU) 6.2 (SNA) is selected for the Network Transport Library (DBPROP_DB2OLEDB_NETTYPE), this property is the Advanced Program-to-Program Communications (APPC) mode and must be set to a value that matches the host configuration and SNA server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bidirectional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This VT_BSTR type property normally defaults to QPCSUPP.
DBPROP_DB2OLEDB_BINASCHAR	This property indicates whether to process binary fields (Character Code Set Identifier or CCSID of 65535) as character data type fields on a per data source basis. The host CCSID and PC Code Page values are required input parameters when this parameter is true. This VT_BOOL type property defaults to VARIANT_FALSE, do not process binary fields as character fields.
DBPROP_DB2OLEDB_CATALOGCOL	The name of the collection where OLE DB Provider for DB2 looks for catalog information. This is the default schema, the "SCHEMA" name for the target collection of tables and views. This property is the Data Schema value when configuring data sources. OLE DB Provider for DB2 uses this default schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection. For DB2, the default schema is the target AUTHENTICATION (User ID or "owner"). For DB2/400, the default schema is the target COLLECTION name. For DB2 Universal Database (UDB), the default schema is the SCHEMA name. If the user does not provide a VT_BSTR value for DBPROP_DB2OLEDB_CATALOGCOL, the OLE DB provider uses the USER_ID provided at logon. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. Because these values for the default schema are inappropriate in many cases, it is essential that the Default Schema value in the data source be defined.
DBPROP_DB2OLEDB_HOSTCCSID	The CCSID matching the data as represented on the host. This property is required when processing binary data as character data. Unless the DBPROP_DB2OLEDB_BINASCHAR property ID is set to **true**, character data is converted based on the host column CCSID and default ANSI code page. This VT_I4 type property defaults to 37 (U.S./Canada).
DBPROP_DB2OLEDB_LOCALLU	When LU 6.2 (SNA) is selected for the Network Transport Library, this property is the name of the local LU alias configured in the SNA server. This VT_BSTR type property has no default value.
DBPROP_DB2OLEDB_NETADDRESS	When TCP/IP has been selected for the Network Transport Library, this property is used to locate the target host computer. This parameter indicates the IP address or TCP/IP host name alias associated with the DDM server on the host. The network address is required when connecting by using TCP/IP. This VT_BSTR type property defaults to SNA.

DBPROP_DB2OLEDB_NETPORT	When TCP/IP has been selected for the Network Transport Library, this property is used to locate the target DDM service access port when connecting by using TCP/IP. This parameter represents the TCP/IP port used for communication with the DDM service on the host. This VT_BSTR type property defaults to 446.
DBPROP_DB2OLEDB_NETTYPE	This property, which represents the dynamic-link library used for transport, designates whether the provider connects through SNA LU 6.2 or TCP/IP for network communication. The possible values for this parameter are TCPIP or SNA. If TCPIP is selected, values for Network Address (DBPROP_DB2OLEDB_NETADDRESS) and Network Port (DBPROP_DB2OLEDB_NETPORT) are required. If SNA is selected, values for APPC Local LU Alias (DBPROP_DB2OLEDB_LOCALLU, APPC), Mode Name (DBPROP_DB2OLEDB_APPCMODE), and APPC Remote LU Alias (DBPROP_DB2OLEDB_REMOTELU) are required. This VT_BSTR type property defaults to SNA.
DBPROP_DB2OLEDB_PACKAGECOL	The name of the Distributed Relational Database Architecture (DRDA) target collection (AS/400 library) where Microsoft OLE DB Provider for DB2 should store and bind DB2 packages. This could be the same as the Default Schema (DBPROP_DB2OLEDB_DEFAULTSCH). Microsoft OLE DB Provider for DB2, which is implemented as an IBM DRDA Application Requester, uses packages to issue dynamic and static SQL statements. OLE DB Provider for DB2 will create packages dynamically in the location to which the user points using this property ID. This VT_BSTR type property has no default value.
DBPROP_DB2OLEDB_PCCODEPAGE	The PC Code Page property ID indicates the code page to be used on the computer for character code conversion. This property is required when processing binary data as character data. Unless DBPROP_DB2OLEDB_BINASCHAR is set to true, character data is converted based on the default ANSI code page configured in Windows. If this parameter is set to Binary or 65535, no character code conversions will take place. This VT_I4 type property defaults to 1252 (Latin 1).
DBPROP_DB2OLEDB_PLATFORM	The target DB2 platform property value is used to optimize performance of the OLE DB provider when executing operations such as data conversion. The following values for this property are supported by OLE DB Provider for DB2: • DB2/MVS • DB2/NT • DB2/6000 • DB2/400 This VT_BSTR property has a default value of DB2/MVS.
DBPROP_DB2OLEDB_QUALIFIERCOL	The name of the schema (collection/owner) used to fully qualify unqualified object names. Note that this attribute allows the user to access database objects without fully qualifying the object using a collection (schema) qualifier. The OLE DB provider sends this value to DB2 using a **SET CURRENT SQLID** statement, instructing the DBMS to use this value when locating unqualified objects (for example, tables and views) referenced in SQL statements. If you do not set a value for default qualifier, no **SET** statement is issued by the ODBC driver. This OLE DB property is only valid when connecting to DB2 for MVS (OS/390, z/OS). This VT_BSTR type property has a default value of “”.
DBPROP_DB2OLEDB_REMOTELU	When LU 6.2 (SNA) is selected for the Network Transport Library (DBPROP_DB2OLEDB_NETTYPE), this property is the name of the remote LU alias configured in the SNA server. This VT_BSTR type property has no default value.

DBPROP_DB2OLEDB_TPNAME	This property represents the default transaction program (TP) name for the DB2 DRDA application server (AS), which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, this property is set to 0X07F9F9F9. This VT_BSTR type property has no default value.
DBPROP_DB2OLEDB_UNITSOFWORK	This property indicates whether two-phase commit (distributed unit of work) used for transactions is supported for this data source. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and SNA LU 6.2 Resync Service. The following values for this property are supported by OLE DB Provider for DB2: • Remote unit of work (RUW) • Distributed unit of work (DUW) This VT_BSTR type property has a default value of RUW. Distributed unit of work (two-phase commit) works only with DB2 for OS/390 v5R1 or later. This option also requires that the SNA LU 6.2 service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OLE DB Data Source Property Support in the OLE DB Provider for DB2

The following table summarizes the standard OLE DB version 2.0 data source properties from the DBPROP_DATASOURCE property set that are supported by the version of Microsoft OLE DB Provider for DB2 included with Host Integration Server 2004,

OLE DB Property ID	**Comments**
DBPROP_CURRENTCATALOG	The name of the current catalog. This property is derived from the *Initial Catalog* parameter when configuring data sources. An application can use the CATALOGS schema rowset to enumerate catalogs. This VT_BSTR type property defaults to the value configured in the data source for *Initial Catalog*.

ODBC Driver for DB2 Programmer's Reference

The Microsoft® ODBC Driver for DB2 enables users to access IBM Data Base 2 (DB2) from within an ODBC-aware application. ODBC defines a standard set of interfaces that provide access to disparate databases. This section provides reference material needed to program for the ODBC Driver for DB2.

For general information about programming for the ODBC Driver for DB2, see the ODBC Driver for DB2 Programmer's Guide section of the SDK.

For sample code using OLE DB Provider and ODBC Driver, see the OLE DB Provider and ODBC Driver Samples section of the SDK.

This section contains:

- Programming Considerations Using the ODBC Driver for DB2
- ODBC Conformance
- ADO Object, Method, Property, and Collection Support for AS/400, VSAM and DB2

Programming Considerations Using the ODBC Driver for DB2

The Microsoft® ODBC Driver for DB2 provides passthrough support for SQL statements. No SQL parsing is provided. The user must know what SQL syntax is supported for the target DB2-implementation. For information on what SQL syntax is supported, see the specific DB2 SQL Reference and DB2 Application Programming and SQL Guide for the specific platform.

The ODBC Driver for DB2 does not parse the SQL statements to qualify table names. Consequently, users of the ODBC Driver for DB2 must use either two-part or three-part (fully qualified) object names when naming tables, views, and stored procedures in DB2. A two-part table name would consist of the user ID and table, <UserID>.<Table>. One-part names (just the table name) will not succeed unless the combination of the DB2 collection and schema name correspond directly to the ODBC User ID

The Microsoft ODBC Driver for DB2 does not insert the correct value for the fraction when using a parameterized insert with the TIMESTAMP data type.

Microsoft Data Access Components (MDAC) supports the option of using a client cursor engine. This service component is implemented as part of OLE DB, ADO, and Remote Data Services (RDS). When using ADO, a client cursor is enabled by setting the **CursorLocation** property on the recordset to **adUseClient**. When using the ADO Client Cursor Engine with DB2 for OS/390, the developer must configure the ODBC Driver for DB2 Auto Commit Mode property in the DSN or connection string to **FALSE**. This is not required when connecting to DB2 for OS/400.

The ODBC Driver for DB2 included with Host Integration Server 2004 supports updating capabilities when used with a client cursor engine and the following requirements are met:

- To support updates (UPDATE, INSERT, and DELETE), the values in at least one column in the target table must be unique.
- The Auto Commit parameter must be set to **FALSE** when configuring the data source or when this parameter is passed as part of a connection string.

Previous versions of the ODBC Driver for DB2 do not support any updating capabilities when used with a client cursor engine. In other words, if a client cursor engine is enabled using RDS or ADO, the ODBC Driver for DB2 cannot be used to update data on the host. The ADO recordset is treated as if it were read-only. When using the ADO Client Cursor Engine with DB2 for OS/390, the developer must configure the ODBC Driver for DB2 Auto Commit parameter in the data source or connection string to FALSE. This is not required when connecting to DB2 for OS/400.

When the intent is to update records with a server-side cursor, DB2 requires that the SQL **SELECT** statement also include the FOR UPDATE option. For example, to select all records from the AUTHORS table in the DB2 collection called PUBS with intent to update requires the following SQL syntax:

```
SELECT * FROM PUBS.AUTHORS FOR UPDATE
```

When using DB2 for MVS V4R1 and DB2 for OS/400 V3R2, there are further requirements to indicate the columns that you intend to update. For example, to update the AU_LNAME and AU_FNAME columns in the PUBS.AUTHORS table, the following SQL syntax must be used:

```
SELECT * FROM PUBS.AUTHORS FOR UPDATE OF AU_LNAME, AU_FNAME
```

The Microsoft ODBC Driver for DB2 provides support for distributed transactions and DRDA Distributed Unit of Work, and can participate in a distributed transaction coordinated by Microsoft Distributed Transaction Coordinator. This feature is only available when connecting to one of the following across an LU 6.2 network connection:

- DB2 for OS/390 V5R1 or later.
- DB2 for DB2/400 V4R3 or later.

This option also requires that the SNA LU 6.2 service is selected as the network transport and Microsoft Transaction Server (MTS) is installed. The Microsoft ODBC Driver for DB2 does not support automatic transaction enlistment under Microsoft Transaction Server.

Applications should not commit or roll back transactions by executing **COMMIT** or **ROLLBACK** statements using the **SQLExecute** or **SQLExecDirect** ODBC functions. The effects of doing this are undefined, and the ODBC Driver for DB2 no longer knows when a transaction is active. Applications should call the **SQLEndTran** ODBC function instead.

Microsoft Visual Studio .NET 2003 offers a number of ADO data-bound controls, including a data grid and the ADO Data control. When using these ADO data controls, the developer must set the **CursorLocation** property on the recordset to **adUseClient**. Additionally, when using these ADO data controls with DB2 for OS/390, you must set the ODBC Driver for DB2 Auto Commit parameter in the data source or connection string to **FALSE**.

You can use Microsoft® Query (MSQUERY) supplied with Microsoft Excel and Microsoft Office to access ODBC data sources using the ODBC Driver for DB2. When a data of a column defined with TIMESTAMP data type is updated using Microsoft Query, the microseconds portion of the TIMESTAMP is not updated properly. The result is that updating any TIMESTAMP value using Microsoft Query will cause the loss of fractional seconds.

The Microsoft ODBC Driver for DB2 is not supported for use with the Microsoft ODBC .NET Data Provider. When accessing DB2 from ADO.NET, use the Microsoft OLE DB Provider for DB2 in conjunction with the Microsoft OLE DB .NET Data Provider.

This section contains:

- Stored Procedure Support Using the ODBC Driver for DB2
- Support for Isolation Levels Using the ODBC Driver for DB2
- Code Page Support Using the ODBC Driver for DB2
- Data Conversion Using the ODBC Driver for DB2
- Floating Point Considerations Using the ODBC Driver for DB2
- Usernames and Passwords Using the ODBC Driver for DB2
- Errors Returned by the ODBC Driver for DB2
- Two-Phase Commit over TCP/IP Support Using the ODBC Driver for DB2
- Troubleshooting the ODBC Driver for DB2

Stored Procedure Support Using the ODBC Driver for DB2

The Microsoft ODBC Driver for DB2 supports calling DB2 stored procedures, returning output parameters and single and multiple result sets.

Support for Isolation Levels Using the ODBC Driver for DB2

The Microsoft ODBC Driver for DB2 provides flexibility in dealing with issues of isolation levels and transaction state. The ODBC **SQLSetConnectAttr** function is used to set the isolation level that is to be used for a connection. This function would be called with the attribute parameter set to SQL_ATTR_TXN_ISOLATION and the *ValuePtr* parameter pointing to an integer value indicating the isolation level requested. This integer value is a 32-bit bitmask that sets the transaction isolation level for the current connection.

The allowable values for isolation level (the *ValuePtr* parameter when calling **SQLSetConnectAttr**) can be determined by calling **SQLGetInfo** with InfoType equal to SQL_TXN_ISOLATION_OPTION. The following table list the allowable values for isolation level using the ODBC Driver for DB2 supplied with Host Integration Server.

ODBC Isolation Level Attribute	Description
SQL_TXN_READ_COMMITTED	When this attribute value is set, it isolates any data read from changes by others and changes made by others by others cannot be seen. The re-execution of the read statement is affected by others. This does not support a repeatable read. This is the default value for isolation level This isolation level is also called Cursor Stability (CS) in IBM DB2 documentation.
SQL_TXN_READ_UNCOMMITTED	When this attribute value is set, it does not isolate data read from changes by others and changes made by others by others can be seen. The re-execution of the read statement is affected by others. This does not support a repeatable read. This isolation level is called Uncommitted Read (UR) in IBM DB2 documentation.
SQL_TXN_REPEATABLE_READ	When this attribute value is set, it isolates any data read from changes by others and changes made by others cannot be seen. The re-execution of the read statement is affected by others. This supports a repeatable read. This isolation level is called Read Stability (RS) in IBM DB2 documentation.
SQL_TXN_SERIALIZABLE	When this attribute value is set, it isolates any data read from changes by others and changes made by others by others cannot be seen. The re-execution of the read statement is not affected by others. This supports a repeatable read. This isolation level is called Repeatable Read (RR) in IBM DB2 documentation.

The SQL_ATTR_TXN_ISOLATION attribute can be set only if there are no open transactions on the connection. An application must call **SQLEndTran** to commit or roll back all open transactions on a connection, before calling **SQLSetConnectAttr** with this option.

Some connection attributes support substitution of a similar value if the data source does not support the value specified in *ValuePtr*. In such cases, the driver returns SQL_SUCCESS_WITH_INFO and SQLSTATE 01S02 (Option value changed). To determine the substituted value, an application calls **SQLGetConnectAttr**.

Code Page Support Using the ODBC Driver for DB2

When creating data sources or file DSNs for use with the ODBC Driver for DB2, the Host character code set identifier (CCSID) should be configured in the data source to match the DB2 data as represented on the remote host computer. The Host CCSID parameter defaults to EBCDIC U.S./Canada (37).

On Windows 2000, the appropriate ANSI NLS file for your locale is installed automatically when you install a localized version of Windows 2000.

The following sections discuss the character code set identifiers (CCSIDs) supported by ODBC Driver for DB2 in Host Integration Server 2004.

This section contains:

- ANSI Code Page Support Using the ODBC Driver for DB2
- EBCDIC Code Page Support Using the ODBC Driver for DB2
- ISO Code Page Support Using the ODBC Driver for DB2
- DBCS Code Page Support Using the ODBC Driver for DB2

ANSI Code Page Support Using the ODBC Driver for DB2

IBM DB2 Universal Database for Windows NT and IBM DB2 Universal Database for AIX are frequently configured to use ANSI code pages, for example ANSI 1253 (Greek). Host Integration Server 2004 includes support for some ANSI code pages for purposes of ANSI-to-UNICODE-to-ANSI conversions when using the OLE DB Provider for DB2 or the ODBC Driver for DB2. These ANSI code pages can be used when accessing IBM DB2 Universal Database on Windows NT and IBM DB2 ON AIX (not all of these ANSI code pages are supported on IBM DB2 Universal Database for AIX).

The following table shows the ANSI character code set identifiers (CCSIDs) supported by ODBC Driver for DB2 in Host Integration Server 2004.

Microsoft Display Name	Microsoft NLS Code Page	IBM CCSID	Comments
ANSI - Arabic	1256	1256	
ANSI - Baltic	1257	1257	
ANSI - Cyrillic	1251	1251	
ANSI - Central Europe	1250	1250	
ANSI - Greek	1253	1253	
ANSI - Hebrew	1255	1255	
ANSI - Latin I	1252	1252	Support for this codepage is normally installed as part of the operating system on Windows 2000.
ANSI - Turkish	1254	1254	
ANSI/OEM - Japanese Shift JIS	932	932	
ANSI/OEM - Korean	949	949	
ANSI/OEM - Simplified Chinese GBK	936	936	
ANSI/OEM - Thai	874	874	
ANSI/OEM - Traditional Chinese Big5	950	950	
ANSI/OEM - Viet Nam	1258	1258	

The Microsoft Display Name is the name found in the Windows 2000 definitions for these NLS files. The Microsoft NLS Code Page column represents the code page number that is registered and associated with an ANSI-to-UNICODE NLS resource file. The Microsoft NLS number should be set as the Host CCSID when configuring data sources when using the ODBC Driver for DB2. When setting the Host CCSID or PC Code Page parameter using a connection string, the Microsoft NLS number should be used for this parameter.

The IBM CCSID column represents the CCSID given to the ANSI code page in IBM publications, which for these supported ANSI CCSIDs are the same as the Microsoft CCSID values. IBM lists their ANSI support in publications by referencing the display name which for these ANSI code pages is the same as the Microsoft display name. The ODBC Driver for DB2 does not recognize or display the IBM CCSID values when configuring data sources. The ODBC Driver for DB2 maps the Microsoft NLS numbers to ANSI NLS files which correspond with the appropriate IBM CCSID numbers. The Microsoft ODBC Driver for DB2 passes the corresponding IBM CCSID to the DB2 system at run time even though you configure the driver to use the Microsoft NLS number.

These are the only ANSI pages currently supported by the ODBC Driver for DB2 in Host Integration Server 2004 and in SNA Server 4.0 with Service Pack 3 or later. IBM supports additional ANSI pages, however, the ANSI code pages listed in the table above are the only cases where the Microsoft NLS pages and IBM ANSI code pages (CCSIDs) match.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

EBCDIC Code Page Support Using the ODBC Driver for DB2

IBM DB2 for MVS, IBM DB2 for OS/390, and IBM DB2 for OS/400 are frequently configured to use EBCDIC code pages, for example EBCDIC 875 (Greek Modern). Host Integration Server 2004 includes support for most EBCDIC code pages for purposes of EBCDIC-to-UNICODE-to-ANSI, ANSI-to-UNICODE-to-EBCDIC, and EBCDIC-to-UNICODE-to-EBCDIC conversions when using the OLE DB Provider for DB2 or the ODBC Driver for DB2. These EBCDIC code pages can be used when accessing IBM DB2 on a variety of platforms (not all of these EBCDIC code pages are supported on all versions of IBM DB2).

The following table shows the EBCDIC character code set identifiers (CCSIDs) supported by ODBC Driver for DB2 in Host Integration Server 2004.

Microsoft Display Name	**Microsoft NLS Code Page**	**IBM CCS ID**	**Comments**
IBM EBCDIC - Arabic	20420	420	
IBM EBCDIC - Cyrillic (Russian)	20880	880	
IBM EBCDIC - Cyrillic (Serbian, Bulgarian)	21025	1025	
IBM EBCDIC - Denmark/Norway	20277	277	
IBM EBCDIC - Denmark/Norway (Euro)	1142	1142	
IBM EBCDIC - Finland/Sweden	20278	278	
IBM EBCDIC - Finland/Sweden (Euro)	1143	1143	
IBM EBCDIC - France	20297	297	
IBM EBCDIC - France (Euro)	1147	1147	
IBM EBCDIC - Germany	20273	273	
IBM EBCDIC - Germany (Euro)	1141	1141	
IBM EBCDIC - Greek	20423	423	
IBM EBCDIC - Greek (Modern)	875	875	
IBM EBCDIC - Hebrew	20424	424	
IBM EBCDIC - Icelandic	20871	871	
IBM EBCDIC - Icelandic (Euro)	1149	1149	
IBM EBCDIC - International	500	500	
IBM EBCDIC - International (Euro)	1148	1148	
IBM EBCDIC - Italy	20280	280	
IBM EBCDIC - Italy (Euro)	1144	1144	
IBM EBCDIC - Japan English/Kanji (Extended)	939	939	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Japan English/Kanji (Extended)	5035	5035	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Japan Katakana/Kanji (Extended)	930	930	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Japan Katakana/Kanji (Extended)	5026	5026	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Japanese	931	931	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Korea (Extended)	933	933	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Latin America/Spain	20284	284	
IBM EBCDIC - Latin America/Spain (Euro)	1145	1145	
IBM EBCDIC - Multilingual/ROECE (Latin-2)	870	870	
IBM EBCDIC - Simplified Chinese (Extended)	935	935	Support for this double-byte character set is supplied using TRNSDT.
IBM EBCDIC - Thai	20838	838	
IBM EBCDIC - Traditional Chinese (Extended)	937	937	Support for this double-byte character set is supplied using TRNSDT.

IBM EBCDIC - Turkish (Latin-3)	20905	905	
IBM EBCDIC - Turkish (Latin-5)	1026	1026	
IBM EBCDIC - U.S./Canada	037	37	
IBM EBCDIC - U.S./Canada (Euro)	1140	1140	
IBM EBCDIC - United Kingdom	20285	285	
IBM EBCDIC - United Kingdom (Euro)	1146	1146	

The Microsoft Display Name is the name found in the Windows 2000 definitions for these NLS files. The Microsoft NLS Code Page column represents the code page number that is registered and associated with an EBCDIC-to-UNICODE NLS resource file. The Microsoft NLS number should be set as the Host CCSID when configuring data sources when using the ODBC Driver for DB2. When setting the Host CCSID or PC Code Page parameter using a connection string, the Microsoft NLS number should be used for this parameter.

The IBM CCSID column represents the CCSID given to the EBCDIC code page in IBM publications. IBM lists their EBCDIC support in publications by referencing the display name which for these EBCDIC code pages is the same as the Microsoft display name. The ODBC Driver for DB2 does not recognize or display the IBM CCSID values when configuring data sources using data links. The ODBC Driver for DB2 maps the Microsoft NLS numbers to EBCDIC NLS files which correspond with the appropriate IBM CCSID numbers. The Microsoft ODBC Driver for DB2 passes the corresponding IBM CCSID to the DB2 system at run time even though you configure the driver to use the Microsoft NLS number.

These are the only EBCDIC pages currently supported by the ODBC Driver for DB2 in Host Integration Server 2004 and in SNA Server 4.0 with Service Pack 3 or later. IBM supports additional EBCDIC pages; however, the EBCDIC code pages listed in the table above are the only cases where the Microsoft NLS pages and IBM EBCDIC code pages (CCSIDs) match.

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ISO Code Page Support Using the ODBC Driver for DB2

IBM DB2 Universal Database for Windows NT and IBM DB2 Universal Database for AIX are frequently configured for an ISO code page, for example ISO 819 (Latin I). Host Integration Server 2004 includes support for some ISO code pages for purposes of ISO-to-UNICODE-to-ANSI, ANSI-to-UNICODE-to-ISO, and ISO-to-UNICODE-to-ISO conversions when using the OLE DB Provider for DB2 or the ODBC Driver for DB2. These ISO code pages can be used when accessing IBM DB2 Universal Database for Windows NT and IBM DB2 Universal Database for AIX.

The following table shows the ISO character code set identifiers (CCSIDs) supported by ODBC Driver for DB2 in Host Integration Server 2004.

Microsoft Display Name	Microsoft NLS Code Page	IBM CCSID	Comments
ISO 8859-1 Latin 1	28591	819	
ISO 8859-2 Central Europe	28592	912	
ISO 8859-5 Cyrillic	28595	915	
ISO 8859-6 Arabic	28596	1089	
ISO 8859-7 Greek	28597	813	
ISO 8859-8 Hebrew	28598	916	
ISO 8859-9 Turkish	28599	920	
ISO 6937 Non-Spacing Accent	20269	819	Note that ISO 6937 (CCSID 20269) is not supported by the ODBC Driver for DB2, but is displayed in the list of configuration options when creating or modifying data sources.
ISO 8859-15 Latin 9 (Euro)	20865	923	NLS Code Page 819 with support for the euro.

The ///Microsoft Display Name is the name found in the Windows 2000 definitions for these NLS files.

The Microsoft NLS Code Page column represents the code page number that is registered and associated with an ISO-to-UNICODE NLS resource file. The Microsoft NLS number should be set as the Host CCSID when configuring data sources when using the ODBC Driver for DB2. When setting the Host CCSID or PC Code Page attribute/property using a connection string, the Microsoft NLS number should be used for this parameter.

The IBM CCSID column represents the CCSID given to the ISO code page in IBM publications. IBM lists their ISO support in publications by referencing the locale name (Bulgaria for ISO 8859-5 and 915, for example) rather than simply using ISO 8859-5 Cyrillic as used by Microsoft. The ODBC Driver for DB2 does not recognize or display the IBM CCSID values when configuring data sources. The ODBC Driver for DB2 maps the Microsoft NLS numbers to ISO NLS files which correspond with the appropriate IBM CCSID numbers. The Microsoft ODBC Driver for DB2 passes the corresponding IBM CCSID to the DB2 system at run time even though you configure the driver to use the Microsoft NLS number.

Note that IBM CCSID 819 is associated with both ISO 8859-1 Latin 1 and ISO 6937 Non-Spacing Accent. It is up to the user to choose the standard ISO 8859-1 Latin 1 code page by selecting NLS code page 28591 or the modified code page ISO 6937 Non-Spacing Accent by selecting NLS code page 20269. Note that ISO 6937 Non-Spacing Accent (CCSID 20269) is not currently supported by the ODBC Driver for DB2, but is displayed in the configuration options when creating or modifying data sources.

IBM CCSID 916 (ISO 8859-8) supports Hebrew "visual sort order". IBM CCSID 920 (ISO 8859-8 derivation) supports Hebrew "logical sort order". Although Microsoft supports the logical sort order with NLS 38598, this NLS file is only distributed with Internet Explorer 5 or Windows 2000. The ODBC Driver for DB2 has not been tested using the ISO 8859-8 derivation matching IBM CCSID 920 and does not support this configuration.

These are the only ISO pages currently supported in Host Integration Server 2004 and in SNA Server 4.0 with Service Pack 3 or later. Microsoft supports a number of additional ISO pages. IBM also supports additional ISO pages. However, the code pages listed in the table above are the only cases where the Microsoft NLS pages and IBM CCSIDs match.

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DBCS Code Page Support Using the ODBC Driver for DB2

The ODBC Provider for DB2 supports Double-Byte Character String (DBCS) data, including conversions between DBCS and ANSI code pages. Conversions between DBCS and ISO code pages are also supported, as are positioned updates against DBCS EBCDIC implementations of DB2.

The DB2 GRAPHIC data types (GRAPHIC, VARGRAPHIC, and LONG VARGRAPHIC) are now explicitly supported. These DB2 data types support DBCS (not mixed) data. Mixed data types are supported using CHAR FOR MIXED DATA, VARCHAR FOR MIXED DATA, and LONGVARCHAR FOR MIXED DATA.

Parameterized SQL statements and calling stored procedures when the parameter values contain Mixed or DBCS characters are supported.

When performing a SQL statement with inline data, character strings can be prefixed with a 'G' or 'g' to denote that the data is DBCS and is to be used with a graphic column. Only double-byte characters can be used with a graphic column. For example:

```
CREATE TABLE NAMES (COL1 GRAPHIC(64), COL2 CHAR(64))
INSERT INTO NAMES (COL1, COL2) VALUES (G’DBCS data’, ‘MBCS or SBCS data’)
```

The prefixes 'n' (graphic) and 'gx' (hexadecimal graphic) are also supported.

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Data Conversion Using the ODBC Driver for DB2

The design of ODBC APIs is similar to other ISAM APIs. The APIs are handle-based. After opening a file, the application can determine the buffer size required to store a row, use the cursor APIs to move, and optionally retrieve one or more rows of data using the row-level binding.

Data is converted to default SQL data types, as defined in ODBC. The following table lists these conversions.

DB2 data type	Default SQL Data Type	Exposed as Native Type in SQLGetTypeInfo	Comments
BIGINT			An 8-byte integer. This data type is supported on DB2 UDB only.
BLOB			A Binary Large Object (BLOB) is a varying-length string that can be up to 2 gigabytes in length. A BLOB is primarily intended to hold binary data. This data type is not supported by the ODBC Driver for DB2.
CHAR (BIT)	SQL_BINARY	No	A fixed length (double-byte only) character string.
CHAR (SBCS)	SQL_CHAR	Yes	A fixed-length SBCS character string.
CHAR (MIXED)	SQL_CHAR	No	A fixed-length mixed (single and double-byte) character string.
CLOB			A Character Large Object (CLOB) is a varying-length string that can be up to 2 gigabytes in length. A CLOB is used to store large single-byte character set data. A CLOB is considered to be a character string. This data type is not supported by the ODBC Driver for DB2.
DATE	SQL_TYPE_DATE	Yes	A 10-byte date string. This data type is converted to an SQL_DATE for use by ODBC.
DBCLOB			A Double-Byte Character Large Object (DBCLOB) is a varying-length string of double-byte characters that can be up to 2 gigabytes in length (1,073,741,823 double-byte characters). A DBCLOB is used to store large double-byte character set data. A DBCLOB is considered to be a graphic string. It is not supported by the ODBC Driver for DB2.
DECIMAL	SQL_DECIMAL	Yes	A packed decimal number.
DOUBLE	SQL_DOUBLE	Yes	An 8-byte double-precision floating point number.
FLOAT	SQL_FLOAT	Yes	An 8-byte double-precision floating point number. This data type is the same as a DOUBLE.
GRAPHIC (DBCS)	SQL_CHAR	No	A fixed-length graphic string consisting of a sequence of double byte (DBCS only) character string data.
INTEGER	SQL_INTEGER	Yes	A 4-byte integer with a precision of 10 digits ranging in value from -2,147,463,648 to +2,147,483,647.
LONG VARCHAR (BIT)	SQL_BINARY	No	A varying-length (double-byte only) character string.
LONG VARCHAR (SBCS)	SQL_CHAR	No	A varying-length SBCS character string.
LONG VARCHAR (MIXED)	SQL_CHAR	No	A varying-length mixed-character (single and double-byte) string.

LONG VARGRAPHIC (DBCS)	SQL_LONGVARCHAR	No	A varying-length graphic string consisting of a sequence of double byte (DBCS only) character string data.
SMALLINT	SQL_SMALLINT	Yes	A SMALLINT (small integer) is a two-byte integer with a precision of 5 digits ranging from -32,768 to +32,767.
REAL	SQL_REAL	Yes	A 4-byte single-precision floating point number.
TIME	SQL_TYPE_TIME	Yes	An 8-byte time string. When using ActiveX Data Objects to return data from a DB2 TIME data type, ADO returns a DATETIME value.
TIMESTAMP	SQL_TYPE_TIMESTAMP	Yes	A 26-byte string representing the date, time, and microseconds.
VARCHAR (BIT)	SQL_BINARY	No	A varying-length (double-byte only) character string.
VARCHAR (SBCS)	SQL_CHAR	Yes	A varying-length character string.
VARCHAR (MIXED)	SQL_CHAR	No	A varying-length mixed (single and double-bye) character string.
VARGRAPHIC (DBCS)	SQL_VARCHAR	No	A varying-length graphic string consisting of a sequence of double byte (DBCS only) character string data.

Not all platforms and versions of DB2 support all of the above-referenced data types. Consult your IBM SQL Reference for the specific target and platform and version of DB2.

The ODBC Driver for DB2 exposes only selected DB2 data types as native types in the ODBC catalog function **GetTypeInfo**. For example, the driver does not expose LONG CHARACTER or VARYING LONG CHARACTER types. Rather these types are exposed as CHARACTER and VARYING CHARACTER respectively. Also, the driver exposes CHARACTER FOR SBCS DATA, CHARACTER FOR MIXED DATA, and CHARACTER FOR BIT DATA as CHARACTER. The driver exposes VARYING CHARACTER FOR SBCS DATA, VARYING CHARACTER FOR MIXED DATA, and VARYING CHARACTER FOR BIT DATA as VARYING CHARACTER. However, the ODBC Driver for DB2 returns these LONG and VARYING LONG data types if one reads a table with these data types. For example, when reading a table with a variable character string of length greater than 254 bytes, the ODBC Driver for DB2 returns a LONG VARCHAR.

The maximum length of the DB2 character and graphic string data types is dependent on the DB2 platform and version. For example, a CHAR type on DB2 for OS/390 V5R1 has a maximum length of 254 bytes, whereas a CHAR type on DB2/400 V4R4 has a maximum length of 32,766 bytes.

Data conversions from a large numeric type to a small numeric type are supported (from DOUBLE to SINGLE and from INT to SMALLINT, for example), however truncation and conversion errors can occur that will not be reported by the ODBC Driver for DB2.

For more information on support for the DB2 character data types of subtype MIXED using the ODBC Driver for DB2, see Code Page Support Using the ODBC Driver for DB2.

Using the ODBC Driver for DB2, certain conversions of strings from EBCDIC to ASCII and then back to EBCDIC are asymmetric, and can result in strings that are different from the original. The EBCDIC specification contains ordinals for which there is no defined character. The ODBC Driver for DB2 translates all such undefined characters to the question mark character ("?"). So when ASCII strings containing these characters are converted back to EBCDIC, these undefined characters are replaced with question marks. To protect EBCDIC strings containing undefined characters, these fields should be tagged as binary strings and mapped by the application.

The affected ANSI-to-EBCDIC character conversions include the following:

Character value (decimal)	**Character value (hexadecimal)**	**ANSI code page 1252**	**EBCDIC character after conversion to CCSID 37**

128	0x80	Not used	?
130	0x82	Single low quote	?
131	0x83	Latin F with hook	?
132	0x84	Double low quote	?
133	0x85	Ellipsis	?
134	0x86	Dagger	?
135	0x87	Double dagger	?
136	0x88	Per mile	?
137	0x89	S with caron	?
138	0x8A	Left angle	?
139	0x8B	Ligature OE	?
140	0x8C	Not used	?
142	0x8E	Not used	?
145-156	0x91-0x9C		?
158-159	0x9E-0x9F		?

Floating Point Considerations Using the ODBC Driver for DB2

When real or double (synonymous with float) data is inserted into a DB2 table as a floating point data type, it is stored in scientific notation. For example, FLOAT(1.1) would be stored as +1.10000E+000.

Care must be taken when executing SQL statements to make sure that the proper data type specified in the SQL statement matches the values stored in DB2. For example, the following select statement would match values in DB2 stored as decimal 1.1:

```
SELECT * FROM TEST WHERE C1 = 1.1
```

If the data in DB2 was stored as real numbers, there would not be a match since decimal 1.1 is stored as 1.1, not the representation of +1.10000E+000. When DB2 parses and executes the SQL **SELECT** statement, it interprets 1.1 as a decimal type. When doing the **SELECT** query, DB2 does not implicitly do the conversion to floating point. In this case, the SQL statement should explicitly typecast the 1.1 so that DB2 looks for the correct format (the scientific notation format). The **SELECT** query would look like the following:

```
SELECT * FROM TEST WHERE C1 = REAL(1.1)
```

This will give the expected results. The SQL **REAL** function converts the decimal 1.1 to the proper format before DB2 executes the actual select.

Usernames and Passwords Using the ODBC Driver for DB2

When connecting to remote DB2 systems, most users must be authenticated by the remote system by passing a valid user ID and password.

The AS/400 computer is case-sensitive with regard to user ID and password; it accepts them only in uppercase. The ODBC Driver for DB2 automatically converts the user ID and password into uppercase when connecting to a DB2 for OS/400 system.

The mainframe is not case-sensitive; the user ID and password is acceptable in lowercase or uppercase.

DB2 Universal Database (UDB) for Windows NT is case-sensitive; it supports mixed case passwords. Users must enter a password in the correct mixed case. When entering a user ID, use only the Windows NT user name and not the Windows NT domain name.

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Errors Returned by the ODBC Driver for DB2

The ODBC Driver for DB2 generates errors in the following areas:

- ODBC Driver Manager
- Microsoft ODBC Driver for DB2
- DRDA Application Requester network client

The ODBC Driver Manager is a shared library that establishes connections with ODBC drivers, submits requests to ODBC drivers, and returns results to applications. An ODBC Driver Manager error has the following format:

```
[vendor] [ODBC DLL] message
```

For example:

```
[Microsoft] [ODBC DLL] Driver does not support this function.
```

If you encounter this type of error, check the last ODBC call the application made for possible problems. For further information on ODBC Driver Manager errors, contact your ODBC application vendor or refer to the ODBC documentation available from Microsoft Press.

An error reported by the Microsoft ODBC Driver for DB2 has the following format:

```
[Microsoft] [ODBC Driver for DB2] message
```

For example:

```
[Microsoft] [ODBC Driver for DB2] Invalid precision specified.
```

If you encounter this type of error is, check the last ODBC call the application made for possible problems. For further information on ODBC Driver errors, contact your ODBC application vendor or refer to the ODBC documentation available from Microsoft Press.

When using the Microsoft ODBC Driver for DB2, data source refers to the target database. An error that occurs in the data source is returned with the data source name and in the following format:

```
[Microsoft] [ODBC Driver for DB2] [data_source] message
```

For example, an ODBC application may receive the following message from a DB2 data source running on an IBM mainframe:

```
[Microsoft] [ODBC Driver for DB2] [DB2] DB2-0919: specified length too long for CHAR column
```

If you encounter this type of error, the application attempted to perform an operation not supported by the DB2 database system. Check the DB2 database system documentation for more information or consult your database administrator.

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Two-Phase Commit over TCP/IP Support Using the ODBC Driver for DB2

Two-phase commit (2PC) is a host server-installed protocol that ensures that updates to multiple instances of a database on a network either succeed or fail in their entirety. Host Integration Server 2004 supports 2PC over TCP/IP, allowing you to gain the security of a 2PC connection over the Internet.

Host Integration Server supports 2PC works using three components: the DTC, the Resync Service, and the transaction log. The DTC governs the normal DTC transaction flow: enlist, prepare, commit, and abort. The Resync service coordinates transaction recovery in case of any failure or disconnection, while the transaction log maintains a log of information that is needed in case of recovery.

You can perform a 2PC transaction with the ODBC Driver for DB2 using **SQLSetConnAttr**. Using a 2PC transaction is automatic. However, you may need to configure your 2PC connection using tools such as ODBC Connection Manager.

Troubleshooting the ODBC Driver for DB2

The Windows 2000 Event Viewer can be a useful tool for troubleshooting data access in some cases. The ODBC Driver for DB2 does not issue events. However, when SNA (APPC/LU 6.2) is used for the network transport for the ODBC Driver for DB2, the low-level SNA APPC transport issues events on the SNA connection.

The ODBC Driver for DB2 supplied with Host Integration Server 2004 has the ability to trace DRDA data flows when used over TCP/IP. This capability is accessible from the SNADB2 Service tracing inside the Trace utility shipped with Host Integration Server 2004.

This facility shows the same data as an APPC trace but without the control indicators (for example, What_Received). Socket errors are traced and the error codes can be looked up in Winsock2.h supplied with the Win32 SDK.

When the ODBC Driver for DB2 passes an error code, the best source in which to look-up the meaning of the return code is often the SQL Reference or SQL Messages and Codes Reference for the target SQL database. In this case, the target database is one of the DB2 platforms supported by the ODBC Driver for DB2.

The ODBC Driver for DB2 maintains an internal integer variable named SQLCODE and an internal 5-byte character string variable named SQLSTATE used to check the execution of SQL statements on DB2. SQLCODE is set by DB2 after each SQL statement is executed. DB2 returns the following values for SQLCODE:

- If SQLCODE = 0, execution was successful.
- If SQLCODE > 0, execution was successful with a warning.
- If SQLCODE < 0, execution was not successful.
- SQLCODE = 100, "no data" was found. For example, a **FETCH** statement returned no data because the cursor was positioned after the last row of the result table.

SQLSTATE is also set by DB2 after the execution of each SQL statement. Application programs can check the execution of SQL statements by testing SQLSTATE instead of SQLCODE. SQLSTATE provides application programs with common codes for common error conditions (the values of SQLSTATE are product-specific only if the error or warning is product-specific). Furthermore, SQLSTATE is designed so that application programs can test for specific errors or classes of errors.

SQLSTATE values consist of a two-character class code value, followed by a three-character subclass code value. The first character of an SQLSTATE value indicates whether the SQL statement was executed successfully or unsuccessfully (equal to or not equal to zero, respectively). Class code values represent classes of successful and unsuccessful execution conditions. The following table describes SQLSTATE class codes used by DB2.

Class Code	Description of Error Class
00	Successful completion. Execution of the SQL statement was successful and did not result in any type of warning or exception condition.
01	Warning
02	No data
07	Dynamic SQL error
08	Connection exception
0A	Feature not supported
0F	Invalid token
21	Cardinality violation
22	Data exception
23	Constraint violation
24	Invalid cursor state
25	Invalid transaction state
26	Invalid SQL statement identifier
2D	Invalid transaction termination
34	Invalid cursor name
39	External function call exception
40	Transaction rollback
42	Syntax error or access rule violation
44	WITH CHECK OPTION violation
51	Invalid application state

53	Invalid operand or inconsistent specification
54	SQL or product limit exceeded
55	Object not in prerequisite state
56	Miscellaneous SQL or product error
57	Resource not available or operator intervention
58	System error

The SQLSTATE value of HY000 is defined as a driver-specific error. An SQLSTATE of 08S01 (connection exception with a subclass code of S01) also indicates a driver-specific error. This means the SQLCODE should be looked up in the driver-specific documentation included with the ODBC Driver for DB2.

If the SQLSTATE does not indicate a driver-specific error when the ODBC Driver for DB2 passes back an SQLSTATE of 08S01, it indicates a network error. For example, an SQLCODE of -603 is a driver-specific error that is mapped to DB2OLEDB_COMM_HOST_CONNECT_FAILED in the db2oledb.h include file supplied with the ODBC Driver for DB2. Errors with an SQLSTATE of 08S01 are documented in the db2oledb.h include file (the SQLCODE value) which is located on the Host Integration Server 2004 CD in the SDK\Include subdirectory.

The following steps are useful in researching an error. Start by reading the provided error text returned by the ODBC Driver for DB2. In some cases, the error text may provide limited information. For example, error text from an SQLCODE of -603 reads:

```
Test connection failed because of an error in initializing driver.
Could not connect to specified host.
```

The next step is to lookup the SQLSTATE to determine the source of the error. Is the error a DB2 error, a network client error, or an ODBC Driver error? An SQLSTATE of 08S01 is defined as follows:

```
Communication link failure.
```

This definition is intended to inform the user, administrator, or developer that the error is one related to the ODBC driver's underlying network client.

Unfortunately, many of the SQLSTATE codes returned by the ODBC Driver for DB2 are DB2 errors and are not documented in the ODBC Driver for DB2 Help.

The SQLSTATE of HY000 is defined as a driver-specific error. An SQLSTATE of 08S01 also indicates a driver-specific error. In this case, you should look up the SQLCODE in the driver-specific documentation included with the ODBC Driver for DB2.

If the SQLSTATE does not indicate a driver-specific error, you should look up the SQLCODE in the appropriate DB2 manual for the target platform. For example, an SQLCODE of -603 is documented in Appendix B, "SQLCODEs and SQLSTATEs," in the *AS/400 Advanced Series DB2 for AS/400 SQL Programming, Version 4*, document number SC41-5611-00 published by IBM. An SQLCODE of -603 corresponds to SQLSTATE 23515 in the DB2 for OS/400 error code list. For example, the explanation for this SQLCODE is:

```
Unique index cannot be created because of duplicate keys.
```

When the SQLSTATE and the SQLCODE definitions documented in these appendixes create a mismatch with the actual errors returned, it usually indicates a driver-specific error condition.

A final step in understanding an error is to check the db2oledb.h file. This file is not installed by Setup for the Host Integration Client 2000, but is located on the CD-ROM for in the SDK\Include folder. An SQLCODE (for example, -603) can be found by searching the rightmost column of the db2oledb.h file for a value near to 603. For instance, locate the comment "/* -600 */" and then count down three additional lines to line number 603. The internal error code -603 is defined as follows:

```
DB2OLEDB_COMM_HOST_CONNECT_FAILED.
```

This particular error usually indicates a problem with the configuration parameters or the connection string passed.

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ODBC Conformance

The Microsoft® ODBC Driver for DB2 supports ODBC 2.*x* and ODBC 3.*x* functions. SQL grammar conformance varies, depending on the version of the DB2 database that is accessed. The following sections list the ODBC functions and attributes supported by the Microsoft ODBC Driver for DB2.

This section contains:

- Support for ODBC 2 Core Functions
- Support for ODBC 2 Level 1 Functions
- Support for ODBC 2 Level 2 Functions
- Support for ODBC 3 Functions
- Support for ODBC Connection Attributes
- Support for ODBC Statement Attributes

Support for ODBC 2 Core Functions

The following table lists the ODBC 2.*x* Core functions that are supported by the Microsoft ODBC Driver for DB2.

ODBC 2.*x* Core Functions	Functions Supported by the Microsoft ODBC Driver for DB2
SQLAllocConnect	Yes
SQLAllocEnv	Yes
SQLAllocStmt	Yes
SQLBindCol	Yes
SQLCancel	Yes
SQLColAttributes	Yes
SQLConnect	Yes
SQLDescribeCol	Yes
SQLDisconnect	Yes
SQLError	Yes
SQLExecDirect	Yes
SQLExecute	Yes
SQLFetch	Yes
SQLFreeConnect	Yes
SQLFreeEnv	Yes
SQLFreeStmt	Yes
SQLGetCursorName	Yes
SQLNumResultCols	Yes
SQLPrepare	Yes
SQLRowCount	Yes
SQLSetCursorName	Yes
SQLSetParam	In ODBC 2.0, the ODBC 1.0 **SQLSetparam** function was replaced by **SQLBindParameter**
SQLTransact	Yes

Support for ODBC 2 Level 1 Functions

The following table lists the ODBC 2.*x* level 1 functions that are supported by the Microsoft ODBC Driver for DB2.

ODBC 2.*x* level 1 functions	Functions supported by the Microsoft ODBC Driver for DB2
SQLBindParameter	Yes
SQLColumns	Yes
SQLDriverConnect	Yes
SQLGetConnectOption	Yes
SQLGetData	Yes
SQLGetFunctions	Yes
SQLGetInfo	Yes
SQLGetStmtOption	Yes
SQLGetTypeInfo	Yes
SQLParamData	Yes
SQLPutData	Yes
SQLSetConnectOption	Yes
SQLSetStmtOption	Yes
SQLSpecialColumns	Yes
SQLStatistics	Yes
SQLTables	Yes

Support for ODBC 2 Level 2 Functions

The following table lists the ODBC 2.*x* level 2 functions that are supported by the Microsoft ODBC Driver for DB2.

ODBC 2.*x* level 2 functions supported	**Functions supported by the Microsoft ODBC Driver for DB2**
SQLBrowseConnect	No
SQLColumnPrivileges	No
SQLDataSources	Yes. This function is actually supported by the ODBC Driver Manager
SQLDescribeParam	No
SQLDrivers	Yes. This function is actually supported by the ODBC Driver Manager
SQLExtendedFetch	Yes, but supports forward scrolling only
SQLForeignKeys	No
SQLMoreResults	Yes
SQLNativeSQL	Yes
SQLNumParams	Yes
SQLParamOptions	Yes
SQLPrimaryKeys	Yes, but SQL grammar conformance varies depending on the version of the DB2 database that is accessed
SQLProcedureColumns	Yes
SQLProcedures	Yes
SetPos	Yes
SQLSetScrollOptions	Yes
SQLTablePrivileges	No

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Support for ODBC 3 Functions

The following table lists the ODBC 3.0 functions that are supported by the Microsoft ODBC Driver for DB2.

ODBC 3.0 functions	Functions supported by the Microsoft ODBC Driver for DB2
SQLAllocHandle	Yes
SQLBulkOperations	No
SQLCloseCursor	Yes
SQLColAttribute	Yes
SQLCopyDesc	Yes
SQLEndTran	Yes
SQLFetchScroll	Yes, but supports forward scrolling only
SQLFreeHandle	Yes
SQLGetConnectAttr	Yes
SQLGetDescField	Yes
SQLDescRec	Yes
SQLGetDiagField	Yes
SQLGetDiagRec	Yes
SQLGetEnvAttr	Yes
SQLGetStmtAttr	Yes
SQLRowCount	Yes
SQLSetConnectAttr	Yes
SQLSetDescField	Yes
SQLSetDescRec	Yes
SQLSetEnvAttr	Yes
SQLSetStmtAttr	Yes

Support for ODBC Connection Attributes

The following table lists the ODBC connection attributes support using the Microsoft ODBC Driver for DB2. Note that the connection attributes in this list use the ODBC Version 3.0 attribute names, rather than the older ODBC 1.0 names.

ODBC connection attribute	ODBC version	Attribute supported by the Microsoft ODBC Driver for DB2
SQL_ATTR_ACCESS_MODE	1.0	Yes
SQL_ATTR_ASYNC_ENABLE	3.0	No
SQL_ATTR_AUTO_IPD	3.0	No
SQL_ATTR_AUTOCOMMIT	1.0	Yes
SQL_ATTR_CONNECTION_DEAD	3.5	No
SQL_ATTR_CONNECTION_TIMEOUT	3.0	No
SQL_ATTR_CURRENT_CATALOG	2.0	Yes
SQL_ATTR_ENLIST_IN_DTC	3.0	Yes
SQL_ATTR_ENLIST_IN_XA	3.0	No
SQL_ATTR_LOGIN_TIMEOUT	1.0	No
SQL_ATTR_METADATA_ID	3.0	No
SQL_ATTR_ODBC_CURSORS	2.0	Yes, handled by ODBC Driver Manager
SQL_ATTR_PACKET_SIZE	2.0	No
SQL_ATTR_QUIET_MODE	2.0	Yes
SQL_ATTR_TRACE	1.0	Yes, handled by ODBC Driver Manager
SQL_ATTR_TRACEFILE	1.0	Yes, handled by ODBC Driver Manager
SQL_ATTR_TRANSLATE_LIB	1.0	No
SQL_ATTR_TRANSLATE_DLL	1.0	No
SQL_ATTR_TRANSLATE_OPTION	1.0	No
SQL_ATTR_TXN_ISOLATION	1.0	Yes

Support for ODBC Statement Attributes

The following table lists the ODBC statement attribute support using the Microsoft ODBC Driver for DB2. Note that the statement attributes in this list use the ODBC Version 3.0 attribute names, rather than the older ODBC 1.0 names.

ODBC statement attribute	ODBC version	Attribute supported by the Microsoft ODBC Driver for DB2
SQL_ATTR_APP_PARAM_DESC	3.0	Yes
SQL_ATTR_APP_ROW_DESC	3.0	Yes
SQL_ATTR_ASYNC_ENABLE	1.0	No
SQL_ATTR_CONCURRENCY		No
SQL_ATTR_CURSOR_SCROLLABLE	3.0	No
SQL_ATTR_CURSOR_SENSITIVITY	3.0	No
SQL_ATTR_CURSOR_TYPE	1.0	Yes, but the ODBC Driver for DB2 supports a forward scrolling only cursor type
SQL_ATTR_ENABLE_AUTO_IPD	3.0	No
SQL_ATTR_FETCH_BOOKMARK_PTR	3.0	No
SQL_ATTR_IMP_PARAM_DESC		Yes, handled by ODBC Driver Manager
SQL_ATTR_IMP_ROW_DESC		Yes, handled by ODBC Driver Manager
SQL_ATTR_KEYSET_SIZE	1.0	No
SQL_ATTR_MAX_LENGTH	1.0	No
SQL_ATTR_MAX_ROWS	1.0	No
SQL_ATTR_METADATA_ID	3.0	Yes
SQL_ATTR_NOSCAN	1.0	Yes
SQL_ATTR_PARAM_BIND_OFFSET_PTR	3.0	Yes
SQL_ATTR_PARAM_BIND_TYPE	3.0	Yes
SQL_ATTR_PARAM_OPERATION_PTR	3.0	Yes
SQL_ATTR_PARAM_STATUS_PTR	3.0	Yes
SQL_ATTR_PARAMS_PROCESSED_PTR	3.0	Yes
SQL_ATTR_PARAMSET_SIZE	3.0	Yes
SQL_ATTR_QUERY_TIMEOUT	1.0	No
SQL_ATTR_RETRIEVE_DATA	1.0	No
SQL_ATTR_ROW_ARRAY_SIZE	3.0	Yes
SQL_ATTR_ROW_BIND_OFFSET_PTR	3.0	Yes
SQL_ATTR_ROW_BIND_TYPE	1.0	Yes
SQL_ATTR_ROW_NUMBER	1.0	No
SQL_ATTR_ROW_OPERATION_PTR	3.0	No
SQL_ATTR_ROW_STATUS_PTR	3.0	Yes
SQL_ATTR_ROWS_FETCHED_PTR	3.0	Yes
SQL_ATTR_SIMULATE_CURSOR	1.0	No
SQL_ATTR_USE_BOOKMARKS	1.0	No

ADO Object Support in the ODBC Driver for DB2

The following table summarizes the Microsoft® ActiveX® Data Objects (ADO) version 2.0 objects that are supported by the current version of the Microsoft Open Database Connectivity (ODBC) Driver for DB2.

ADO object	Support
Collection	Yes, most methods
Command Object	Yes, some methods, some properties, and all collections
Connection Object	Yes, some methods, some properties, and all collections
Error Object	Yes, some properties
Field Object	Yes, no methods, most properties, and all collections
Parameter Object	Yes, most methods, most properties, and all collections
Recordset Object	Yes, most methods, most properties, and all collections

The **Parameter** object will be supported by a later version of the ODBC Driver for DB2. For more information about ADO object support, see ADO Object Support in the OLE DB Provider for AS/400 and VSAM and ADO Object Support in the OLE DB Provider for DB2.

This section contains:

- ADO Method Support in the ODBC Driver for DB2
- ADO Property Support in the ODBC Driver for DB2
- ADO Collection Support in the ODBC Driver for DB2
- Command Object in the ODBC Driver for DB2 (ADO)
- Connection Object in the ODBC Driver for DB2 (ADO)
- Error Object in the ODBC Driver for DB2 (ADO)
- Field Object in the ODBC Driver for DB2 (ADO)
- Recordset Object in the ODBC Driver for DB2 (ADO)

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ADO Method Support in the ODBC Driver for DB2

The following table summarizes the ActiveX Data Objects (ADO) version 2.0 object methods that are supported by the current version of the Microsoft ODBC Driver for DB2.

ADO object	Method	Support
Collection Object	**Append** Method	No
	Clear Method	Yes
	Delete Method	Yes
	Item Method	Yes
	Refresh Method	Yes
Command Object	**CreateParameter** Method	Yes
	Cancel Method	No
	Execute Method	Yes
Connection Object	**BeginTrans** Method	Yes
	Cancel Method	No
	Close Method	Yes
	CommitTrans Method	Yes
	Execute Method	Yes
	Open Method	Yes
	OpenSchema Method	Yes
	RollbackTrans Method	Yes
Field Object	**AppendChunk** Method	No
	GetChunk Method	No
	ReadFromFile Method	No
	WriteToFile Method	No
Parameter Object	**AppendChunk** Method	No
Recordset Object	AddNew Method	Yes
	Cancel Method	No
	CancelBatch Method	Yes
	CancelUpdate	Yes
	Clone Method	Yes
	Close Method	Yes
	Delete Method	Yes
	Find Method	No
	GetRows Method	Yes
	Move Method	Yes
	MoveFirst Method	Yes
	MoveLast Method	Yes, when using a client-side cursor only
	MoveNext Method	Yes
	MovePrevious Method	Yes, when using a client-side cursor only
	NextRecordset Method	No
	Open Method	Yes
	Requery Method	Yes
	Resync Method	No
	Save Method	Yes
	Seek Method	No
	Supports Method	Yes
	Update Method	Yes
	UpdateBatch Method	Yes

Note The **Collection** object is actually a special case, representing a collection of other ADO objects. These collection objects support several methods:

- **Append** to add an object to a collection.

- **Clear** to empty all objects from a collection.
- **Delete** to remove a single object from a collection.
- **Item** to return a specific member object of a collection by name or ordinal number.
- **Refresh** to update the objects in a collection to reflect objects available from and specific to the ODBC Driver.

ADO Property Support in the ODBC Driver for DB2

The following table summarizes the ActiveX Data Objects (ADO) version 2.0 object properties that are supported by the current version of Microsoft ODBC Driver for DB2.

ADO object	Property	Support
Command Object	ActiveConnection Property	Yes
	CommandText Property	Yes
	CommandTimeout Property	No
	CommandType Property	Yes
	Prepared Property	Yes
	State Property	Yes
Connection Object	Attributes Property	Yes
	CommandTimeout Property	No
	ConnectionString Property	Yes
	ConnectionTimeout Property	No
	CursorLocation Property	Yes
	DefaultDatabase Property	No
	IsolationLevel Property	Yes
	Mode Property	Yes
	Provider Property	Yes
	State Property	Yes
	Version Property	Yes
Error Object	Description Property	Yes
	HelpContext Property	No
	HelpFile	No
	NativeError Property	Yes
	Number Property	Yes
	Source Property	Yes
	SQLState Property	Yes
Field Object	ActualSize Property	Yes
	Attributes Property	Yes
	DataFormat Property	No
	DefinedSize Property	Yes
	Name Property	Yes
	NumericScale Property	Yes
	OriginalValue Property	Yes
	Precision Property	Yes
	Type Property	Yes
	UnderlyingValue Property	Yes
	Value Property	Yes
Parameter Object	**Attributes** Property	Yes
	Direction Property	Yes
	Name Property	Yes
	NumericScale Property	Yes
	Precision Property	Yes
	Size Property	Yes
	Type Property	Yes
	Value Property	Yes
Recordset Object	**AbsolutePage** Property	No
	AbsolutePosition Property	No
	ActiveCommand Property	Yes
	ActiveConnection Property	Yes
	BOF Property	Yes

	Bookmark Property	Yes
	CacheSize Property	Yes
	CursorLocation Property	Yes
	CursorType Property	Yes
	DataMember Property	No
	DataSource Property	No
	EditMode Property	Yes
	EOF Property	Yes
	Filter Property	No
	Index Property	No
	LockType Property	Yes
	MarshalOptions Property	No
	MaxRecords Property	Yes
	PageCount Property	No
	PageSize Property	No
	RecordCount Property	No
	Sort Property	No
	Source Property	Yes
	State Property	Yes
	Status Property	Yes
	StayInSync Property	No

ADO Collection Support in the ODBC Driver for DB2

The following table summarizes the Microsoft® ActiveX® Data Objects (ADO) version 2.0 object collections that are supported by the current version of the Microsoft ODBC Driver for DB2.

ADO object	Collection	Support
Command Object	**Parameters** Property	Yes
	Properties Property	Yes
Connection Object	**Errors** Property	Yes
	Properties Property	Yes
Field Object	**Properties** Property	Yes
Parameter	**Properties** Property	Yes
Recordset Object	**Fields** Property	Yes
	Properties Property	Yes

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Command Object in the ODBC Driver for DB2 (ADO)

The ActiveX Data Objects (ADO) **Command** object is a definition of a specific command that is to be executed against an Open Database Connectivity (ODBC) Driver data source.

Command objects can be used to create a **Recordset** object and obtain records, execute a bulk operation, or manipulate the structure of a database. When using the Microsoft ODBC Driver for DB2, some collections, methods, or properties of a **Command** object can generate an error when called.

The primary purpose of the **Command** object in the context of the ODBC Driver for DB2 is to issue SQL commands for execution by the remote DB2 target server. Legal SQL commands are documented for the target DB2 platforms in SQL Reference Guides published by IBM.

The following table lists the **Command** object methods, properties, and collections that are supported by the current version of the ODBC Driver for DB2.

Name	**Comment**
Execute Method	Evaluates command text (only supported *Options* parameter for this method is **adCmdText**, which indicates that this is an SQL text command).
ActiveConnection Property	Sets or returns the information used to establish a connection to a data source (see notes following).
CommandText Property	Sets or returns the command text to be executed.
CommandType Property	Sets or returns the type of command in a **CommandText** property.
State Property	Describes the current state of an object.
Properties collection	Collections of properties on the command.

The **Execute** method executes a command and returns a **Recordset** object, if appropriate. The **Command** object can be used to open tables or execute SQL commands on a remote DB2 server. If errors occur, you can examine them with the **Errors** collection on the **Connection** object.

You can create a **Command** object independently of a previously defined **Connection** object by setting the **ActiveConnection** property of the **Command** object to a valid connection string (for the proper syntax, see the **ConnectionString** property of the **Connection** object). ADO still creates a **Connection** object, but it does not assign that object to an object variable. However, if multiple **Command** objects are to be associated with the same connection, the **Connection** object should be explicitly created and opened. This assigns the **Connection** object to an object variable. If the **ActiveConnection** property of the **Command** object is not set to this object variable, ADO creates a new **Connection** object for each **Command** object, even if the same connection string is used.

The **ActiveConnection** property associates an open connection with a **Command** object. The **CommandText** property defines the text version of a command (**SELECT ALL FROM TABLE**, for example). The **CommandType** property specifies the type of command described in the **CommandText** property prior to execution to optimize performance. The **CommandType** property must be set to **adCmdText** for use with the ODBC Driver for DB2.

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Connection Object in the ODBC Driver for DB2 (ADO)

The ActiveX Data Objects (ADO) **Connection** object represents an open connection to an Open Database Connectivity (ODBC) data source. The **Provider** property sets the ODBC Driver to use. Setting the **ConnectionString** properties configures the connection before opening the data source. The **Version** property determines the version of the ADO implementation in use.

The **Open** method establishes the physical connection to the data source and the **Close** method terminates the connection. If errors occur, these can be examined with the **Errors** collection.

The following table lists the **Connection** object methods, properties, and collections that are supported by the current version of the Microsoft ODBC Driver for DB2.

Name	**Comment**
Close Method	Closes a connection to a data source.
Execute Method	Evaluates command text.
Open Method	Opens a connection to a data source and can optionally pass **ConnectionString** parameters with this method.
OpenSchema Method	Obtains database schema information from the ODBC Driver.
Attributes Property	One or more characteristics supported for a given **Connection** object.
ConnectionString Property	Contains the information used to establish a connection to a data source (see notes following this table).
CursorLocation property	Sets or returns the location of the cursor (whether the cursor is on the client or the server side).
IsolationLevel Property	Sets or returns the level of isolation for a **Connection** object.
Mode Property	Indicates the available permissions for modifying data in a connection.
Provider Property	Sets or returns the name of the provider for a connection.
State Property	Describes the current state of an object.
Version Property	Returns the version number of the ADO implementation in use.
Errors collection	Collections of **Error** objects on the connection.
Properties collection	Collections of properties on the connection.

The information needed to establish a connection to a data source can be set in the **ConnectionString** property or passed as part of the **Open** method. In either case, this information must be in a specific format for use with the ODBC Driver for DB2. This information can be a data source name (DSN) or a detailed connection string containing a series of *argument=value* statements separated by semicolons. The following table list the supported ADO-defined arguments for the **ConnectionString** property.

Argument	**Description**
Data Source	A required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file that is stored in the Program Files\Common Files\ODBC\Data Sources directory.
File Name	Name of the provider-specific file containing preset connection information. This argument cannot be used if a *Provider* argument is passed.
Location	The remote database name used for connecting to OS/400 systems. This parameter is optional when connecting to mainframe systems.
Password	Valid mainframe or AS/400 password for use when opening the connection. This password is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database.
Provider	Name of the provider to use for the connection. To use the ODBC Driver for DB2, the Provider string must be set to "DB2OLEDB".
User ID	Specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database.

The ODBC Driver for DB2 also supports a number of provider-specific arguments, some of which have default values as specified in the following tables. The arguments supported by ODBC Driver for DB2 supplied with Host Integration Server 2004 differ from the arguments supported by the earlier ODBC Driver for DB2 included with SNA Server 4.0.

The following table describes the arguments supported by the ODBC Driver for DB2 supplied with Host Integration Server 2004.

Argument	**Description**
BAC	When the *BinAsChar* parameter is set to **true** (1), the ODBC Driver for DB2 treats binary data type fields (with a Code Character Set Identifier (CCSID) of 65535) as character data type fields on a per-data source basis. The **CCSID** and **PCCodePage** values are required input parameters.
CCSID	The CCSID matching the DB2 data as represented on the remote computer. The **CCSID** property is required when processing binary data as character data. Unless the **BinAsChar** value is set, character data is converted based on the DB2 column CCSID and default ANSI code page. If this argument is omitted, this parameter defaults to U.S./Canada (37).
CP	The character *Code Page* to use on the computer. This parameter is required when processing binary data as character data. Unless the Binary as Character (BAC) value is set, character data is converted based on the default ANSI code page configured in Microsoft® Windows®. If this argument is omitted, the default value is set to Latin 1 (1252).
DESC	A field to provide a comment describing this ODBC data source. The description is an optional parameter and may be left blank.
DS	The *Default Schema* parameter is the name of the collection where the ODBC Driver for DB2 looks for catalog information. The *Default Schema* parameter is the "SCHEMA" name for the target collection of tables and views. The ODBC driver uses *Default Schema* to restrict results sets for popular operations, such as enumerating a list of tables in a target collection (for example, ODBC Catalog SQLTables). For DB2, the *Default Schema* is the target AUTHENTICATION (User ID or "owner"). For DB2/400, the *Default Schema* is the target COLLECTION name. For DB2 Universal Database (UDB), the *Default Schema* is the SCHEMA name. If the user does not provide a value for *Default Schema*, then the ODBC driver uses the USER_ID provided at login. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. Obviously, this default is inappropriate in many cases, therefore it is essential that the **Default Schema** value in the data source be defined.
DSN	The data source name is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file which is stored in the Program Files\Common Files\ODBC\Data Sources directory.
LLU	When SNA is used for the network transport, this field is the name of the remote logical unit (LU) alias configured in Host Integration Server.
MN	When SNA is used for the Network Transport Library (NTL), the **Mode Name** field is the APPC mode and must be set to a value that matches the host configuration and Host Integration Server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bidirectional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This parameter normally defaults to *QPCSUPP*.
NA	When TCP/IP is used for the NTL, the *Network Address* parameter indicates the IP address or the hostname alias of the host DB2 server.

NP	When TCP/IP is used for the NTL, the *Network Port* parameter indicates the TCP/IP port used for communication with the target DB2 Distributed Relational Database Architecture (DRDA) service. The default value is TCP/IP port 446.
NTL	The *Network Transport Library* parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA. If the default SNA is selected, then values for LLU, MN, and RLU are required. If TCP/IP is selected, then values for **NetAddr** and **NetPort** are required.
PC	The name of the DRDA target collection (AS/400 library) where the Microsoft ODBC Driver for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft ODBC Driver for DB2, which is implemented as an IBM DRDA Application Requester, uses packages to issue dynamic and static SQL statements. The ODBC driver will create packages dynamically in the location to which the user points using the *Package Collection* parameter.
PDS	The *Provider Data Source* is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file which is stored in the Program Files\Common Files\ODBC\Data Sources directory.
PROV	Specifies the name of the provider to use for the connection. To use the ODBC Driver for DB2, the Provider string must be set to "DB2OLEDB".
PWD	Specifies a valid mainframe or AS/400 password to use when opening the connection. This password is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. Note that this parameter is the same as the *Parameter* parameter.
RDB	The *Remote Database Name* parameter is used as the first part of a three-part, fully qualified DB2 table name. This parameter is referred to by different names depending on the DB2 platform. In DB2 on MVS and OS/390, this parameter is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect on these platforms, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 Installation manual. In DB2/400 on OS/400, this property is referred to as RDBNAM. The **RDBNAM** value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no **RDBNAM** value, then a value can be created using the **Add** option. In DB2 Universal Database, this property is referred to as DATABASE.
RLU	When SNA is used for the network transport, this field is the name of the remote LU alias configured in Host Integration Server.
TPN	The *Transaction Program (TP) Name* parameter represents the default transaction program name for the DB2 DRDA application server (AS) which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, the alternative TP Name is set to 0X07F9F9F9.
UID	Specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. This parameter is the same as the *User ID* parameter.
UOW	Determines whether two-phase commit is enabled. The possible values for this parameter are distributed unit of work (DUW) or remote unit of work (RUW). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in the OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

Note Not all of these parameters are required. The user can also be prompted for this information.

A sample **ConnectionString** using the ODBC Driver for DB2 is as follows:

```
Conn.Provider="DB2OLEDB"
Conn.ConnectionString = "UID=USERNAME;PWD=password",&_
  "LLU=LOCAL;RLU=DATABASE",&_
  "MN=QPCSUPP;CCSID=37;CP=437"
Conn.Properties("PROMPT")=adPromptNever
Conn.Open
```

Note The &_ character combination is used for continuing long lines in Visual Basic.

When opening a connection object in ADO 2.0, you must specify the *Prompt* connection property. For example, the following syntax is valid with ADO 1.5 and ADO 2.0 and prompts the user for **ConnectionString** properties, as shown in the following code:

```
Conn.ConnectionString = "Provider=DB2OLEDB
Conn.Properties("PROMPT")=adPromptAlways
Conn.Open
```

A sample **Open** method call with these parameters is as follows:

```
RS.Open "Accounting",Conn,0,1,1
```

The last three parameters to the **Open** method correspond with the *CursorType* (the **adOpenForwardOnly** enum is 0, for example), *LockType* (the **adLockReadOnly** enum is 1, for example), and *Options* (**adCmdText** is 1, which indicates that the source name should be evaluated as SQL text). The *Options* parameter must be set to **adCmdText** (1) when used with a data source name with ODBC Driver for DB2.

The following table describes the allowable values for CCSID when using SNA National Language Support (SNANLS) for character code conversions (the default).

EBCDIC character set	CCSID value
Arabic	20420
Binary (No Conversion)	65535
Chinese (Simplified)	935
Chinese (Traditional)	937
Cyrillic (Russian)	20880
Cyrillic (Serbian, Bulgarian)	21025
Denmark/Norway (euro)	1142
Denmark/Norway	20277
Finland/Sweden (euro)	1143
Finland/Sweden	20278
France (euro)	1147
France	20297
Germany (euro)	1141
Germany	20273
Greek (Modern)	875
Greek	20423
Hebrew	20424
Icelandic (euro)	1149
Icelandic	20871
International (euro)	1148
International	500
Italy (euro)	1144
Italy	20280
Japanese (English-lower)	931
Japanese (Extend English)	939
Japanese (Extend Katakana)	930
Japanese (Katakana)	290
Japanese (Katakana-Kanji)	5026

Japanese (Latin-Kanji)	5035
Korean	933
Latin America/Spain (euro)	1145
Latin America/Spain	20284
Latin-1 Open System (euro)	20924
Latin-1 Open System	1047
Multilingual/ROECE (Latin-2)	870
Thai	20838
Turkish (Latin-5)	1026
Turkish	20905
U.S./Canada (euro)	1140
U.S./Canada	37
United Kingdom (euro)	1146
United Kingdom	20285

Note that the SNANLS conversions use the locale configured for the data sources using data links. For more information, see SNA National Language Support Programmer's Guide.

The following table describes the allowable values for CCSID when using ANSI/OEM for character code conversions.

ANSI/OEM character set	CCSID value
ANSI - Arabic	1256
ANSI - Baltic	1257
ANSI - Cyrillic	1251
ANSI - Eastern Europe	1250
ANSI - Greek	1253
ANSI - Hebrew	1255
ANSI - Latin I	1252
ANSI - Turkish	1254
ANSI/OEM - Korean (Extended Wansung)	949
ANSI/OEM - Japanese Shift-JIS	932
ANSI/OEM - Simplified Chinese GBK	936
ANSI/OEM - Traditional Chinese Big5	950
ANSI/OEM - Thai	874
ANSI/OEM - Vietnam	1258

Error Object in the ODBC Driver for DB2 (ADO)

The ActiveX Data Objects (ADO) **Error** object contains details about data access errors pertaining to a single operation involving ADO. You can read the properties of an **Error** object to obtain specific details about each error.

The **Error** object does not support any methods or collections; however, the **Errors** collection supported by other objects provides the standard **Collection** methods (**Clear** and **Delete**). **Error** objects are automatically appended to the **Errors** collection by the Open Database Connectivity (ODBC) Driver when they occur. The following table lists the **Error** object properties that are supported by the current version of the Microsoft® ODBC Driver for DB2.

Property Name	**Comment**
Description Property	The text of the error alert that is returned based on the minor error code (specific to the ODBC Driver for DB2) contained in the **Error** object resulting from an error.
NativeError Property	A **Long** integer value of the error code returned by the ODBC Driver for DB2.
Number Property	The **Long** integer value of the ODBC error constant.
Source Property	A **string** that indicates the name of the object or application that originally generated an error.

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Field Object in the ODBC Driver for DB2 (ADO)

The ActiveX Data Objects (ADO) **Field** object represents a column of data with a common data type. Each **Field** object corresponds to a column in a **Recordset** object.

The following table lists the **Field** object methods, properties, and collections that are supported by the current version of Microsoft ODBC Driver for DB2.

Name	**Comment**
ActualSize Property	Actual length of a field's value.
Attributes Property	One or more characteristics supported for a given **Field** object.
DefinedSize Property	Defined size of a **Field** object.
Name Property	Name of the **Field** object.
NumericScale Property	Scale of numeric values in a **Field** object for numeric data.
OriginalValue Property	Value of a **Field** object that existed in the record before changes were made.
Precision Property	Degree of precision for numeric values in a **Field** object for numeric data.
Type Property	Operational type or data type for a **Field** object.
UnderlyingValue Property	Current value of a **Field** object.
Value Property	Value assigned to a **Field** object in a **Recordset**.
Properties collection	Collections of properties on the field.

Recordset Object in the ODBC Driver for DB2 (ADO)

The ActiveX Data Objects (ADO) **Recordset** object represents the entire set of records from a base table. At any time, the **Recordset** object refers to only one record within the set as the current record.

The following table lists the **Recordset** object methods, properties, and collections that are supported by the current version of the Microsoft ODBC Driver for DB2.

Name	**Comment**
AddNew Method	Creates a new record for an updateable **Recordset** object.
CancelBatch Method	Cancels a pending batch update.
CancelUpdate Method	Cancels any changes made to a current record or to a new record prior to calling the **UpdateBatch** method.
Clone Method	Creates a duplicate **Recordset** object from an existing **Recordset** object.
Close Method	Closes an open object and any dependent objects.
Delete Method	Deletes the current record in an open **Recordset** object or an object from a collection.
GetRows Method	Retrieves multiple records of a **Recordset** into an array.
Move Method	Moves the position of the current record in a **Recordset** object.
MoveFirst Method	Moves to the first record in a specified **Recordset**.
MoveLast Method	Moves to the last record in a specified **Recordset**. This method is only supported when using a client-side cursor.
MoveNext Method	Moves to the next record in a specified **Recordset**.
MovePrevious Method	Moves to the previous record in a specified **Recordset**. This method is only supported when using a client-side cursor.
Open Method	Opens a cursor on a **Recordset**.
Requery Method	Updates the data in a **Recordset** object by re-executing the query on which the object is based (equivalent to calling the **Close** and **Open** methods in succession).
Save Method	Saves a **Recordset** in a file or **Stream** object.
Supports Method	Determines whether a specified **Recordset** object supports a particular type of function.
Update Method	Saves any changes you make to the current record of a **Recordset** object.
UpdateBatch Method	Writes all pending batch updates to disk.
ActiveCommand Property	Returns the **Command** object that created the specified **Recordset**.
ActiveConnection Property	Sets or returns the **Connection** object that the specified **Recordset** object currently belongs.
BOF Property	Indicates whether the current record position is before the first record in a **Recordset** object.
Bookmark Property	Returns a bookmark that uniquely identifies the current record in a **Recordset** object or sets the current record in a **Recordset** object identified by a valid bookmark.
CacheSize Property	Sets or returns the number of records from a **Recordset** object that are cached locally in memory.
CursorLocation Property	Sets or returns the location of the cursor (whether the cursor is on the client or the server side).
CursorType Property	Sets or returns the type of cursor used in a **Recordset** object. Only the **adOpenForwardOnly CursorType** is supported by the current version of the ODBC Driver for DB2.
EditMode Property	Indicates the editing status of the current record type.
EOF Property	Indicates whether the current record position is after the last record in a **Recordset** object.
LockType Property	Sets or returns the types of locks placed on records during editing. The ODBC Driver for DB2 supports locks of type **adLockReadOnly** and **adLockPessimistic**.
MaxRecords Property	Sets or returns the maximum number of records to return to a **Recordset** from a query.
Source Property	Sets or returns the source (table name or command object) for the data in a **Recordset**.
State Property	Describes the current state of an object.

Status Property	Indicates the status of the current record with respect to batch updates or other bulk operations.
Fields collection	Collections of fields on the **Recordset**.
Properties collection	Collections of properties on the **Recordset**.

Managed Provider for DB2 Programmer's Reference

The Managed Provider for DB2 enables users to access IBM Data Base 2 (DB2) from within a managed code application, and serves as a bridge between a DB2 data source and an ADO **DataSet**. This section provides the reference material needed to program the Managed Provider for DB2.

For general information about programming for the Managed Provider for DB2, see the Managed Provider Programmer's Guide.

This section contains:

- Microsoft.HostIntegration.MsDb2Client Namespace

Microsoft.HostIntegration.MsDb2Client Namespace

The **Microsoft.HostIntegration.MsDb2Client** namespace contains functions designed to be used for accessing DB2 databases using Microsoft® Host Integration Server 2004 technologies.

Namespace hierarchy

Classes

Class	Description
MsDb2Command	Manages all parameters that a query might have which includes both SQL parameters and stored procedure parameters.
MsDb2Connection	Responsible for opening, closing, and maintaining a connection to a DB2 host.
MsDb2DataAdapter	Acts as the gateway between a DB2 host table and a .NET-based data set.
MsDb2DataReader	A server-side forward-only cursor implementation that inherits from the **IDataReader** and **IDataRecord** interfaces.
MsDb2Exception	The exception thrown when the underlying provider returns a warning or error for a DB2 data source.
MsDb2NetworkProperties	An abstract base class for defining network-specific connection properties to a DB2 host.
MsDb2NetworkPropertiesAPPC	Defines the network-specific connections for connecting to a DB2 host using the APPC protocol.
MsDb2NetworkPropertiesTCP	Defines the network-specific connection properties for connecting to a DB2 host using the TCP/IP protocol.
MsDb2Parameter	Represents a placeholder for a parameter in a SQL command.
MsDb2ParameterCollection	A strongly-typed collection of **MsDb2Parameters**.
MsDb2RowUpdatedEventArgs	Provides data for the **RowUpdated** event.
MsDb2RowUpdatingEventArgs	Provides data for the **RowUpdating** event.
MsDb2Transaction	An implementation of the **IDbTransaction** interface.

Delegates

Delegate	Description
MsDb2RowUpdatedEventHandler	Represents the method that handles the **RowUpdated** event of an **MsDb2DataAdapter**.
MsDb2RowUpdatingEventHandler	Represents the method that handles the **RowUpdating** event of an **OleDbDataAdapter**.

Enumerations

Enumeration	Description
DBMSPlatform	The target DB2 platform property value to optimize performance of the OLEDB provider when executing operations such as data conversions.
MsDb2Type	Specifies the data type of a field, a property, or an **MsDb2Parameter**.
UnitsOfWorkType	The type of transaction supported by the provider. Currently only remote unite of work is supported.

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DBMSPlatform Enumeration

Specifies the target DB2 platform to optimize the Managed Provider when executing operations, such as data conversions.

VB

```
<Serializable>
Public Enum DBMSPlatform
[C#]
[Serializable]
public enum DBMSPlatform
[C++]
[Serializable]
__value public enum DBMSPlatform
[JScript]
public
   Serializable
enum DBMSPlatform
```

Members

The following table describes the different target DB2 platforms for which to optimize. The default value is DB2VMS.

Member name	Description
DB2MVS	MVS
DB2AS400	AS400
DB2NT	Windows NT 4.0
DB26000	6000

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Windows 2000, Windows XP Professional, Windows Server 2003 family

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

Microsoft.HostIntegration.MsDb2Client Namespace Managed Provider for DB2 Programmer's Guide

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MsDb2Command Class

Manages all parameters that a query might have, including both SQL parameters and stored procedure parameters.

For a list of all members of this type, see MsDb2Command Members.

System.Object
  Microsoft.HostIntegration.MsDb2Client.MsDb2Command

VB

```
Public Class MsDb2Command
   Implements IDbCommand, IDisposable
[C#]
public class MsDb2Command : IDbCommand, IDisposable
[C++]
public __gc class MsDb2Command : public IDbCommand, IDisposable
[JScript]
public class MsDb2Command implements IDbCommand, IDisposable
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Remarks

MsDB2Command is an implementation of the **IDbCommand** interface. An **MsDb2Command** represents a single query to a DB2 host system. These queries can be any DML, DDL, or stored procedure statement formatted for the specific DB2 platform. The **MsDb2Command** class does not perform any pre-parsing to verify the SQL statement. As **MsDb2Command** is a single SQL statement per command, there is no batch mode.

An **MsDB2Command** instance belongs to a single transaction running on a single connection.

An **Ms2Db2Command** can become "dirty" if it has been prepared, and there is a change to a piece of the command structure. If a change is made, the command must be re-prepared to account for the changes. **MsDb2Command** has a private dirty flag that will determine when to re-prepare a command. Events that make a command dirty include:

- All changes to parameters, excluding the value (such as precision, scale, type, and so on)
- Changes to the number of parameters
- Changes to the **CommandText**
- Changes to the **CommandType**

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

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MsDb2Command Members

For background and overview information, see MsDb2Command overview.

Public Constructors

MsDb2Command Constructor	Overloaded. Initializes a new instance of the **MsDb2Command** class.

Public Properties

CommandText	Gets or sets the command value sent to the DB2 system.
CommandTimeout	Gets or sets the amount of time to wait before the command execution times out.
CommandType	Gets or sets the type of command the **CommandText** property stores.
Connection	Gets or sets the connection that owns the command.
Parameters	Gets the collection of parameters that belong to this particular command.
Transaction	Gets or sets the owning transaction of the command.
UpdatedRowSource	Gets or sets how command results are applied to the DataRow when used by **MsDb2DataAdapter.Update**.

Public Methods

Cancel	Preempts an executing command and causes a transition rollback of the results have been partially retrieved.
CreateParameter	Creates and returns a new **MsDb2Parameter**.
Dispose	Releases the resources used by the current instance.
Equals (inherited from **System.Object**)	Determines whether two **Objects** are equal.
ExecuteNonQuery	Executes an SQL statement against the Connection and returns the number of rows affected.
ExecuteReader	Overloaded. Executes a query that expects some sort of forward-only resultset cursor.
ExecuteScalar	Executes a query that returns a resultset and returns the object value of row 1, column 1.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
Prepare	Prepares a query command for execution.
ToString (inherited from **System.Object**)	Returns a **String** that represents the current **Object**.

Protected Methods

Finalize	Overridden. Enables an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current object.

See Also

MsDb2Command Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command Constructor

For background and overview information, see MsDb2Command overview.

Overload List

[Visual Basic] Public Sub New()

[C#] public MsDb2Command();

[C++] public: MsDb2Command();

[JScript] public function MsDb2Command();

[Visual Basic] Public Sub New(System.String)

[C#] public MsDb2Command(System.String);

[C++] public: MsDb2Command(System.String);

[JScript] public function MsDb2Command(System.String);

[Visual Basic] Public Sub New(System.String, MsDb2Connection)

[C#] public MsDb2Command(System.String, MsDb2Connection);

[C++] public: MsDb2Command(System.String, MsDb2Connection*);

[JScript] public function MsDb2Command(System.String, MsDb2Connection);

[Visual Basic] Public Sub New(System.String, MsDb2Connection, MsDb2Transaction)

[C#] public MsDb2Command(System.String, MsDb2Connection, MsDb2Transaction);

[C++] public: MsDb2Command(System.String, MsDb2Connection*, MsDb2Transaction*);

[JScript] public function MsDb2Command(System.String, MsDb2Connection, MsDb2Transaction);

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Command Constructor ()

Initializes a new instance of the MsDb2Command class.

VB

```
Public Sub New()
[C#]
public MsDb2Command();
[C++]
public: MsDb2Command();
[JScript]
public function MsDb2Command();
```

Remarks

The default constructor initializes any fields to their default values. The following table describes the initial values for an instance of **MsDb2Command**.

Properties	Initial Value
CommandText	Empty string ("")
CommandTimeout	30
CommandType	**Text**
Connection	null

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Command Constructor Overload List

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MsDb2Command Constructor (System.String)

Initializes a new instance of the MsDb2Command class.

VB

```
Public Sub New( _
   ByVal cmdText As String _
)
[C#]
public MsDb2Command(
   string cmdText
);
[C++]
public: MsDb2Command(
   String* cmdText
);
[JScript]
public function MsDb2Command(
   cmdText : String
);
```

Parameters

cmdText
The text of the query.

Remarks

The following table describes the initial values for an instance of MsDb2Command.

Properties	Initial Value
CommandText	*cmdText*
CommandTimeout	30
CommandType	**Text**
Connection	null

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Command Constructor Overload List

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MsDb2Command Constructor (System.String, MsDb2Connection)

initializes a new instance of the MsDb2Command class using the specified command text and connection.

VB

```
Public Sub New( _
   ByVal cmdText As String, _
   ByVal connection As MsDb2Connection _
)
[C#]
public MsDb2Command(
   string cmdText,
   MsDb2Connection connection
);
[C++]
public: MsDb2Command(
   String* cmdText,
   MsDb2Connection* connection
);
[JScript]
public function MsDb2Command(
   cmdText : String,
   connection : MsDb2Connection
);
```

Parameters

cmdText
The text of the query.
connection
The MsDb2Connection that represents a connection to the database source.

Remarks

The following table describes the initial values for an instance of **MsDb2Command**.

Properties	Initial Value
CommandText	*cmdText*
CommandTimeout	30
CommandType	**Text**
Connection	The value contained in the *connection* parameter.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Command Constructor Overload List

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MsDb2Command Constructor (System.String, MsDb2Connection, MsDb2Transaction)

Initializes a new instance of the MsDb2Command class using the specified command text, connection, and transaction.

VB

```
Public Sub New( _
   ByVal cmdText As String, _
   ByVal connection As MsDb2Connection, _
   ByVal txn As MsDb2Transaction _
)
[C#]
public MsDb2Command(
   string cmdText,
   MsDb2Connection connection,
   MsDb2Transaction txn
);
[C++]
public: MsDb2Command(
   String* cmdText,
   MsDb2Connection* connection,
   MsDb2Transaction* txn
);
[JScript]
public function MsDb2Command(
   cmdText : String,
   connection : MsDb2Connection,
   txn : MsDb2Transaction
);
```

Parameters

cmdText
  The text of the query.
connection
  An MsDb2Connection representing a connection to the data source.
txn
  The transaction in which the **MsDb2Command** executes.

Remarks

The following table describes the initial values for an instance of **MsDb2Command**.

Properties	**Initial Value**
CommandText	*cmdText*
CommandTimeout	30
CommandType	**Text**
Connection	The value contained in the *connection* parameter.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Command Constructor Overload List

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MsDb2Command Properties

This section lists the properties of the **MsDb2Command** class. For a complete list of **MsDb2Command** class members, see MsDb2Command Members.

Public Properties

CommandText	Gets or sets the command value sent to the DB2 system.
CommandTimeout	Gets or sets the amount of time to wait before the command execution times out.
CommandType	Gets or sets the type of command the **CommandText** property stores.
Connection	Gets or sets the connection that owns the command.
Parameters	Gets the collection of parameters that belong to this particular command.
Transaction	Gets or sets the owning transaction of the command.
UpdatedRowSource	Gets or sets how command results are applied to the DataRow when used by **MsDb2DataAdapter.Update**.

See Also

MsDb2Command Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command.CommandText Property

Gets or sets the command value sent to the DB2 system.

VB

```
Public Overridable Property CommandText As String  Implements _
   IDbCommand.CommandText
[C#]
public virtual string CommandText {get; set;}
[C++]
public: __property virtual String* get_CommandText();
public: __property virtual void set_CommandText(String*);
[JScript]
public function get CommandText() : String;
public function set CommandText(String);
```

Property Value

The command value sent to the DB2 system. The default is an empty string.

Implements

IDbCommand.CommandText

Exceptions

Exception Type	Condition
InvalidCommandText	The command text is null or empty.

Remarks

The value of **CommandText** is dependent on the *CommandValue* field. The **CommandText** can include a stored procedure name, a table name, or SQL statement text. When **CommandText** is changed, the _dirty flag is set.

When CommandType is set to **StoredProcedure**, CommandText should be set to the name of the stored procedure. The user may be required to use escape character syntax if the stored procedure name contains any special characters. The command executes this stored procedure when you call one of the Execute methods.

When **CommandType** is set to **TableDirect**, **CommandText** should be set to the name of the table or tables to be accessed. The user may be required to use escape character syntax if any of the tables named contain any special characters. All rows and columns of the named table or tables will be returned when you call one of the Execute methods.

You cannot set Connection, CommandType and **CommandText** if the current connection is performing an execute or fetch operation.

The Managed Provider for DB2 not support named parameters for passing parameters to an SQL statement or a stored procedure called by an **MsDb2Command** when **CommandType** is set to **Text**. In this case, the question mark (?) placeholder must be used, as in the following example:

```
SELECT * FROM Customers WHERE CustomerID = ?
```

As a result, the order in which an MsDb2Parameter is added to the MsDb2ParameterCollection must directly correspond to the position of the question mark placeholder for the parameter.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace |

Managed Provider for DB2 Programmer's Guide

MsDb2Command.CommandTimeout Property

Gets or sets the amount of time to wait before the command execution times out.

VB

```
Public Overridable Property CommandTimeout As Integer  Implements _
   IDbCommand.CommandTimeout
[C#]
public virtual int CommandTimeout {get; set;}
[C++]
public: __property virtual int get_CommandTimeout();
public: __property virtual void set_CommandTimeout(int);
[JScript]
public function get CommandTimeout() : int;
public function set CommandTimeout(int);
```

Property Value

The time (in seconds) to wait for the command to execute. The default is 30 seconds

Implements

IDbCommand.CommandTimeout

Property Value

Integer containing the amount of time to wait before the command execution times out.

Exceptions

Exception Type	Condition
InvalidCommandTimeout	Timeout was attempted to be set to a negative value.

Remarks

A value of 0 indicates no limit, and should be avoided in a **StoredProcedure** because an attempt to execute a command waits indefinitely.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command.CommandType Property

Gets or sets the type of command the **CommandText** property stores.

VB

```
Public Overridable Property CommandType As CommandType  Implements _
   _
   IDbCommand.CommandType
[C#]
public virtual CommandType CommandType {get; set;}
[C++]
public: __property virtual CommandType get_CommandType();
public: __property virtual void set_CommandType(CommandType);
[JScript]
public function get CommandType() : CommandType;
public function set CommandType(CommandType);
```

Property Value

One of the CommandType values. The default is **Text**.

Implements

IDbCommand.CommandType

Property Value

CommandType containing the type of command the **CommandText** property stores.

Exceptions

Exception Type	Condition
InvalidCommandType	The **CommandType** value is not a value listed above.

Remarks

When you set **CommandType** to **StoredProcedure**, you should set CommandText to the name of the stored procedure. The command executes this stored procedure when you call one of the Execute methods.

The Connection, CommandType and CommandText cannot be set if the current connection is performing an execute or fetch operation.

The Managed Provider for DB2 does not support named parameters for passing parameters to an SQL statement or a stored procedure called by an **MsDb2Command** when **CommandType** is set to **Text**. In this case, the question mark (?) placeholder must be used, as in the following example:

```
SELECT * FROM Customers WHERE CustomerID = ?
```

As a result, the order in which an MsDb2Parameter is added to the MsDb2ParameterCollection must directly correspond to the position of the question mark placeholder for the parameter.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command.Connection Property

Gets or sets the connection that owns this command.

VB

```
Public Overridable Property Connection As IDbConnection  Implements _
   _
   IDbCommand.Connection
[C#]
public virtual IDbConnection Connection {get; set;}
[C++]
public: __property virtual IDbConnection* get_Connection();
public: __property virtual void set_Connection(IDbConnection*);
[JScript]
public function get Connection() : IDbConnection;
public function set Connection(IDbConnection);
```

Property Value

IdbConnection containing the connection that owns this command. The default value is a null reference (**Nothing** in Microsoft Visual Basic).

Implements

IDbCommand.Connection

Remarks

You cannot set the **Connection**, CommandType and CommandText if the current connection is performing an execute or fetch operation.

If you set **Connection** while a transaction is in progress and the Transaction property is not null, an **InvalidOperationException** is generated. If the **Transaction** is not null and the transaction has already been committed or rolled back, **Transaction** is set to null.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command.Parameters Property

Gets the collection of parameters that belong to this particular command.

VB

```
Public ReadOnly Property Parameters As MsDb2ParameterCollection
[C#]
public MsDb2ParameterCollection Parameters {get;}
[C++]
public: __property MsDb2ParameterCollection* get_Parameters();
[JScript]
public function get Parameters() : MsDb2ParameterCollection;
```

Property Value

The parameters of the SQL statement or stored procedure. The default is an empty collection.

Remarks

The Managed Provider for DB2 does not support named parameters for passing parameters to an SQL statement or a stored procedure called by an MsDb2Command when CommandType is set to **Text**. In this case, the question mark (?) placeholder must be used. For example:

```
SELECT * FROM Customers WHERE CustomerID = ?
```

As a result, the order in which an MsDb2Parameter is added to the MsDb2ParameterCollection must directly correspond to the position of the question mark placeholder for the parameter.

If the parameters in the collection do not match the requirements of the query to be executed, an error may result.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command.Transaction Property

Gets or sets the owning transaction of the command.

VB

```
Public Property Transaction As MsDb2Transaction
[C#]
public MsDb2Transaction Transaction {get; set;}
[C++]
public: __property MsDb2Transaction* get_Transaction();
public: __property void set_Transaction(MsDb2Transaction*);
[JScript]
public function get Transaction() : MsDb2Transaction;
public function set Transaction(MsDb2Transaction);
```

Property Value

IdBTransaction containing the owning transaction of this command. The default value is a null reference (**Nothing** in Visual Basic).

Exceptions

Exception Type	Condition
InvalidTransactionProperty	The property value is null.

Remarks

Changing the transaction of the command causes a rollback of the current transaction.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command.UpdatedRowSource Property

Gets or sets how command results are applied to the DataRow when used by **MsDb2DataAdapter**.

VB

```
Public Overridable Property UpdatedRowSource As UpdateRowSource  _
   Implements IDbCommand.UpdatedRowSource
[C#]
public virtual UpdateRowSource UpdatedRowSource {get; set;}
[C++]
public: __property virtual UpdateRowSource get_UpdatedRowSource();
public: __property virtual void
   set_UpdatedRowSource(UpdateRowSource);
[JScript]
public function get UpdatedRowSource() : UpdateRowSource;
public function set UpdatedRowSource(UpdateRowSource);
```

Property Value

One of the UpdateRowSource values. The default is Both unless the command is automatically generated. Then the default is None.

Implements

IDbCommand.UpdatedRowSource

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command Methods

This section lists the methods of the **MsDb2Command** class. For a complete list of **MsDb2Command** class members, see MsDb2Command Members.

Public Methods

Cancel	Preempts an executing command and causes a transition rollback of the results have been partially retrieved.
CreateParameter	Creates and returns a new **MsDb2Parameter**.
Dispose	Releases the resources used by the **Component**.
Equals (inherited from **System.Object**)	Determines whether two **Objects** are equal.
ExecuteNonQuery	Executes an SQL statement against the Connection and returns the number of rows affected.
ExecuteReader	Overloaded. Executes a query that expects some sort of forward-only resultset cursor.
ExecuteScalar	Executes a query that returns a resultset and returns the object value of row 1, column 1.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
Prepare	Prepares a query command for execution.
ToString (inherited from **System.Object**)	Returns a **String** that represents the current **Object**.

Protected Methods

Finalize	Overridden. Enables an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current Object.

See Also

MsDb2Command Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Command.Cancel Method

Preempts an executing command and causes a transaction rollback if the results have been partially retrieved

VB

```
Public Overridable Sub Cancel() Implements IDbCommand.Cancel
[C#]
public virtual void Cancel();
[C++]
public: virtual void Cancel();
[JScript]
public function Cancel();
```

Implements

IDbCommand.Cancel

Remarks

If there is nothing to cancel, nothing happens. However, if there is a command in process, and the attempt to cancel fails, no exception is generated.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Command.CreateParameter Method

Creates and returns a new **MsDb2Parameter**.

VB

```
Public Function CreateParameter() As MsDb2Parameter
[C#]
public MsDb2Parameter CreateParameter();
[C++]
public: MsDb2Parameter* CreateParameter();
[JScript]
public function CreateParameter() : MsDb2Parameter;
```

Return Value

A new MsDb2Parameter.

Remarks

CreateParameter does not add the parameter to the internally stored **MsDb2ParameterCollection**. To do so, you must manually call **Parameters.Add()**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Command.Dispose Method

Releases the resources used by the current instance.

VB

```
Public Overridable Sub Dispose() Implements IDisposable.Dispose
[C#]
public virtual void Dispose();
[C++]
public: virtual void Dispose();
[JScript]
public function Dispose();
```

Implements

IDisposable.Dispose

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command.ExecuteNonQuery Method

Executes a Data Definition Language (DDL) or Distributed Data Management (DDM) statement that does not expect a resultset.

VB

```
Public Overridable Function ExecuteNonQuery() As Integer Implements _
   _
   IDbCommand.ExecuteNonQuery
[C#]
public virtual int ExecuteNonQuery();
[C++]
public: virtual int ExecuteNonQuery();
[JScript]
public function ExecuteNonQuery() : int;
```

Return Value

The number of rows affected.

Implements

IDbCommand.ExecuteNonQuery

Exceptions

Exception Type	Condition
InvalidOperationException	The connection does not exist, or the connection is not open.

Remarks

Output parameters are suitable. The return value is the number of rows affected.

You can use the **ExecuteNonQuery** to perform catalog operations (for example, querying the structure of a database or creating database objects such as tables), or to change the data in a database without using a **DataSet** by executing UPDATE, INSERT, or DELETE statements.

Although the **ExecuteNonQuery** does not return any rows, any output parameters or return values mapped to parameters are populated with data.

For UPDATE, INSERT, and DELETE statements, the return value is the number of rows affected by the command. For all other types of statements, the return value is -1.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Command.ExecuteReader Method

Executes a query that expects some sort of forward-only result set cursor.

Overload List

[Visual Basic] Overloads Public Function ExecuteReader() As MsDb2DataReader

[C#] public MsDb2DataReader ExecuteReader();

[C++] public: MsDb2DataReader* ExecuteReader();

[JScript] public function ExecuteReader() : MsDb2DataReader;

[Visual Basic] Overloads Public Function ExecuteReader(System.Data.CommandBehavior) As MsDb2DataReader

[C#] public MsDb2DataReader ExecuteReader(System.Data.CommandBehavior);

[C++] public: MsDb2DataReader* ExecuteReader(System.Data.CommandBehavior);

[JScript] public function ExecuteReader(System.Data.CommandBehavior) : MsDb2DataReader;

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Command.ExecuteReader Method ()

Executes a query that expects some sort of forward-only resultset cursor.

VB

```
Overloads Public Function ExecuteReader() As MsDb2DataReader
[C#]
public MsDb2DataReader ExecuteReader();
[C++]
public: MsDb2DataReader* ExecuteReader();
[JScript]
public function ExecuteReader() : MsDb2DataReader;
```

Return Value

An MsDb2DataReader object.

Remarks

In addition, the queries can include stored procedures, **SELECT** statements, and schema fetches. Calling **ExecuteReader** with these types of queries is the same as calling **ExecuteReader(CommandBehavior.Default)**.

When CommandType is set to **StoredProcedure**, CommandText should be set to the name of the stored procedure. The command executes this stored procedure when you call **ExecuteReader**. While the MsDb2DataReader is in use, the associated MsDb2Connection is busy serving the **MsDb2DataReader**. While in this state, no other operations can be performed on the **MsDb2Connection** other than closing it. This is the case until the **Close** method of the **MsDb2DataReader** is called.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Command.ExecuteReader Overload List

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MsDb2Command.ExecuteReader Method (System.Data.CommandBehavior)

Executes a query that expects some sort of forward-only resultset cursor using the specified behavior.

VB

```
Overloads Public Function ExecuteReader( _
   ByVal behavior As CommandBehavior _
) As MsDb2DataReader
[C#]
public MsDb2DataReader ExecuteReader(
   CommandBehavior behavior
);
[C++]
public: MsDb2DataReader* ExecuteReader(
   CommandBehavior behavior
);
[JScript]
public function ExecuteReader(
   behavior : CommandBehavior
) : MsDb2DataReader;
```

Parameters

behavior
The command behavior of the execution.

Remarks

The queries executed by **ExecuteReader** can include stored procedures, **SELECT** statements, and schema fetches.

The following is a list of possible values for *behavior***.**

- CloseConnection
- Default
- KeyInfo
- SchemaOnly
- SequentialAccess
- SingleResult
- SingleRow

When you specify **SingleRow** with **ExecuteReader**, the Managed Provider for DB2 performs binding using the OLE DB **IRow** interface if it is available. Otherwise, it uses the **IRowset** interface. If your SQL statement is expected to return only a single row, specifying **SingleRow** can also improve application performance.

When CommandType is set to **StoredProcedure**, CommandText should be set to the name of the stored procedure. The command executes this stored procedure when you call **ExecuteReader**.

The MsDb2DataReader supports a special mode that enables large binary values to be read efficiently. For more information, see the **SequentialAccess** setting for **CommandBehavior**.

While the **MsDb2DataReader** is in use, the associated **MsDb2Connection** is busy serving the **MsDb2DataReader**. While in this state, no other operatons can be performed on the MsDb2Connection other than closing it. This is the case until the **Close** method of the **MsDb2DataReader** is called.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Command.ExecuteReader Overload List

MsDb2Command.ExecuteScalar Method

Executes a query that returns a result set and returns the object value of row 1, column 1.

VB

```
Public Overridable Function ExecuteScalar() As Object Implements _
   IDbCommand.ExecuteScalar
[C#]
public virtual object ExecuteScalar();
[C++]
public: virtual Object* ExecuteScalar();
[JScript]
public function ExecuteScalar() : Object;
```

Return Value

The first column in the first row in the resultset.

Implements

IDbCommand.ExecuteScalar

Remarks

Calling **ExecuteScalar** is semantically equivalent to the following code:

```
IDbDataReader reader = cmd.ExecuteReader();
reader.Read();
object value = reader.GetValue(0);
```

Use **ExecuteScalar** to retrieve a single value (for example, an aggregate value) from a data source. This requires less code than using **ExecuteReader**, and then performing the operations necessary to generate the single value using the data returned by an MsDb2DataReader.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Command.Finalize Method

Allows an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by the garbage collection.

[C#] In C#, finalizers are expressed using destructor syntax.

[C++] In C++, finalizers are expressed using destructor syntax.

VB

```
Overrides Protected Sub Finalize()
[C#]
~MsDb2Command();
[C++]
~MsDb2Command();
[JScript]
protected override function Finalize();
```

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Command.IDbCommand.CreateParameter Method

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Private Function CreateParameter() As IDbDataParameter Implements _
   IDbCommand.CreateParameter
[C#]
IDbDataParameter IDbCommand.CreateParameter();
[C++]
private: IDbDataParameter* IDbCommand::CreateParameter();
[JScript]
private function IDbCommand.CreateParameter() : IDbDataParameter;
```

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Command.IDbCommand.ExecuteReader Method

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

Overload List

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

[Visual Basic] Overloads Private Function ExecuteReader() As IDataReader Implements IDbCommand.ExecuteReader

[C#] IDataReader IDbCommand.ExecuteReader();

[C++] private: IDataReader* IDbCommand::ExecuteReader();

[JScript] private function IDbCommand.ExecuteReader() : IDataReader;

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

[Visual Basic]
Overloads Private Function ExecuteReader(System.Data.CommandBehavior) As IDataReader Implements IDbCommand.ExecuteReader

[C#] IDataReader IDbCommand.ExecuteReader(System.Data.CommandBehavior);

[C++] private: IDataReader* IDbCommand::ExecuteReader(System.Data.CommandBehavior);

[JScript] private function IDbCommand.ExecuteReader(System.Data.CommandBehavior) : IDataReader;

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

MsDb2Command.IDbCommand.ExecuteReader Method ()

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Private Function ExecuteReader() As IDataReader Implements _
   IDbCommand.ExecuteReader
[C#]
IDataReader IDbCommand.ExecuteReader();
[C++]
private: IDataReader* IDbCommand::ExecuteReader();
[JScript]
private function IDbCommand.ExecuteReader() : IDataReader;
```

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Command.IDbCommand.ExecuteReader Overload List

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MsDb2Command.IDbCommand.ExecuteReader Method (System.Data.CommandBehavior)

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Private Function ExecuteReader( _
   ByVal behavior As CommandBehavior _
) As IDataReader Implements IDbCommand.ExecuteReader
[C#]
IDataReader IDbCommand.ExecuteReader(
   CommandBehavior behavior
);
[C++]
private: IDataReader* IDbCommand::ExecuteReader(
   CommandBehavior behavior
);
[JScript]
private function IDbCommand.ExecuteReader(
   behavior : CommandBehavior
) : IDataReader;
```

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Command.IDbCommand.ExecuteReader Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Command.Prepare Method

Prepares a query command for execution.

VB

```
Public Overridable Sub Prepare() Implements IDbCommand.Prepare
[C#]
public virtual void Prepare();
[C++]
public: virtual void Prepare();
[JScript]
public function Prepare();
```

Remarks

Prepare improves efficiency when the command is executed more than once, but with different parameter values. If the _dirty flag is set inside the **MsDb2Command**, then the command must be re-prepared (but this can be done internally).

If CommandType is set to **TableDirect**, **Prepare** does nothing. If **CommandType** is set to **StoredProcedure**, the call to **Prepare** should succeed, although it may result in a no-op.

Before you call **Prepare**, specify the data type of each parameter in the statement to be prepared. For each parameter that has a variable length data type, you must set the **Size** property to the maximum size needed. **Prepare** returns an error if these conditions are not met.

If you call an Execute method after calling **Prepare**, any parameter value that is larger than the value specified by the **Size** property is automatically truncated to the original specified size of the parameter, and no truncation errors are returned.

Output parameters (whether prepared or not) must have a user-specified data type. If you specify a variable length data type, you must also specify the maximum **Size**.

Implements

IDbCommand.Prepare

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Command Class | MsDb2Command Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection Class

Opens, closes, and maintains a connection to a DB2 host.

For a list of all members of this type, see MsDb2Connection Members.

System.Object
  Microsoft.HostIntegration.MsDb2Client.MsDb2Connection

VB

```
Public Class MsDb2Connection
   Implements IDbConnection, IDisposable
[C#]
public class MsDb2Connection : IDbConnection, IDisposable
[C++]
public __gc class MsDb2Connection : public IDbConnection,
   IDisposable
[JScript]
public class MsDb2Connection implements IDbConnection, IDisposable
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Remarks

An **MsDb2Connection** object represents a unique connection to a data source. In the case of a client/server database system, it is equivalent to a network connection to the server. Depending on the functionality supported by the native OLE DB provider, some collections, methods, or properties of an **MsDb2Connection** object may not be available.

When you create an instance of **MsDb2Connection**, all properties are set to their initial values. For a list of these values, see the MsDb2Connection constructor.

If the **MsDb2Connection** goes out of scope, it is not closed. Therefore, you must explicitly close the connection by calling Close or Dispose.

To deploy high-performance applications, you need to use connection pooling. When you use the MsDb2 .NET Data Provider, you do not need to enable connection pooling because the provider manages this automatically.

If a fatal MsDb2Exception (for example, a SQL Server severity level of 20 or greater) is generated by the method executing an MsDb2Command, the **MsDb2Connection**, the connection may be closed. However, the user can reopen the connection and continue.

An application that creates an instance of the **MsDb2Connection** object can require all direct and indirect callers to have adequate permission to the code by setting declarative or imperative security demands. **MsDb2Connection** makes security demands using the **MsDb2Permission** object. Users can verify that their code has adequate permissions by using the **MsDb2PermissionAttribute** object. Users and administrators can also use the Code Access Security Policy Tool (Caspol.exe) to modify security policy at the computer, user, and enterprise levels.

Unlike other .NET providers, the Managed Provider for DB2 enables you to open multiple **MsDb2DataReaders** on a single **MsDb2Connection**.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

MsDb2Connection Members

See MsDb2Connection overview for more information.

Public Constructors

MsDb2Connection Constructor	Overloaded. Initializes a new instance of the **MsDb2Connection** class.

Public Properties

BinaryAsCharacter	Gets or sets a value that determines if the provider treats binary data type fields (with a character code set identifier (CCSID) of 65535) as character data type fields on a per-data source basis.
ConnectionPooling	Gets or sets a value that determines if the application connects to the server using a traditional connection or a connection pool.
ConnectionString	Gets or sets the connection string to connect to the data source.
Database	Gets or sets the name of the database to which **MsDb2Connection** connects.
DBMSPlatform	Gets or sets the target DB2 platform the Managed Provider is optimized for.
DefaultSchema	Gets or sets the default database schema used.
HostCCSID	Gets or sets the character code set identifier (CCSID) that must match the data in the file as represented on the remote host computer.
NetworkProperties	Gets or sets network-specific connection properties.
PackageCollection	Gets or sets the name of the DRDA target collection (AS/400 library) where the provider should store and bind DB2 packages.
Password	Gets or sets the password used to connect to the database.
PCCodepage	Gets or sets the code page to be used on the local machine.
State	Gets the status of the **MsDb2Connection**.
UnitsOfWork	Gets or sets the type of transaction supported by the provider.
UserName	Gets or sets the name of the user connecting to the database.

Public Methods

BeginTransaction	Overloaded. Begins a transaction context using the wanted **IsolationLevel**.
ChangeDatabase	Enables users to change the database that the connection is accessing.
Close	Closes the connection with the remote host.
CreateCommand	Creates a new command that can be executed.
Dispose	Releases the resources used by the **Component**.
Equals (inherited from **System.Object**)	Determines if two **Objects** are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
Open	Opens the connection with the remote host.
ToString (inherited from **System.Object**)	Returns a **String** that represents the current **Object**.

Protected Methods

Finalize	Overridden. Allows an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2Connection Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Connection Constructor

Initializes a new instance of the **MsDb2Connection** class.

Overload List

[Visual Basic] Public Sub New()

[C#] public MsDb2Connection();

[C++] public: MsDb2Connection();

[JScript] public function MsDb2Connection();

[Visual Basic] Public Sub New(System.String)

[C#] public MsDb2Connection(System.String);

[C++] public: MsDb2Connection(System.String);

[JScript] public function MsDb2Connection(System.String);

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Connection Constructor ()

Initializes a new instance of the MsDb2Connection class.

VB

```
Public Sub New()
[C#]
public MsDb2Connection();
[C++]
public: MsDb2Connection();
[JScript]
public function MsDb2Connection();
```

Remarks

The default constructor initializes any fields to their default values. The following table describes the default values for a new instance of **MsDb2Connection**.

Properties	Initial Values
ConnectionString	Empty string ("")
Database	Empty string ("")
DataSource	Empty string ("")

You can change the value for these properties only by using ConnectionString.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Connection Constructor Overload List

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MsDb2Connection Constructor (System.String)

Initializes a new instance of the MsDb2Connection class using the specified connection string.

VB

```
Public Sub New( _
   ByVal connectionString As String _
)
[C#]
public MsDb2Connection(
   string connectionString
);
[C++]
public: MsDb2Connection(
   String* connectionString
);
[JScript]
public function MsDb2Connection(
   connectionString : String
);
```

Parameters

connectionString
The connection string that provides the parameters for the connection.

Exceptions

Exception Type	Condition
InvalidPropertyValue	The connection string is invalid.

Remarks

The default constructor initializes any fields to their default values. The following table describes the default values for a new instance of **MsDb2Connection**.

Properties	Initial Values
ConnectionString	*connectionString*
Database	Empty string ("")
DataSource	Empty string ("")

You can change the value for these properties only by using ConnectionString.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Connection Constructor Overload List

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MsDb2Connection Properties

This section lists the properties of the **MsDb2Connection** class. For a complete list of **MsDb2Connection** class members, see MsDb2Connection Members.

Public Properties

BinaryAsCharacter	Gets or sets a value that determines if the provider treats binary data type fields (with a character code set identifier (CCSID) of 65535) as character data type fields on a per-data source basis.
ConnectionPooling	Gets or sets a value that determines if the application connects to the server using a traditional connection or a connection pool.
ConnectionString	Gets or sets the connection string to connect to the data source.
Database	Gets or sets the name of the database to which **MsDb2Connection** connects.
DBMSPlatform	Gets or sets the target DB2 platform for which the Managed Provider is optimized.
DefaultSchema	Gets or sets the default database schema used.
HostCCSID	Gets or sets the character code set identifier (CCSID) that must match the data in the file as represented on the remote host computer.
NetworkProperties	Gets or sets network-specific connection properties.
PackageCollection	Gets or sets the name of the DRDA target collection (AS/400 library) where the provider should store and bind DB2 packages.
Password	Gets or sets the password used to connect to the database.
PCCodepage	Gets or sets the code page to be used on the local computer.
State	Gets the status of the **MsDb2Connection**.
UnitsOfWork	Gets or sets the type of transaction supported by the provider.
UserName	Gets or sets the name of the user connecting to the database.

See Also

MsDb2Connection Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Connection.BinaryAsCharacter Property

Gets or sets a value that determines if the provider treats binary data type fields (with a character code set identifier (CCSID) of 65535) as character data type fields on a per-data source basis.

VB

```
Public Property BinaryAsCharacter As Boolean
[C#]
public bool BinaryAsCharacter {get; set;}
[C++]
public: __property bool get_BinaryAsCharacter();
public: __property void set_BinaryAsCharacter(bool);
[JScript]
public function get BinaryAsCharacter() : Boolean;
public function set BinaryAsCharacter(Boolean);
```

Value

true to treat binary data type fields as character data on a per-data source basis; otherwise, **false**. The default value is **false**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.ConnectionPooling Property

Gets or sets a value that determines if the application connects to the server using a traditional connection or a connection pool.

C#

```
public bool ConnectionPool {get; set;}
[C++]
public: __property bool get_ConnectionPool();
public: __property void set_ConnectionPool(bool);
[JScript]
public function get ConnectionPool() : Boolean;
public function set ConnectionPool(Boolean);
```

Value

true to connect to the DB2 server using a connection pool; otherwise, **false**. The default value is **false**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.ConnectionString Property

Gets or sets the connection string to connect to the data source.

VB

```
Public Overridable Property ConnectionString As String  Implements _
   _
   IDbConnection.ConnectionString
[C#]
public virtual string ConnectionString {get; set;}
[C++]
public: __property virtual String* get_ConnectionString();
public: __property virtual void set_ConnectionString(String*);
[JScript]
public function get ConnectionString() : String;
public function set ConnectionString(String);
```

Value

The connection string to connect to the data source.

Remarks

The format of the connection string follows the attribute=value pair listing similar to Open Database Connectivity (ODBC) and OLE DB connection strings. The connection string is parsed in the managed environment so that the proper fields can be extracted for a uniform call to the distributed relational database architecture (DRDA AR). The default value is an empty string.

Exceptions

Exception type	Condition
InvalidPropertyException	A property name/value pair is invalid.
InvalidConnectionPropertySet	User tried to set the value while the connection was not closed.

Implements

IDbConnection.ConnectionString

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.Database Property

Gets or sets the name of the database to which **MsDb2Connection** connects.

VB

```
Public Overridable Property Database As String  Implements _
   IDbConnection.Database
[C#]
public virtual string Database {get; set;}
[C++]
public: __property virtual String* get_Database();
public: __property void set_Database(String*);
[JScript]
public function get Database() : String;
public function set Database(String);
```

Implements

IDbConnection.Database

Value

The name of the database to which **MsDb2Connection** connects. The default value is an empty string.

Remarks

Database is set in the connection string.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Connection.DBMSPlatform Property

Gets or sets the target DB2 platform for which the Managed Provider is optimized.

VB

```
Public Property DBMSPlatform As DBMSPlatform
[C#]
public DBMSPlatform DBMSPlatform {get; set;}
[C++]
public: __property DBMSPlatform get_DBMSPlatform();
public: __property void set_DBMSPlatform(DBMSPlatform);
[JScript]
public function get DBMSPlatform() : DBMSPlatform;
public function set DBMSPlatform(DBMSPlatform);
```

Value

The DB2 platform the Managed Provider is optimized for.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.DefaultSchema Property

Gets or sets the default database schema to be used.

VB

```
Public Property DefaultSchema As String
[C#]
public string DefaultSchema {get; set;}
[C++]
public: __property String* get_DefaultSchema();
public: __property void set_DefaultSchema(String*);
[JScript]
public function get DefaultSchema() : String;
public function set DefaultSchema(String);
```

Value

The default database schema to use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.HostCCSID Property

Gets or sets the character code set identifier (CCSID) that must match the data in the file as represented on the remote host computer.

VB

```
Public Property HostCCSID As Integer
[C#]
public int HostCCSID {get; set;}
[C++]
public: __property int get_HostCCSID();
public: __property void set_HostCCSID(int);
[JScript]
public function get HostCCSID() : int;
public function set HostCCSID(int);
```

Value

The character code set identifier (CCSID) that must match the data in the file as represented on the remote host computer.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Connection.NetworkProperties Property

Gets or sets network-specific connection properties.

VB

```
Public Property NetworkProperties As MsDb2NetworkProperties
[C#]
public MsDb2NetworkProperties NetworkProperties {get; set;}
[C++]
public: __property MsDb2NetworkProperties* get_NetworkProperties();
public: __property void set_NetworkProperties(MsDb2NetworkProperties*);
[JScript]
public function get NetworkProperties() : MsDb2NetworkProperties;
public function set NetworkProperties(MsDb2NetworkProperties);
```

Value

MsDb2NetworkProperties containing the network properties of the connection.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.PackageCollection Property

Gets or sets the name of the DRDA target collection (AS/400 library) where the Managed Provider should store and bind DB2 packages.

VB

```
Public Property PackageCollection As String
[C#]
public string PackageCollection {get; set;}
[C++]
public: __property String* get_PackageCollection();
public: __property void set_PackageCollection(String*);
[JScript]
public function get PackageCollection() : String;
public function set PackageCollection(String);
```

Value

The name of the DRDA target collection.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.Password Property

Gets or sets the password used to connect to the database.

VB

```
Public Property Password As String
[C#]
public string Password {get; set;}
[C++]
public: __property String* get_Password();
public: __property void set_Password(String*);
[JScript]
public function get Password() : String;
public function set Password(String);
```

Value

The password used to connect to the database.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.PCCodepage Property

Gets or sets the code page to be used on the local computer.

VB

```
Public Property PCCodepage As Integer
[C#]
public int PCCodepage {get; set;}
[C++]
public: __property int get_PCCodepage();
public: __property void set_PCCodepage(int);
[JScript]
public function get PCCodepage() : int;
public function set PCCodepage(int);
```

Value

The code page for the local computer.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Connection.State Property

Gets the status of the **MsDb2Connection**.

VB

```
Public Overridable ReadOnly Property State As ConnectionState  _
   Implements IDbConnection.State
[C#]
public virtual ConnectionState State {get;}
[C++]
public: __property virtual ConnectionState get_State();
[JScript]
public function get State() : ConnectionState;
```

Implements

IDbConnection.State

Value

The duration in seconds to wait before the connection times out.

Remarks

State is set in the connection string.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.UnitsOfWork Property

Gets or sets the type of transaction supported by the Managed Provider.

VB

```
Public Property UnitsOfWork As UnitsOfWorkType
[C#]
public UnitsOfWorkType UnitsOfWork {get; set;}
[C++]
public: __property UnitsOfWorkType get_UnitsOfWork();
public: __property void set_UnitsOfWork(UnitsOfWorkType);
[JScript]
public function get UnitsOfWork() : UnitsOfWorkType;
public function set UnitsOfWork(UnitsOfWorkType);
```

Value

UnitsOfWorkType containing the units of work.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.UserName Property

Gets or sets the name of the user connecting to the database.

VB

```
Public Property UserName As String
[C#]
public string UserName {get; set;}
[C++]
public: __property String* get_UserName();
public: __property void set_UserName(String*);
[JScript]
public function get UserName() : String;
public function set UserName(String);
```

Value

The user name.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Connection Methods

This section lists the methods of the **MsDb2Connection** class. For a complete list of **MsDb2Connection** class members, see MsDb2Connection Members.

Public Methods

BeginTransaction	Overloaded. Begins a transaction context using the wanted **IsolationLevel**.
ChangeDatabase	Enables users to change the database that the connection is accessing.
Close	Closes the connection with the remote host.
CreateCommand	Creates a new command that can be executed.
Dispose	Releases the resources used by the **Component**.
Equals (inherited from **System.Object**)	Determines if two **Objects** are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
Open	Opens the connection with the remote host.
ToString (inherited from **System.Object**)	Returns a **String** that represents the current **Object**.

Protected Methods

Finalize	Overridden. Enables an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2Connection Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Connection.BeginTransaction Method

Begins a transaction context using the wanted **IsolationLevel**.

Overload List

[Visual Basic] Overloads Public Function BeginTransaction() As MsDb2Transaction

[C#] public MsDb2Transaction BeginTransaction();

[C++] public: MsDb2Transaction* BeginTransaction();

[JScript] public function BeginTransaction() : MsDb2Transaction;

[Visual Basic] Overloads Public Function BeginTransaction(System.Data.IsolationLevel) As MsDb2Transaction

[C#] public MsDb2Transaction BeginTransaction(System.Data.IsolationLevel);

[C++] public: MsDb2Transaction* BeginTransaction(System.Data.IsolationLevel);

[JScript] public function BeginTransaction(System.Data.IsolationLevel) : MsDb2Transaction;

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Connection.BeginTransaction Method ()

Begins a transaction context using the default isolation level.

VB

```
Overloads Public Function BeginTransaction() As MsDb2Transaction
[C#]
public MsDb2Transaction BeginTransaction();
[C++]
public: MsDb2Transaction* BeginTransaction();
[JScript]
public function BeginTransaction() : MsDb2Transaction;
```

Exceptions

Exception Type	Condition
OpenConnectionRequired	Connection is not yet open.
ParallelTransactionNotSupport	Attempt to begin two transactions at once.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Connection.BeginTransaction Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Connection.BeginTransaction Method (System.Data.IsolationLevel)

Begins a transaction context using the specified isolation level.

VB

```
Overloads Public Function BeginTransaction( _
   ByVal level As IsolationLevel _
) As MsDb2Transaction
[C#]
public MsDb2Transaction BeginTransaction(
   IsolationLevel level
);
[C++]
public: MsDb2Transaction* BeginTransaction(
   IsolationLevel level
);
[JScript]
public function BeginTransaction(
   level : IsolationLevel
) : MsDb2Transaction;
```

Return Value

IsolationLevel describing the current isolation level.

Exceptions

Exception Type	Condition
OpenConnectionRequired	Connection is not yet open.
InvalidIsolationLevel	The isolation level is invalid. Some levels are invalid because there is no .NET to Distributed Data Management (DDM) conversion, and some because some isolation levels are not permitted on certain platforms. Isolation Level UR is forbidden on OS/390.

Remarks

The following table describes the possible values for *IsolationLevel* and the associated DRDA AR values and **ConnectionAttribute** values.

.NET Isolation level	DRDA AR Value	ConnectionAttribute
Chaos	n/a	n/a
ReadCommitted	IsolationCS	SQL_TXN_READ_COMMITED
ReadUncommitted	IsolationCHG	SQL_TXN_READ_UNCOMMITED
RepeatableRead	IsolationALL	SQL_TXN_REPEATABLE_READ
Serializable	IsolationRR	SQL_TXN_SERIALIZABLE
Unspecified	n/a	n/a
n/a	IsolationNC	n/a Must be AS/400 + AutoCommit = TRUE to get this.

Parameters

level
The wanted **IsolationLevel**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Connection.BeginTransaction Overload List

MsDb2Connection.ChangeDatabase Method

Enables users to change the database that the connection is accessing using the specified database name.

VB

```
Public Overridable Sub ChangeDatabase( _
   ByVal dbName As String _
) Implements IDbConnection.ChangeDatabase
[C#]
public virtual void ChangeDatabase(
   string dbName
);
[C++]
public: virtual void ChangeDatabase(
   String* dbName
);
[JScript]
public function ChangeDatabase(
   dbName : String
);
```

Parameters

dbName
The new database name to which to connect.

Implements

IDbConnection.ChangeDatabase

Exceptions

Exception Type	Condition
OpenConnectionRequired	The connection is not open.
InvalidPropertyValue	The **dbName** is null or empty.

Remarks

Using **ChageDatabase** requires all open **MsDb2Commands**, **MsDb2DataAdapters**, and **MsDb2DataReaders** be closed or declared invalid.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.Close Method

Closes the connection with the remote host.

VB

```
Public Overridable Sub Close() Implements IDbConnection.Close
[C#]
public virtual void Close();
[C++]
public: virtual void Close();
[JScript]
public function Close();
```

Implements

IDbConnection.Close

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.CreateCommand Method

Creates a new command that can be executed.

VB

```
Public Function CreateCommand() As MsDb2Command
[C#]
public MsDb2Command CreateCommand();
[C++]
public: MsDb2Command* CreateCommand();
[JScript]
public function CreateCommand() : MsDb2Command;
```

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Connection.Dispose Method

Releases the resources used by the **Component**.

VB

```
Public Overridable Sub Dispose() Implements IDisposable.Dispose
[C#]
public virtual void Dispose();
[C++]
public: virtual void Dispose();
[JScript]
public function Dispose();
```

Implements

IDisposable.Dispose

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.Finalize Method

Enables an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by the garbage collection.

[C#] In C#, finalizers are expressed using destructor syntax.

[C++] In C++, finalizers are expressed using destructor syntax.

VB

```
Overrides Protected Sub Finalize()
[C#]
~MsDb2Connection();
[C++]
~MsDb2Connection();
[JScript]
protected override function Finalize();
```

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Connection.IDbConnection.BeginTransaction Method

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

Overload List

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

[Visual Basic] Overloads Private Function BeginTransaction() As IDbTransaction Implements IDbConnection.BeginTransaction

[C#] IDbTransaction IDbConnection.BeginTransaction();

[C++] private: IDbTransaction* IDbConnection::BeginTransaction();

[JScript] private function IDbConnection.BeginTransaction() : IDbTransaction;

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

[Visual Basic]
Overloads Private Function BeginTransaction(System.Data.IsolationLevel) As IDbTransaction Implements IDbConnection.BeginTransaction

[C#] IDbTransaction IDbConnection.BeginTransaction(System.Data.IsolationLevel);

[C++] private: IDbTransaction* IDbConnection::BeginTransaction(System.Data.IsolationLevel);

[JScript] private function IDbConnection.BeginTransaction(System.Data.IsolationLevel) : IDbTransaction;

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

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MsDb2Connection.IDbConnection.BeginTransaction Method ()

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Private Function BeginTransaction() As IDbTransaction Implements _
   IDbConnection.BeginTransaction
[C#]
IDbTransaction IDbConnection.BeginTransaction();
[C++]
private: IDbTransaction* IDbConnection::BeginTransaction();
[JScript]
private function IDbConnection.BeginTransaction() : IDbTransaction;
```

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Connection.IDbConnection.BeginTransaction Overload List

MsDb2Connection.IDbConnection.BeginTransaction Method (System.Data.IsolationLevel)

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Private Function BeginTransaction( _
   ByVal isolationLevel As IsolationLevel _
) As IDbTransaction Implements IDbConnection.BeginTransaction
[C#]
IDbTransaction IDbConnection.BeginTransaction(
   IsolationLevel isolationLevel
);
[C++]
private: IDbTransaction* IDbConnection::BeginTransaction(
   IsolationLevel isolationLevel
);
[JScript]
private function IDbConnection.BeginTransaction(
   isolationLevel : IsolationLevel
) : IDbTransaction;
```

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Connection.IDbConnection.BeginTransaction Overload List

MsDb2Connection.IDbConnection.CreateCommand Method

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Private Function CreateCommand() As IDbCommand Implements _
   IDbConnection.CreateCommand
[C#]
IDbCommand IDbConnection.CreateCommand();
[C++]
private: IDbCommand* IDbConnection::CreateCommand();
[JScript]
private function IDbConnection.CreateCommand() : IDbCommand;
```

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Connection.Open Method

Opens the connection with the remote host.

VB

```
Public Overridable Sub Open() Implements IDbConnection.Open
[C#]
public virtual void Open();
[C++]
public: virtual void Open();
[JScript]
public function Open();
```

Implements

IDbConnection.Open

Exceptions

Exception Type	Condition
NoConnectionString	No connection string.
ConnectionAlreadyOpen	Connection is already in the open state.
HostNotAvailableException	The host is not available.
InvalidPropertyException	One or more of the properties in the connection was invalid.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Connection Class | MsDb2Connection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataAdapter Class

Acts as the gateway between a DB2 host table and a .NET-based data set.

For a list of all members of this type, see MsDb2DataAdapter Members.

System.Object
  System.MarshalByRefObject
    System.ComponentModel.Component
      System.Data.Common.DataAdapter
        System.Data.Common.DbDataAdapter
          Microsoft.HostIntegration.MsDb2Client.MsDb2DataAdapter

VB

```
Public Class MsDb2DataAdapter
   Inherits DbDataAdapter
   Implements IDbDataAdapter
[C#]
public class MsDb2DataAdapter : DbDataAdapter, IDbDataAdapter
[C++]
public __gc class MsDb2DataAdapter : public DbDataAdapter,
   IDbDataAdapter
[JScript]
public class MsDb2DataAdapter extends DbDataAdapter implements
   IDbDataAdapter
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Remarks

The **MsDb2DataAdapter** serves as a bridge between a **DataSet** and data source for retrieving and saving data. The **MsDb2DataAdapter** provides this bridge by using **Fill** to load data from the data source into the **DataSet**, and using **Updat**e to send changes made in the **DataSet** back to the data source.

When the **MsDb2DataAdapter** fills a **DataSet**, it creates the necessary tables and columns for the returned data if they do not already exist. However, primary key information is not included in the implicitly created schema unless the **MissingSchemaAction** property is set to **AddWithKey**. You may also have the **MsDb2DataAdapter** create the schema of the **DataSet**, including primary key information, before filling it with data using **FillSchema**. Note that some OLE DB providers, including the **MSDataShape** provider, do not return base table or primary key information. As a result, the **MsDb2DataAdapter** cannot properly set the **PrimaryKey** property on any created **DataTable**. In such cases you should explicitly specify primary keys for tables in the **DataSet**.

The **MsDb2DataAdapter** also includes the **SelectCommand**, **InsertCommand**, **DeleteCommand**, **UpdateCommand**, and **TableMappings** properties to facilitate the loading and updating of data.

When you create an instance of **MsDb2DataAdapter**, properties are set to their initial values. For a list of these values, see the **MsDb2DataAdapter** constructor.

> **Note** Do not use double or real columns when specifying UPDATE or DELETE statements on the **MsDb2DataAdapter**: These rows will not be found and will throw the concurrency violation exception.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataAdapter Members

MsDb2DataAdapter overview

Public Constructors

MsDb2DataAdapter Constructor	Overloaded. Initializes a new instance of the **MsDb2DataAdapter** class.

Public Properties

AcceptChangesDuringFill (inherited from **System.Data.Common.DataAdapter**)	Gets or sets a value indicating whether **AcceptChanges** is called on a **DataRow** after it is added to the **DataTable**.
Container (inherited from **System.ComponentModel.Component**)	Gets the **IContainer** that contains the Component.
ContinueUpdateOnError (inherited from **System.Data.Common.DataAdapter**)	Gets or sets a value that specifies whether to generate an exception, or the row in error when an error is encountered during a row update.
DeleteCommand	Gets or sets an SQL statement or stored procedure for deleting records from the data set.
InsertCommand	Gets or sets an SQL statement or stored procedure used to insert new records into the data source.
MissingMappingAction (inherited from **System.Data.Common.DataAdapter**)	Determines the action to take when incoming data does not have a matching table or column.
MissingSchemaAction (inherited from **System.Data.Common.DataAdapter**)	Determines the action to take when existing **DataSet** schema does not match incoming data.
SelectCommand	Gets or sets an SQL statement or stored procedure used to select records in the data source.
Site (inherited from **System.ComponentModel.Component**)	Gets or sets the **ISite** of the Component.
TableMappings (inherited from **System.Data.Common.DataAdapter**)	Gets a collection that provides the master mapping between a source table and a **DataTable**.
UpdateCommand	Gets or sets an SQL statement or stored procedure used to update records in the data source.

Public Methods

CreateRowUpdatedEvent	Creates a new instance of the MsDb2RowUpdatedEventArgs class.
CreateRowUpdatingEvent	Creates a new instance of the MsDb2RowUpdatingEventArgs class.
CreateObjRef (inherited from **System.MarshalByRefObject**)	Creates an object that contains all the relevant information required to generate a proxy used to communicate with a remote object.
Dispose (inherited from **System.ComponentModel.Component**)	Overloaded. Releases the resources used by the **Component**.
Equals (inherited from **System.Object**)	Overloaded. Determines whether two **Object** instances are equal.
Fill (inherited from **System.Data.Common.DbDataAdapter**)	Overloaded. Adds or refreshes rows in the **DataSet** to match those in an ADO **Recordset** or **Record** object.
FillSchema (inherited from **System.Data.Common.DbDataAdapter**)	Overloaded. Overridden. Adds a **DataTable** to a **DataSet** and configures the schema to match that in the data source.
GetFillParameters (inherited from **System.Data.Common.DbDataAdapter**)	Overridden. Gets the parameters set by the user when executing an SQL SELECT statement.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetLifetimeService (inherited from **System.MarshalByRefObject**)	Retrieves the current lifetime service object that controls the lifetime policy for this instance.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
InitializeLifetimeService (inherited from **System.MarshalByRefObject**)	Obtains a lifetime service object to control the lifetime policy for this instance.
OnRowUpdated	Raises the **RowUpdated** event using a **RowUpdatedEventArgs** object.
OnRowUpdating	Raises the **RowUpdating** event using a **RowUpdatingEventArgs**.

ToString (inherited from **System.ComponentModel.Component**)	Returns a String that represents the current **Object**.
Update (inherited from **System.Data.Common.DbDataAdapter**)	Overloaded. Calls the respective INSERT, UPDATE, or DELETE statements for each inserted, updated, or deleted row in the **DataSet**.

Public Events

Disposed (inherited from **System.ComponentModel.Component**)	Adds an event handler to listen to the **Disposed** event on the component.
FillError (inherited from **System.Data.Common.DbDataAdapter**)	Returned when an error occurs during a fill operation.
RowUpdated	Occurs during **Update** after a command is executed against the data source. The attempt to update is made, so the event fires.
RowUpdating	Occurs during **Update** before a command is executed against the data source. The attempt to update is made, so the event fires.

See Also

MsDb2DataAdapter Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2DataAdapter Constructor

Initializes a new instance of the **MsDb2DataAdapter** class.

Overload List

[Visual Basic] Public Sub New()

[C#] public MsDb2DataAdapter();

[C++] public: MsDb2DataAdapter();

[JScript] public function MsDb2DataAdapter();

[Visual Basic] Public Sub New(MsDb2Command)

[C#] public MsDb2DataAdapter(MsDb2Command);

[C++] public: MsDb2DataAdapter(MsDb2Command*);

[JScript] public function MsDb2DataAdapter(MsDb2Command);

[Visual Basic] Public Sub New(System.String, MsDb2Connection)

[C#] public MsDb2DataAdapter(System.String, MsDb2Connection);

[C++] public: MsDb2DataAdapter(System.String, MsDb2Connection*);

[JScript] public function MsDb2DataAdapter(System.String, MsDb2Connection);

[Visual Basic] Public Sub New(System.String, System.String)

[C#] public MsDb2DataAdapter(System.String, System.String);

[C++] public: MsDb2DataAdapter(System.String, System.String);

[JScript] public function MsDb2DataAdapter(System.String, System.String);

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataAdapter Constructor ()

Initializes a new instance of the MsDb2DataAdapter class.

VB

```
Public Sub New()
[C#]
public MsDb2DataAdapter();
[C++]
public: MsDb2DataAdapter();
[JScript]
public function MsDb2DataAdapter();
```

Remarks

The default constructor initializes any fields to their default values. The following table describes the default values of **MsDb2DataAdapter**.

Properties	Initial Value
MissingMappingAction	**MissingMappingAction.Passthrough**
MissingSchemaAction	**MissingSchemaAction.Add**

You can change the value of any of these properties through a separate call to the relevant property.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2DataAdapter Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2DataAdapter Constructor (MsDb2Command)

Initializes a new instance of the MsDb2DataAdapter class.

VB

```
Public Sub New( _
   ByVal selectCommand As MsDb2Command _
)
[C#]
public MsDb2DataAdapter(
   MsDb2Command selectCommand
);
[C++]
public: MsDb2DataAdapter(
   MsDb2Command* selectCommand
);
[JScript]
public function MsDb2DataAdapter(
   selectCommand : MsDb2Command
);
```

Parameters

selectCommand
An **MsDb2Command** that is a SELECT statement or stored procedure. This **MsDb2Command** is set as the **SelectCommand** property of the **MsDb2DataAdapter**.

Remarks

This version of the constructor sets the **SelectCommand** property to the value specified in the *selectCommand* parameter.

The following table describes the default values of **MsDb2DataAdapter**.

Properties	Initial Value
MissingMappingAction	**MissingMappingAction.Passthrough**
MissingSchemaAction	**MissingSchemaAction.Add**

You can change the value of any of these properties through a separate call to the relevant property.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2DataAdapter Constructor Overload List

MsDb2DataAdapter Constructor (System.String, MsDb2Connection)

Initializes a new instance of the MsDb2DataAdapter class.

VB

```
Public Sub New( _
   ByVal selectCommandText As String, _
   ByVal selectConnection As MsDb2Connection _
)
[C#]
public MsDb2DataAdapter(
   string selectCommandText,
   MsDb2Connection selectConnection
);
[C++]
public: MsDb2DataAdapter(
   String* selectCommandText,
   MsDb2Connection* selectConnection
);
[JScript]
public function MsDb2DataAdapter(
   selectCommandText : String,
   selectConnection : MsDb2Connection
);
```

Parameters

selectCommandText
A String that is an SQL SELECT statement or stored procedure to be used as the **CommandText** of the **SelectCommand** property of the **MsDb2DataAdapter**.

selectConnection
An **MsDb2Connection** that represents the connection.

Remarks

This implementation of the **MsDb2DataAdapter** opens and closes an MsDb2Connection if it is not already open. This can be useful in an application that must call the **Fill** method for two or more **MsDb2DataAdapter** objects. If the **MsDb2Connection** is already open, you must explicitly call **Close** or **Dispose** to close it.

The following table describes the default values of **MsDb2DataAdapter**.

Properties	**Initial Value**
MissingMappingAction	**MissingMappingAction.Passthrough**
MissingSchemaAction	**MissingSchemaAction.Add**

You can change the value of any of these properties through a separate call to the relevant property.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2DataAdapter Constructor Overload List

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MsDb2DataAdapter Constructor (System.String, System.String)

Initializes a new instance of the MsDb2DataAdapter class.

VB

```
Public Sub New( _
   ByVal selectCommandText As String, _
   ByVal selectConnectionString As String _
)
[C#]
public MsDb2DataAdapter(
   string selectCommandText,
   string selectConnectionString
);
[C++]
public: MsDb2DataAdapter(
   String* selectCommandText,
   String* selectConnectionString
);
[JScript]
public function MsDb2DataAdapter(
   selectCommandText : String,
   selectConnectionString : String
);
```

Parameters

selectCommandText
A **String** that is a SQL SELECT statement or stored procedure to be used as the **CommandText** of the **SelectCommand** property of the **MsDb2DataAdapter**.
selectConnectionString
The connection string.

Remarks

The following table describes the default values of **MsDb2DataAdapter**.

Properties	Initial Value
MissingMappingAction	**MissingMappingAction.Passthrough**
MissingSchemaAction	**MissingSchemaAction.Add**

You can change the value of any of these properties through a separate call to the relevant property.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2DataAdapter Constructor Overload List

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MsDb2DataAdapter Properties

This section lists the properties of the **MsDb2DataAdapter** class. For a complete list of **MsDb2DataAdapter** class members, see MsDb2DataAdapter Members.

Public Properties

AcceptChangesDuringFill (inherited from **System.Data.Common.DataAdapter**)	Gets or sets a value indicating whether **AcceptChanges** is called on a **DataRow** after it is added to the **DataTable**.
Container (inherited from **System.ComponentModel.Component**)	Gets the **IContainer** that contains the **Component**.
ContinueUpdateOnError (inherited from **System.Data.Common.DataAdapter**)	Gets or sets a value that specifies whether to generate an exception, or the row in error when an error is encountered during a row update.
DeleteCommand	Gets or sets an SQL statement or stored procedure for deleting records from the data set.
InsertCommand	Gets or sets an SQL statement or stored procedure used to insert new records into the data source.
MissingMappingAction (inherited from **System.Data.Common.DataAdapter**)	Determines the action to take when incoming data does not have a matching table or column.
MissingSchemaAction (inherited from **System.Data.Common.DataAdapter**)	Determines the action to take when existing **DataSet** schema does not match incoming data.
SelectCommand	Gets or sets an SQL statement or stored procedure used to select records in the data source.
Site (inherited from **System.ComponentModel.Component**)	Gets or sets the **ISite** of the **Component**.
TableMappings (inherited from **System.Data.Common.DataAdapter**)	Gets a collection that provides the master mapping between a source table and a **DataTable**.
UpdateCommand	Gets or sets an SQL statement or stored procedure used to update records in the data source.

See Also

MsDb2DataAdapter Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataAdapter.DeleteCommand Property

Gets or sets an SQL statement or stored procedure for deleting records from the data set.

VB

```
Public Shadows Property DeleteCommand As MsDb2Command
[C#]
public new MsDb2Command DeleteCommand {get; set;}
[C++]
public: __property MsDb2Command* get_DeleteCommand();
public: __property void set_DeleteCommand(MsDb2Command*);
[JScript]
public hide function get DeleteCommand() : MsDb2Command;
public function set DeleteCommand(MsDb2Command);
```

Property Value

An **MsDb2Command** used during **Update** to delete records in the data source that correspond to deleted rows in the **DataSet**.

Remarks

During **Update**, if this property is not set and primary key information is present in the **DataSet**, the **DeleteCommand** can be generated automatically if you set the **SelectCommand** property and use the **MsDb2CommandBuilder**. Then, any additional commands that you do not set are generated by the **MsDb2CommandBuilder**. This generation logic requires key column information to be present in the **DataSet**.

When **DeleteCommand** is assigned to a previously created **MsDb2Command**, the **MsDb2Command** is not cloned. The **DeleteCommand** maintains a reference to the previously created **MsDb2Command** object.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataAdapter.InsertCommand Property

Gets or sets an SQL statement or stored procedure used to insert new records into the data source.

VB

```
Public Shadows Property InsertCommand As MsDb2Command
[C#]
public new MsDb2Command InsertCommand {get; set;}
[C++]
public: __property MsDb2Command* get_InsertCommand();
public: __property void set_InsertCommand(MsDb2Command*);
[JScript]
public hide function get InsertCommand() : MsDb2Command;
public function set InsertCommand(MsDb2Command);
```

Property Value

An **MsDb2Command** used during **Update** to insert records in the data source that correspond to new rows in the **DataSet**.

Remarks

During **Update**, if this property is not set and primary key information is present in the **DataSet**, the **InsertCommand** can be generated automatically if you set the **SelectCommand** property and use the **MsDb2CommandBuilder**. Then, any additional commands that you do not set are generated by the **MsDb2CommandBuilder**. This generation logic requires key column information to be present in the **DataSet**.

When **InsertCommand** is assigned to a previously created MsDb2Command, the **MsDb2Command** is not cloned. The **InsertCommand** maintains a reference to the previously created **MsDb2Command** object.

If execution of this command returns rows, these rows may be added to the **DataSet** depending on how you set the **UpdatedRowSource** property of the **MsDb2Command** object.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataAdapter.SelectCommand Property

Gets or sets an SQL statement or stored procedure used to select records in the data source. .

VB

```
Public Shadows Property SelectCommand As MsDb2Command
[C#]
public new MsDb2Command SelectCommand {get; set;}
[C++]
public: __property MsDb2Command* get_SelectCommand();
public: __property void set_SelectCommand(MsDb2Command*);
[JScript]
public hide function get SelectCommand() : MsDb2Command;
public function set SelectCommand(MsDb2Command);
```

Property Value

An **MsDb2Command** that is used during **Fill** to select records from data source for placement in the **DataSet**.

Remarks

When **SelectCommand** is assigned to a previously created **MsDb2Command**, the **MsDb2Command** is not cloned. The **SelectCommand** maintains a reference to the previously created **MsDb2Command** object.

If the **SelectCommand** does not return any rows, no tables are added to the **DataSet**, and no exception is raised.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataAdapter.UpdateCommand Property

Gets or sets an SQL statement or stored procedure used to update records in the data source.

VB

```
Public Shadows Property UpdateCommand As MsDb2Command
[C#]
public new MsDb2Command UpdateCommand {get; set;}
[C++]
public: __property MsDb2Command* get_UpdateCommand();
public: __property void set_UpdateCommand(MsDb2Command*);
[JScript]
public hide function get UpdateCommand() : MsDb2Command;
public function set UpdateCommand(MsDb2Command);
```

Property Value

An **MsDb2Command** used during **Update** to update records in the data source that correspond to modified rows in the **DataSet**.

Remarks

During **Update**, if this property is not set and primary key information is present in the **DataSet**, the **UpdateCommand** can be generated automatically if you set the **SelectCommand** property and use the **MsDb2CommandBuilder**. Then, any additional commands that you do not set are generated by the **MsDb2CommandBuilder**. This generation logic requires key column information to be present in the **DataSet**.

When **UpdateCommand** is assigned to a previously created **MsDb2Command**, the **MsDb2Command** is not cloned. The **UpdateCommand** maintains a reference to the previously created **MsDb2Command** object.

If execution of this command returns rows, these rows may be merged with the **DataSet** depending on how you set the **UpdatedRowSource** property of the **MsDb2Command** object.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataAdapter Methods

This section lists the methods of the **MsDb2DataAdapter** class. For a complete list of **MsDb2DataAdapter** class members, see MsDb2DataAdapter Members.

Public Methods

CreateRowUpdatedEvent	Creates a new instance of the MsDb2RowUpdatedEventArgs class.
CreateRowUpdatingEvent	Creates a new instance of the MsDb2RowUpdatingEventArgs class.
CreateObjRef (inherited from **System.MarshalByRefObject**)	Creates an object that contains all the relevant information required to generate a proxy used to communicate with a remote object.
Dispose (inherited from **System.ComponentModel.Component**)	Overloaded. Releases the resources used by the **Component**.
Equals (inherited from **System.Object**)	Overloaded. Determines whether two **Object** instances are equal.
Fill (inherited from **System.Data.Common.DbDataAdapter**)	Overloaded. Adds or refreshes rows in the **DataSet** to match those in an ADO **Recordset** or **Record** object.
FillSchema (inherited from **System.Data.Common.DbDataAdapter**)	Overloaded. Overridden. Adds a **DataTable** to a **DataSet** and configures the schema to match that in the data source.
GetFillParameters (inherited from **System.Data.Common.DbDataAdapter**)	Overridden. Gets the parameters set by the user when executing an SQL SELECT statement.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetLifetimeService (inherited from **System.MarshalByRefObject**)	Retrieves the current lifetime service object that controls the lifetime policy for this instance.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
InitializeLifetimeService (inherited from **System.MarshalByRefObject**)	Obtains a lifetime service object to control the lifetime policy for this instance.
OnRowUpdated	Raises the **RowUpdated** event using a **RowUpdatedEventArgs** object.
OnRowUpdating	Raises the **RowUpdating** event using a **RowUpdatingEventArgs**.
ToString (inherited from **System.ComponentModel.Component**)	Returns a String that represents the current **Object**.
Update (inherited from **System.Data.Common.DbDataAdapter**)	Overloaded. Calls the respective INSERT, UPDATE, or DELETE statements for each inserted, updated, or deleted row in the **DataSet**.

See Also

MsDb2DataAdapter Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataAdapter.CreateRowUpdatedEvent Method

Creates a new instance of the MsDb2RowUpdatedEventArgs class.

This member overrides **DbDataAdapter.CreateRowUpdatedEvent**.

VB

```
Overrides Protected Function CreateRowUpdatedEvent( _
   ByVal dataRow As DataRow, _
   ByVal command As IDbCommand, _
   ByVal statementType As StatementType, _
   ByVal tableMapping As DataTableMapping _
) As RowUpdatedEventArgs
[C#]
protected override RowUpdatedEventArgs CreateRowUpdatedEvent(
   DataRow dataRow,
   IDbCommand command,
   StatementType statementType,
   DataTableMapping tableMapping
);
[C++]
protected: RowUpdatedEventArgs* CreateRowUpdatedEvent(
   DataRow* dataRow,
   IDbCommand* command,
   StatementType statementType,
   DataTableMapping* tableMapping
);
[JScript]
protected override function CreateRowUpdatedEvent(
   dataRow : DataRow,
   command : IDbCommand,
   statementType : StatementType,
   tableMapping : DataTableMapping
) : RowUpdatedEventArgs;
```

Parameters

dataRow
The **DataRow** used to update the data source.
command
The command executed during the **Update**.
statementType
Whether the command is an UPDATE, INSERT, DELETE, or SELECT statement.
tableMapping
A **DataTAbleMapping** object.

Return Value

A new instance of the MsDb2RowUpdatedEventArgs class.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataAdapter.CreateRowUpdatingEvent Method

Creates a new instance of the MsDb2RowUpdatingEventArgs class.

This member overrides **DbDataAdapter.CreateRowUpdatingEvent**.

VB

```
Overrides Protected Function CreateRowUpdatingEvent( _
   ByVal dataRow As DataRow, _
   ByVal command As IDbCommand, _
   ByVal statementType As StatementType, _
   ByVal tableMapping As DataTableMapping _
) As RowUpdatingEventArgs
[C#]
protected override RowUpdatingEventArgs CreateRowUpdatingEvent(
   DataRow dataRow,
   IDbCommand command,
   StatementType statementType,
   DataTableMapping tableMapping
);
[C++]
protected: RowUpdatingEventArgs* CreateRowUpdatingEvent(
   DataRow* dataRow,
   IDbCommand* command,
   StatementType statementType,
   DataTableMapping* tableMapping
);
[JScript]
protected override function CreateRowUpdatingEvent(
   dataRow : DataRow,
   command : IDbCommand,
   statementType : StatementType,
   tableMapping : DataTableMapping
) : RowUpdatingEventArgs;
```

Parameters

dataRow
The **DataRow** that updates the data source.
command
The command to execute during the **Update**.
statementType
Whether the command is an UPDATE, INSERT, DELETE, or SELECT statement.
tableMapping
A **DataTableMapping** object.

Return Value

Creates a new instance of the MsDb2RowUpdatingEventArgs class.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataAdapter.OnRowUpdated Method

Raises the **RowUpdated** event using a **RowUpdatedEventArgs** object.

VB

```
Overrides Protected Sub OnRowUpdated( _
   ByVal value As RowUpdatedEventArgs _
)
[C#]
protected override void OnRowUpdated(
   RowUpdatedEventArgs value
);
[C++]
protected: void OnRowUpdated(
   RowUpdatedEventArgs* value
);
[JScript]
protected override function OnRowUpdated(
   value : RowUpdatedEventArgs
);
```

Parameters

value
A **RowUpdatedEventArgs** that contains the event data.

Remarks

Raising an event invokes the event handler through a delegate.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataAdapter.OnRowUpdating Method

Raises the **RowUpdating** event using a **RowUpdatingEventArgs**.

VB

```
Overrides Protected Sub OnRowUpdating( _
   ByVal value As RowUpdatingEventArgs _
)
[C#]
protected override void OnRowUpdating(
   RowUpdatingEventArgs value
);
[C++]
protected: void OnRowUpdating(
   RowUpdatingEventArgs* value
);
[JScript]
protected override function OnRowUpdating(
   value : RowUpdatingEventArgs
);
```

Parameters

value
A **RowUpdatingEventArgs** that contains the event data.

Remarks

Raising an event invokes the event handler through a delegate.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataAdapter Events

This section lists the events of the **MsDb2DataAdapter** class. For a complete list of **MsDb2DataAdapter** class members, see MsDb2DataAdapter Members.

Public Events

⚡Disposed (inherited from **System.ComponentModel.Component**)	Adds an event handler to listen to the **Disposed** event on the component.
⚡FillError (inherited from **System.Data.Common.DbDataAdapter**)	Occurs when an error occurs during a fill operation.
⚡RowUpdated	Occurs during **Update** after a command is executed against the data source. The attempt to update is made, so the event fires.
⚡RowUpdating	Occurs during **Update** before a command is executed against the data source. The attempt to update is made, so the event fires.

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MsDb2DataAdapter.RowUpdated Event

Occurs during **Update** after a command is executed against the data source. The attempt to update is made, so the event fires.

VB

```
Public Event RowUpdated As MsDb2RowUpdatedEventHandler
[C#]
public event MsDb2RowUpdatedEventHandler RowUpdated;
[C++]
public: __event MsDb2RowUpdatedEventHandler* RowUpdated;
```

[JScript] In JScript, you can handle the events defined by a class, but you cannot define your own.

Event Data

The event handler receives an argument of type MsDb2RowUpdatedEventArgs containing data related to this event. The following **MsDb2RowUpdatedEventArgs** properties provide information specific to this event.

Property	Description
Command	Gets the MsDb2Command executed when Update is called.
Errors (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets any errors generated by the .NET data provider when the **Command** was executed.
RecordsAffected (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the number of rows changed, inserted, or deleted by execution of the SQL statement.
Row (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the **DataRow** sent through an **Update**.
StatementType (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the type of SQL statement executed.
Status (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the **UpdateStatus** of the **Command**.
TableMapping (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the **DataTableMapping** sent through an **Update**.

Remarks

When using **Update**, there are two events that occur per data row updated. The order of execution is as follows:

1. The values in the **DataRow** are moved to the parameter values.
2. The **OnRowUpdating** event is raised.
3. The command executes.
4. If the command is set to **FirstReturnedRecord**, then the first returned result is placed in the **DataRow**.
5. If there are output parameters, they are placed in the **DataRow**.
6. The **OnRowUpdated** event is raised.
7. **AcceptChanges** is called.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataAdapter.RowUpdating Event

Occurs during **Update** before a command is executed against the data source. The attempt to update is made, so the event fires.

VB

```
Public Event RowUpdating As MsDb2RowUpdatingEventHandler
[C#]
public event MsDb2RowUpdatingEventHandler RowUpdating;
[C++]
public: __event MsDb2RowUpdatingEventHandler* RowUpdating;
```

[JScript] In JScript, you can handle the events defined by a class, but you cannot define your own.

Event Data

The event handler receives an argument of type MsDb2RowUpdatingEventArgs containing data related to this event. The following **MsDb2RowUpdatingEventArgs** properties provide information specific to this event.

Property	**Description**
Command	Gets or sets the **MsDb2Command** to execute when performing the Update.
Errors (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets any errors generated by the .NET data provider when the **Command** executes.
Row (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **DataRow** to send through an **Update**.
StatementType (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the type of SQL statement to execute.
Status (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **UpdateStatus** of the **Command**.
TableMapping (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **DataTableMapping** to send through the **Update**.

Remarks

When using **Update**, there are two events that occur per data row updated. The order of execution is as follows:

1. The values in the **DataRow** are moved to the parameter values.
2. The **OnRowUpdating** event is raised.
3. The command executes.
4. If the command is set to **FirstReturnedRecord**, then the first returned result is placed in the **DataRow**.
5. If there are output parameters, they are placed in the **DataRow**.
6. The **OnRowUpdated** event is raised.
7. **AcceptChanges** is called.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataAdapter Class | MsDb2DataAdapter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader Class

Describes a server-side forward-only cursor implementation that inherits from the **IDataReader** and **IDataRecord** interfaces.

For a list of all members of this type, see MsDb2DataReader Members.

System.Object
  Microsoft.HostIntegration.MsDb2Client.MsDb2DataReader

VB

```
Public Class MsDb2DataReader
   Implements IDataReader, IDisposable, IDataRecord
[C#]
public class MsDb2DataReader : IDataReader, IDisposable,
   IDataRecord
[C++]
public __gc class MsDb2DataReader : public IDataReader,
   IDisposable, IDataRecord
[JScript]
public class MsDb2DataReader implements IDataReader, IDisposable,
   IDataRecord
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Remarks

To create an **MsDb2DataReader**, you must call MsDb2Command.ExecuteReader, rather than directly using a constructor.

Unlike other .NET providers, the Managed Provider for DB2 allows you to open multiple **MsDb2DataReaders** on a single MsDb2Connection.

Changes made to a **ResultSet** by another process or thread while data is being read may be visible to the user of the **MsDb2DataReader**. However, the precise behavior is timing-dependent.

IsClosed and RecordsAffected are the only properties that you can call after the **MsDb2DataReader** is closed. Though the **RecordsAffected** property may be accessed at any time while the **MsDb2DataReader** exists, always call Close before returning the value of **RecordsAffected** to ensure an accurate return value.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003 , Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader Members

MsDb2DataReader overview

Public Properties

Depth	Gets a value indicating the depth of nesting for the current row.
FieldCount	Gets the number of columns in the current row.
IsClosed	Gets a value that indicates whether the data reader is closed.
Item	Overloaded. Gets the value of a column in its native format. In Microsoft® Visual C#®, this property is the indexer for the **MsDb2DataReader** class.
RecordsAffected	Gets the number of rows changed, inserted, or deleted by execution of the SQL statement.

Public Methods

Close	Closes the current instance.
Dispose	This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.
Equals (inherited from **System.Object**)	Determines whether two **Object** instances are equal.
GetBoolean	Gets the value of the specified column as a Boolean.
GetByte	Gets the value of the specified column as a byte.
GetBytes	Gets a stream of bytes from the specified column offset into the buffer as an array starting at the given buffer offset.
GetChar	Gets the value of the specified column as a character.
GetChars	Gets a stream of characters from the specified column offset into the buffer as an array starting at the given buffer offset.
GetData	This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.
GetDataTypeName	Gets the name of the source data type.
GetDateTime	Gets the value of the specified column as a **DateTime** object.
GetDecimal	Gets the value of the specified column as a **Decimal** object.
GetDouble	Gets the value of the specified column as a double-precision floating point number.
GetFieldType	Gets the **Type** that is the data type of the object.
GetFloat	Gets the value of the specified column as a single-precision floating point number.
GetGuid	Gets the value of the specified column as a globally-unique identifier (GUID).
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetInt16	Gets the value of the specified column as a 16-bit signed integer.
GetInt32	Gets the value of the specified column as a 32-bit signed integer.
GetInt64	Gets the value of the specified column as a 64-bit signed integer.
GetName	Gets the name of the specified column.
GetOrdinal	Gets the column ordinal, given the name of the column.
GetSchemaTable	Returns a **DataTable** that describes the column metadata of the **MsDb2DataReader**.
GetString	Gets the value of the specified column as a string.
GetTimeSpan	Gets the value of the specified column as a **TimeSpan** object.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
GetValue	Gets the value of the column at the specified ordinal in its native format.
GetValues	Gets all the attribute columns in the current row.
IsDBNull	Gets a value indicating whether the column contains nonexistent or missing values.
NextResult	Advances the data reader to the next result, when reading the results of batch SQL statements.
Read	Advances the **MsDb2DataReader** to the next record

ToString (inherited from **System.Object**)	Returns a String that represents the current **Object**.

Protected Methods

Finalize (inherited from **System.Object**)	Frees resources before the **MsDb2DataReader** is reclaimed by the Garbage Collector. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2DataReader Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataReader Properties

This section lists the properties of the **MsDb2DataReader** class. For a complete list of **MsDb2DataReader** class members, see MsDb2DataReader Members.

Public Properties

Depth	Gets a value indicating the depth of nesting for the current row.
FieldCount	Gets the number of columns in the current row.
IsClosed	Indicates whether the data reader is closed.
Item	Overloaded. Gets the value of a column in its native format. In Microsoft® Visual C#®, this property is the indexer for the **MsDb2DataReader** class.
RecordsAffected	Gets the number of rows changed, inserted, or deleted by execution of the SQL statement.

See Also

MsDb2DataReader Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataReader.Depth Property

Gets a value indicating the depth of nesting for the current row.

VB

```
Public Overridable ReadOnly Property Depth As Integer  Implements _
   IDataReader.Depth
[C#]
public virtual int Depth {get;}
[C++]
public: __property virtual int get_Depth();
[JScript]
public function get Depth() : int;
```

Property Value

The depth of nesting for the current row.

Implements

IDataReader.Depth

Remarks

The outermost table has a length of zero.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.FieldCount Property

Gets the number of columns in the current row.

VB

```
Public Overridable ReadOnly Property FieldCount As Integer  _
   Implements IDataRecord.FieldCount
[C#]
public virtual int FieldCount {get;}
[C++]
public: __property virtual int get_FieldCount();
[JScript]
public function get FieldCount() : int;
```

Property Value

When not positioned in a valid **RecordSet**, 0; otherwise the number of columns in the current record. The default is -1.

Implements

IDataRecord.FieldCount

Remarks

After executing a query that does not return rows, **FieldCount** returns 0.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.IsClosed Property

Gets a value that indicates whether the data reader is closed.

VB

```
Public Overridable ReadOnly Property IsClosed As Boolean  _
   Implements IDataReader.IsClosed
[C#]
public virtual bool IsClosed {get;}
[C++]
public: __property virtual bool get_IsClosed();
[JScript]
public function get IsClosed() : Boolean;
```

Property Value

true if the **MsDb2DbDataReader** is closed; otherwise, **false**.

Implements

IDataReader.IsClosed

Remarks

IsClosed and **RecordsAffected** are the only properties that you can call after the **MsDb2DataReader** is closed.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataReader.Item Property

Gets the value of a column in its native format.

[C#] In C#, this property is the indexer for the **MsDb2DataReader** class.

Overload List

[Visual Basic]
Overloads Public Overridable Default ReadOnly Property Item(System.Int32) As Object Implements IDataRecord.Item

[C#] public virtual object this[System.Int32] {get;}

[C++] public: __property virtual Object* get_Item(System.Int32);

[JScript] MsDb2DataReader.Item (System.Int32)

[Visual Basic]
Overloads Public Overridable Default ReadOnly Property Item(System.String) As Object Implements IDataRecord.Item

[C#] public virtual object this[System.String] {get;}

[C++] public: __property virtual Object* get_Item(System.String);

[JScript] MsDb2DataReader.Item (System.String)

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataReader.Item Property (System.Int32)

Gets the value of the specified column in its native format given the column ordinal.

[C#] In C#, this property is the indexer for the **MsDb2DataReader** class.

VB

```
Overloads Public Overridable Default ReadOnly Property Item( _
   ByVal i As Integer _
) As Object  Implements IDataRecord.Item
[C#]
public virtual object this[
   int i
] {get;}
[C++]
public: __property virtual Object* get_Item(
   int i
);
[JScript]
returnValue = MsDb2DataReaderObject.Item(i);
-or-
returnValue = MsDb2DataReaderObject(i);
```

[JScript] In JScript, you can use the default indexed properties defined by a type, but you cannot explicitly define your own. However, specifying the **expando** attribute on a class automatically provides a default indexed property whose type is **Object** and whose index type is **String**.

Arguments [JScript]

i
  The column ordinal.

Parameters [Visual Basic, C#, C++]

i
  The column ordinal.

Property Value

The value of the specified column in its native format.

Implements

IDataRecord.Item

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2DataReader.Item Overload List

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MsDb2DataReader.Item Property (System.String)

Gets the value of the specified column in its native format given the column name.

[C#] In C#, this property is the indexer for the **MsDb2DataReader** class.

VB

```
Overloads Public Overridable Default ReadOnly Property Item( _
   ByVal name As String _
) As Object  Implements IDataRecord.Item
[C#]
public virtual object this[
   string name
] {get;}
[C++]
public: __property virtual Object* get_Item(
   String* name
);
[JScript]
returnValue = MsDb2DataReaderObject.Item(name);
-or-
returnValue = MsDb2DataReaderObject(name);
```

[JScript] In JScript, you can use the default indexed properties defined by a type, but you cannot explicitly define your own. However, specifying the **expando** attribute on a class automatically provides a default indexed property whose type is **Object** and whose index type is **String**.

Arguments [JScript]

name
The column name.

Parameters [Visual Basic, C#, C++]

name
The column name.

Property Value

The value of the specified column in its native format.

Implements

IDataRecord.Item

Remarks

A case-sensitive lookup is performed first. If it fails, a second case-insensitive search is made.

This method is kana-width insensitive.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2DataReader.Item Overload List

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MsDb2DataReader.RecordsAffected Property

Gets the number of rows changed, inserted, or deleted by execution of the SQL statement.

VB

```
Public Overridable ReadOnly Property RecordsAffected As Integer  _
   Implements IDataReader.RecordsAffected
[C#]
public virtual int RecordsAffected {get;}
[C++]
public: __property virtual int get_RecordsAffected();
[JScript]
public function get RecordsAffected() : int;
```

Implements

IDataReader.RecordsAffected

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader Methods

This section lists the methods of the **MsDb2DataReader** class. For a complete list of **MsDb2DataReader** class members, see MsDb2DataReader Members.

Public Methods

Close	Closes the **MsDb2DataReader** object.
Dispose	This member supports the .NET Framework infrastructure and is not intended to be used directly from your code
Equals (inherited from **System.Object**)	Determines whether two **Object** instances are equal.
GetBoolean	Gets the value of the specified column as a **Boolean**.
GetByte	Gets the value of the specified column as a byte.
GetBytes	Reads a stream of bytes from the specified column offset into the buffer as an array starting at the given buffer offset.
GetChar	Gets the value of the specified column as a character.
GetChars	Reads a stream of characters from the specified column offset into the buffer as an array starting at the given buffer offset.
GetData	This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.
GetDataTypeName	Gets the name of the source data type.
GetDateTime	Gets the value of the specified column as a **DateTime** object.
GetDecimal	Gets the value of the specified column as a **Decimal** object.
GetDouble	Gets the value of the specified column as a double-precision floating point number.
GetFieldType	Gets the Type that is the data type of the object.
GetFloat	Gets the value of the specified column as a single-precision floating point number.
GetGuid	Gets the value of the specified column as a globally unique identifier (GUID).
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetInt16	Gets the value of the specified column as a 16-bit signed integer.
GetInt32	Gets the value of the specified column as a 32-bit signed integer.
GetInt64	Gets the value of the specified column as a 64-bit signed integer.
GetName	Gets the name of the specified column.
GetOrdinal	Gets the column ordinal, given the name of the column.
GetSchemaTable	Returns a DataTable that describes the column metadata of the **MsDb2DataReader**.
GetString	Gets the value of the specified column as a string.
GetTimeSpan	Gets the value of the specified column as a **TimeSpan** object.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
GetValue	Gets the value of the column at the specified ordinal in its native format.
GetValues	Gets all the attribute columns in the current row.
IsDBNull	Gets a value indicating whether the column contains nonexistent or missing values.
NextResult	Advances the data reader to the next result, when reading the results of batch SQL statements.
Read	Advances the **MsDb2DataReader** to the next record.
ToString (inherited from **System.Object**)	Returns a **String** that represents the current **Object**.

See Also

MsDb2DataReader Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataReader.Close Method

Closes the **MsDb2DataReader** object.

VB

```
Public Overridable Sub Close() Implements IDataReader.Close
[C#]
public virtual void Close();
[C++]
public: virtual void Close();
[JScript]
public function Close();
```

Implements

IDataReader.Close

Remarks

You must explicitly call the Close method when you are through using the **MsDb2DataReader** to use the associated MsDb2Connection for any other purpose.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.Dispose Method

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Public Overridable Sub Dispose() Implements IDisposable.Dispose
[C#]
public virtual void Dispose();
[C++]
public: virtual void Dispose();
[JScript]
public function Dispose();
```

Implements

IDisposable.Dispose

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetBoolean Method

Gets the value of the specified column as a **Boolean**.

VB

```
Public Overridable Function GetBoolean( _
   ByVal i As Integer _
) As Boolean Implements IDataRecord.GetBoolean
[C#]
public virtual bool GetBoolean(
   int i
);
[C++]
public: virtual bool GetBoolean(
   int i
);
[JScript]
public function GetBoolean(
   i : int
) : Boolean;
```

Parameters

i

The zero-based column ordinal.

Return Value

Implements

IDataRecord.GetBoolean

Remarks

No conversions are performed, therefore the data retrieved must already be a **Boolean** or an exception is generated.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetByte Method

Gets the value of the specified column as a byte.

VB

```
Public Overridable Function GetByte( _
   ByVal i As Integer _
) As Byte Implements IDataRecord.GetByte
[C#]
public virtual byte GetByte(
   int i
);
[C++]
public: virtual unsigned char GetByte(
   int i
);
[JScript]
public function GetByte(
   i : int
) : Byte;
```

Parameters

i
The zero-based column ordinal.

Return Value

The value of the specified column as a byte.

Implements

IDataRecord.GetByte

Remarks

No conversions are performed; therefore the data retrieved must already be a byte.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetBytes Method

Reads a stream of bytes from the specified column offset into the buffer as an array starting at the given buffer offset.

VB

```
Public Overridable Function GetBytes( _
   ByVal i As Integer, _
   ByVal fieldOffset As Long, _
   ByVal buffer() As Byte, _
   ByVal bufferoffset As Integer, _
   ByVal length As Integer _
) As Long Implements IDataRecord.GetBytes
[C#]
public virtual long GetBytes(
   int i,
   long fieldOffset,
   byte[] buffer,
   int bufferoffset,
   int length
);
[C++]
public: virtual __int64 GetBytes(
   int i,
   __int64 fieldOffset,
   unsigned char buffer __gc[],
   int bufferoffset,
   int length
);
[JScript]
public function GetBytes(
   i : int,
   fieldOffset : long,
   buffer : Byte[],
   bufferoffset : int,
   length : int
) : long;
```

Parameters

i
The zero-based column ordinal.
fieldOffset
The index within the field from which to begin the read operation.
buffer
The buffer into which to read the stream of bytes.
bufferoffset
The index for buffer to begin the read operation.
length
The maximum length to copy into the buffer.

Return Value

The actual number of bytes read.

Implements

IDataRecord.GetBytes

Remarks

GetBytes returns the number of available bytes in the field. In most cases this is the exact length of the field. However, the number returned may be less than the true length of the field if **GetBytes** has already been used to obtain bytes from the field. This may be the case, for example, when the MsDb2DataReader is reading a large data structure into a buffer. For more information, see the **SequentialAccess** setting for **CommandBehavior**.

If you pass a buffer that is a null reference (**Nothing** in Visual Basic), **GetBytes** returns the length of the field in bytes.

No conversions are performed; therefore the data retrieved must already be a byte array.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetChar Method

Gets the value of the specified column as a character.

VB

```
Public Overridable Function GetChar( _
   ByVal i As Integer _
) As Char Implements IDataRecord.GetChar
[C#]
public virtual char GetChar(
   int i
);
[C++]
public: virtual __wchar_t GetChar(
   int i
);
[JScript]
public function GetChar(
   i : int
) : Char;
```

Parameters

i

The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetChar

Remarks

No conversions are performed; the data retrieved must already be a character.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetChars Method

Reads a stream of characters from the specified column offset into the buffer as an array starting at the given buffer offset.

VB

```
Public Overridable Function GetChars( _
   ByVal i As Integer, _
   ByVal fieldoffset As Long, _
   ByVal buffer() As Char, _
   ByVal bufferoffset As Integer, _
   ByVal length As Integer _
) As Long Implements IDataRecord.GetChars
[C#]
public virtual long GetChars(
   int i,
   long fieldoffset,
   char[] buffer,
   int bufferoffset,
   int length
);
[C++]
public: virtual __int64 GetChars(
   int i,
   __int64 fieldoffset,
   __wchar_t buffer __gc[],
   int bufferoffset,
   int length
);
[JScript]
public function GetChars(
   i : int,
   fieldoffset : long,
   buffer : Char[],
   bufferoffset : int,
   length : int
) : long;
```

Parameters

i
The zero-based column ordinal.
fieldoffset
The index within the row from which to begin the read operation.
buffer
The buffer into which to copy data.
bufferoffset
The index for buffer to begin the read operation.
length
The number of characters to read.

Return Value

The actual number of characters read.

Implements

IDataRecord.GetChars

Remarks

GetChars returns the number of available characters in the field. In most cases this is the exact length of the field. However, the number returned may be less than the true length of the field if **GetChars** has already been used to obtain characters from the field. This may be the case, for example, when the **MsDb2DataReader** is reading a large data structure into a buffer. For more information, see the **SequentialAccess** setting for **CommandBehavior**.

If you pass a buffer that is a null reference (**Nothing** in Visual Basic), **GetChars** returns the length of the field in characters.

No conversions are performed; therefore the data retrieved must already be a character array.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetData Method

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Public Function GetData( _
   ByVal i As Integer _
) As MsDb2DataReader
[C#]
public MsDb2DataReader GetData(
   int i
);
[C++]
public: MsDb2DataReader* GetData(
   int i
);
[JScript]
public function GetData(
   i : int
) : MsDb2DataReader;
```

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataReader.GetDataTypeName Method

Gets the name of the source data type.

VB

```
Public Overridable Function GetDataTypeName( _
   ByVal i As Integer _
) As String Implements IDataRecord.GetDataTypeName
[C#]
public virtual string GetDataTypeName(
   int i
);
[C++]
public: virtual String* GetDataTypeName(
   int i
);
[JScript]
public function GetDataTypeName(
   i : int
) : String;
```

Parameters

i
The zero-based column ordinal.

Return Value

The name of the host data type.

Implements

IDataRecord.GetDataTypeName

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetDateTime Method

Gets the value of the specified column as a **DateTime** object.

VB

```
Public Overridable Function GetDateTime( _
   ByVal i As Integer _
) As DateTime Implements IDataRecord.GetDateTime
[C#]
public virtual DateTime GetDateTime(
   int i
);
[C++]
public: virtual DateTime GetDateTime(
   int i
);
[JScript]
public function GetDateTime(
   i : int
) : DateTime;
```

Parameters

i

The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetDateTime

Remarks

No conversions are performed; the data retrieved must already be a **DateTime** object.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetDecimal Method

Gets the value of the specified column as a **Decimal** object.

VB

```
Public Overridable Function GetDecimal( _
   ByVal i As Integer _
) As Decimal Implements IDataRecord.GetDecimal
[C#]
public virtual decimal GetDecimal(
   int i
);
[C++]
public: virtual Decimal GetDecimal(
   int i
);
[JScript]
public function GetDecimal(
   i : int
) : Decimal;
```

Parameters

i
  The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetDecimal

Remarks

No conversions are performed; the data retrieved must already be a **Decimal** object.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2DataReader.GetDouble Method

Gets the value of the specified column as a double-precision floating point number.

VB

```
Public Overridable Function GetDouble( _
   ByVal i As Integer _
) As Double Implements IDataRecord.GetDouble
[C#]
public virtual double GetDouble(
   int i
);
[C++]
public: virtual double GetDouble(
   int i
);
[JScript]
public function GetDouble(
   i : int
) : double;
```

Parameters

i

The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetDouble

Remarks

No conversions are performed; the data retrieved must already be a double-precision floating point number.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2DataReader.GetFieldType Method

Gets the **Type** that is the data type of the object.

VB

```
Public Overridable Function GetFieldType( _
   ByVal i As Integer _
) As Type Implements IDataRecord.GetFieldType
[C#]
public virtual Type GetFieldType(
   int i
);
[C++]
public: virtual Type* GetFieldType(
   int i
);
[JScript]
public function GetFieldType(
   i : int
) : Type;
```

Parameters

i

The zero-based column ordinal.

Return Value

The **Type** that is the data type of the object.

Implements

IDataRecord.GetFieldType

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetFloat Method

Gets the value of the specified column as a single-precision floating point number.

VB

```
Public Overridable Function GetFloat( _
   ByVal i As Integer _
) As Single Implements IDataRecord.GetFloat
[C#]
public virtual float GetFloat(
   int i
);
[C++]
public: virtual float GetFloat(
   int i
);
[JScript]
public function GetFloat(
   i : int
) : float;
```

Parameters

i
The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetFloat

Remarks

No conversions are performed; the data retrieved must already be a single-precision floating point number.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetGuid Method

Gets the value of the specified column as a globally unique identifier (GUID).

VB

```
Public Overridable Function GetGuid( _
   ByVal i As Integer _
) As Guid Implements IDataRecord.GetGuid
[C#]
public virtual Guid GetGuid(
   int i
);
[C++]
public: virtual Guid GetGuid(
   int i
);
[JScript]
public function GetGuid(
   i : int
) : Guid;
```

Parameters

i
The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetGuid

Remarks

No conversions are performed; the data retrieved must already be a globally unique identifier.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetInt16 Method

Gets the value of the specified column as a 16-bit signed integer.

VB

```
Public Overridable Function GetInt16( _
   ByVal i As Integer _
) As Short Implements IDataRecord.GetInt16
[C#]
public virtual short GetInt16(
   int i
);
[C++]
public: virtual short GetInt16(
   int i
);
[JScript]
public function GetInt16(
   i : int
) : Int16;
```

Parameters

i

The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetInt16

Remarks

No conversions are performed; the data retrieved must already be a 16-bit signed integer.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetInt32 Method

Gets the value of the specified column as a 32-bit signed integer.

VB

```
Public Overridable Function GetInt32( _
   ByVal i As Integer _
) As Integer Implements IDataRecord.GetInt32
[C#]
public virtual int GetInt32(
   int i
);
[C++]
public: virtual int GetInt32(
   int i
);
[JScript]
public function GetInt32(
   i : int
) : int;
```

Parameters

i

The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetInt32

Remarks

No conversions are performed; the data retrieved must already be a 32-bit signed integer.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetInt64 Method

Gets the value of the specified column as a 64-bit signed integer.

VB

```
Public Overridable Function GetInt64( _
   ByVal i As Integer _
) As Long Implements IDataRecord.GetInt64
[C#]
public virtual long GetInt64(
   int i
);
[C++]
public: virtual __int64 GetInt64(
   int i
);
[JScript]
public function GetInt64(
   i : int
) : long;
```

Parameters

i

The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetInt64

Remarks

No conversions are performed; the data retrieved must already be a 64-bit signed integer.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetName Method

Gets the name of the specified column.

VB

```
Public Overridable Function GetName( _
   ByVal i As Integer _
) As String Implements IDataRecord.GetName
[C#]
public virtual string GetName(
   int i
);
[C++]
public: virtual String* GetName(
   int i
);
[JScript]
public function GetName(
   i : int
) : String;
```

Parameters

i
The zero-based column ordinal.

Return Value

The name of the specified column.

Implements

IDataRecord.GetName

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetOrdinal Method

Gets the column ordinal, given the name of the column.

VB

```
Public Overridable Function GetOrdinal( _
   ByVal name As String _
) As Integer Implements IDataRecord.GetOrdinal
[C#]
public virtual int GetOrdinal(
   string name
);
[C++]
public: virtual int GetOrdinal(
   String* name
);
[JScript]
public function GetOrdinal(
   name : String
) : int;
```

Parameters

name
The name of the column.

Return Value

The zero-based column ordinal.

Implements

IDataRecord.GetOrdinal

Remarks

GetOrdinal performs a case-sensitive lookup first. If it fails, a second case-insensitive search is made.

GetOrdinal is kana-width insensitive.

Because ordinal-based lookups are more efficient than named lookups, it is inefficient to call **GetOrdinal** within a loop. Save time by calling **GetOrdinal** once and assigning the results to an integer variable for use within the loop.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetSchemaTable Method

Returns a data table that describes the column metadata of the **MsDb2DataReader**.

VB

```
Public Overridable Function GetSchemaTable() As DataTable _
   Implements _
   IDataReader.GetSchemaTable
[C#]
public virtual DataTable GetSchemaTable();
[C++]
public: virtual DataTable* GetSchemaTable();
[JScript]
public function GetSchemaTable() : DataTable;
```

Implements

IDataReader.GetSchemaTable

Remarks

The **GetSchemaTable** method maps to the OLE DB IColumnsRowset::GetColumnsRowset method, and returns metadata about each column in the following order:

DataReader Column	OLE DB Column ID	Description
ColumnName	DBCOLUMN_NAME	The name of the column; this might not be unique. If this cannot be determined, a null value is returned. This name always reflects the most recent renaming of the column in the current view or command text.
ColumnOrdinal	DBCOLUMN_NUMBER	The ordinal of the column. This is zero for the bookmark column of the row, if any. Other columns are numbered starting with one. This column cannot contain a null value.
ColumnSize	DBCOLUMN_COLUMNSIZE	The maximum possible length of a value in the column. For columns that use a fixed-length data type, this is the size of the data type.
NumericPrecision	DBCOLUMN_PRECISION	If **DbType** is a numeric data type, this is the maximum precision of the column. The precision of columns with a data type of DBTYPE_DECIMAL or DBTYPE_NUMERIC depends on the definition of the column. If DbType is not a numeric data type, this is a null value.
NumericScale	DBCOLUMN_SCALE	If **DbType** is DBTYPE_DECIMAL or DBTYPE_NUMERIC, this is the number of digits to the right of the decimal point. Otherwise, this is a null value.
DataType	None	Maps to the .NET Framework type of the column.
ProviderType	DBCOLUMN_TYPE	The indicator of the column's data type. If the data type of the column varies from row to row, this must be DBTYPE_VARIANT. This column cannot contain a null value.
IsLong	DBCOLUMNFLAGS_ISLONG	The provider sets DBCOLUMNFLAGS_ISLONG if the column contains a Binary Long Object (BLOB) that contains very long data. The definition of very long data is provider-specific. The setting of this flag corresponds to the value of the IS_LONG column in the PROVIDER_TYPES rowset for the data type.

AllowDBNull	DBCOLUMNFLAGS_ISNULLABLE	The provider sets DBCOLUMNFLAGS_ISNULLABLE if the consumer can set the column to a null value, or if the provider cannot determine whether or not the consumer can set the column to a null value. A column may contain null values, even if it cannot be set to a null value.
IsReadOnly	DBCOLUMNFLAGS_WRITE	**true** if the column can be modified; otherwise **false**. The column is assumed to be writable if the provider has set either the DBCOLUMNFLAGS_WRITE or DBCOLUMNFLAGS_WRITEUNKNOWN flag.
IsRowVersion	DBCOLUMNFLAGS_ISROWID	The provider sets DBCOLUMNFLAGS_ISROWID if the column contains a persistent row identifier that cannot be written to, and has no meaningful value except to identity the row.
IsUnique	DBCOLUMN_ISUNIQUE	VARIANT_TRUE: No two rows in the base table-the table returned in **BaseTableName**-can have the same value in this column. **IsUnique** is guaranteed to be VARIANT_TRUE if the column constitutes a key by itself or if there is a constraint of type UNIQUE that applies only to this column. VARIANT_FALSE: The column can contain duplicate values in the base table. The default of this column is VARIANT_FALSE.
IsKey	DBCOLUMN_KEYCOLUMN	VARIANT_TRUE: The column is one of a set of columns in the rowset that, taken together, uniquely identify the row. The set of columns with **IsKey** set to VARIANT_TRUE must uniquely identify a row in the rowset. There is no requirement that this set of columns is a minimal set of columns. This set of columns may be generated from a base table primary key, a unique constraint or a unique index. VARIANT_FALSE-The column is not required to uniquely identify the row.
IsAutoIncrement	DBCOLUMN_ISAUTOINCREMENT	VARIANT_TRUE: The column assigns values to new rows in fixed increments. VARIANT_FALSE: The column does not assign values to new rows in fixed increments. The default of this column is VARIANT_FALSE.
BaseSchemaName	DBCOLUMN_BASESCHEMANAME	The name of the schema in the data store that contains the column. A null value if the base schema name cannot be determined. The default of this column is a null value.
BaseCatalogName	DBCOLUMN_BASECATALOGNAME	The name of the catalog in the data store that contains the column. A null value if the base catalog name cannot be determined. The default of this column is a null value.
BaseTableName	DBCOLUMN_BASETABLENAME	The name of the table or view in the data store that contains the column. A null value if the base table name cannot be determined. The default of this column is a null value.
BaseColumnName	DBCOLUMN_BASECOLUMNNAME	The name of the column in the data store. This might be different than the column name returned in the **ColumnName** column if an alias was used. A null value if the base column name cannot be determined or if the rowset column is derived, but not identical to, a column in the data store. The default of this column is a null value.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataReader.GetString Method

Gets the value of the specified column as a string.

VB

```
Public Overridable Function GetString( _
   ByVal i As Integer _
) As String Implements IDataRecord.GetString
[C#]
public virtual string GetString(
   int i
);
[C++]
public: virtual String* GetString(
   int i
);
[JScript]
public function GetString(
   i : int
) : String;
```

Parameters

i

The zero-based column ordinal.

Return Value

The value of the specified column.

Implements

IDataRecord.GetString

Remarks

No conversions are performed; the data retrieved must already be a string.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetTimeSpan Method

Gets the value of the specified column as a **TimeSpan** object.

VB

```
Public Function GetTimeSpan( _
   ByVal i As Integer _
) As TimeSpan
[C#]
public TimeSpan GetTimeSpan(
   int i
);
[C++]
public: TimeSpan GetTimeSpan(
   int i
);
[JScript]
public function GetTimeSpan(
   i : int
) : TimeSpan;
```

Parameters

i
  The zero-based column ordinal.

Return Value

The value of the specified column.

Remarks

No conversions are performed; the data retrieved must already be a **TimeSpan** object.

Call **IsDBNull** to check for null values before calling this method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.GetValue Method

Gets the value of the column at the specified ordinal in its native format.

VB

```
Public Overridable Function GetValue( _
   ByVal i As Integer _
) As Object Implements IDataRecord.GetValue
[C#]
public virtual object GetValue(
   int i
);
[C++]
public: virtual Object* GetValue(
   int i
);
[JScript]
public function GetValue(
   i : int
) : Object;
```

Parameters

i
  The zero-based column ordinal.

Return Value

The value to return.

Implements

IDataRecord.GetValue

Remarks

This method returns **DBNull** for null database columns.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataReader.GetValues Method

Gets all the attribute columns in the current row.

VB

```
Public Overridable Function GetValues( _
   ByVal values() As Object _
) As Integer Implements IDataRecord.GetValues
[C#]
public virtual int GetValues(
   object[] values
);
[C++]
public: virtual int GetValues(
   Object* values __gc[]
);
[JScript]
public function GetValues(
   values : Object[]
) : int;
```

Parameters

values

An array of **Object** into which to copy the attribute columns.

Return Value

The number of instances of **Object** in the array.

Implements

IDataRecord.GetValues

Remarks

For most applications, the **GetValues** method provides an efficient means for retrieving all columns, rather than retrieving each column individually.

You can pass an **Object** array that contains fewer than the number of columns contained in the resulting row. Only the amount of data the **Object** array holds is copied to the array. You can also pass an **Object** array whose length is more than the number of columns contained in the resulting row.

This method returns **DBNull** for null database columns.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.IDataRecord.GetData Method

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Private Function GetData( _
   ByVal ordinal As Integer _
) As IDataReader Implements IDataRecord.GetData
[C#]
IDataReader IDataRecord.GetData(
   int ordinal
);
[C++]
private: IDataReader* IDataRecord::GetData(
   int ordinal
);
[JScript]
private function IDataRecord.GetData(
   ordinal : int
) : IDataReader;
```

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2DataReader.IEnumerable.GetEnumerator Method

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Private Function GetEnumerator() As IEnumerator Implements _
IEnumerable.GetEnumerator
[C#]
IEnumerator IEnumerable.getEnumerator();
 [C++]
private: IEnumerator* IEnumerable::GetEnumerator();
 [JScript]
private function IEnumerable.GetEnumerator() : IEnumerator;
```

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.IsDBNull Method

Gets a value indicating whether the column contains nonexistent or missing values.

VB

```
Public Overridable Function IsDBNull( _
   ByVal i As Integer _
) As Boolean Implements IDataRecord.IsDBNull
[C#]
public virtual bool IsDBNull(
   int i
);
[C++]
public: virtual bool IsDBNull(
   int i
);
[JScript]
public function IsDBNull(
   i : int
) : Boolean;
```

Parameters

i
  The zero-based column ordinal.

Return Value

true if the specified column value is equivalent to **DBNull**; otherwise, **false**.

Implements

IDataRecord.IsDBNull

Remarks

Call this method to check for null column values before calling the typed get methods (for example, **GetByte**, **GetChar**, and so on) to avoid raising an error.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.NextResult Method

Advances the data reader to the next result, when reading the results of batch SQL statements.

VB

```
Public Overridable Function NextResult() As Boolean Implements _
   IDataReader.NextResult
[C#]
public virtual bool NextResult();
[C++]
public: virtual bool NextResult();
[JScript]
public function NextResult() : Boolean;
```

Return Value

true if there are more resultsets; otherwise, **false**.

Implements

IDataReader.NextResult

Remarks

Used to process multiple results, which can be generated by executing batch SQL statements.

By default, the data reader is positioned on the first result.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2DataReader.Read Method

Advances the **MsDb2DataReader** to the next record.

VB

```
Public Overridable Function Read() As Boolean Implements _
   IDataReader.Read
[C#]
public virtual bool Read();
[C++]
public: virtual bool Read();
[JScript]
public function Read() : Boolean;
```

Return Value

true if there are more rows; otherwise, **false**.

Implements

IDataReader.Read

Remarks

The default position of the **MsDb2DataReader** is prior to the first record. Therefore, you must call **Read** to begin accessing any data.

While the **MsDb2DataReader** is in use, the associated **MsDb2Connection** is busy serving it until you call **Close**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2DataReader Class | MsDb2DataReader Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Exception Class

The exception that is thrown when the underlying provider returns a warning or error for a DB2 data source. This class cannot be inherited.

For a list of all members of this type, see MsDb2Exception Members.

System.Object
  System.Exception
    Microsoft.HostIntegration.MsDb2Client.MsDb2Exception

VB

```
Public Class MsDb2Exception
   Inherits Exception
[C#]
public class MsDb2Exception : Exception
[C++]
public __gc class MsDb2Exception : public Exception
[JScript]
public class MsDb2Exception extends Exception
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Remarks

This class is created whenever the DB2 .NET Data Provider encounters an error generated from the server. (Client side errors are thrown as standard URT exceptions.) **MsDb2Exception** always contains at least one instance of **MsDb2Error**.

If the severity of the error is too great, the server may close the **MsDb2Connection**. However, the user can reopen the connection and continue.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Exception Members

MsDb2Exception overview

Public Properties

HelpLink (inherited from **System.Exception**)	Gets or sets a link to the help file associated with this exception.
InnerException (inherited from **System.Exception**)	Gets the **Exception** instance that caused the current exception.
Message (inherited from **System.Exception**)	Overridden. Gets the text describing the error.
Source (inherited from **System.Exception**)	Overridden. Gets the name of the DB2 provider that generated the error.
StackTrace (inherited from **System.Exception**)	Gets a string representation of the frames on the call stack at the time the current exception was thrown.
TargetSite (inherited from **System.Exception**)	Gets the method that throws the current exception.

Public Methods

Argument	Overloaded. Contains the arguments for the exception.
Equals (inherited from **System.Object**)	Overloaded. Determines whether two **Object** instances are equal.
GetBaseException (inherited from **System.Exception**)	When overridden in a derived class, returns the **Exception** that is the root cause of one or more subsequent exceptions.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetObjectData (inherited from **System.Exception**)	See **Exception.GetObjectData**.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
InvalidOperation	Describes the invalid operation that caused the exception to occur.
NullReference	Describes the null reference that caused the exception to occur.
Security	Describes the security violation that caused the exception to occur.
ToString	Overridden. Creates and returns a string representation of the current exception.
TypeLoad	Describes the type-loading failure that caused the exception.

See Also

MsDb2Exception Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Exception Methods

This section lists the methods of the **MsDb2Exception** class. For a complete list of **MsDb2Exception** class members, see MsDb2Exception Members.

Public Methods

Argument	Overloaded. Contains the arguments for the exception.
Equals (inherited from **System.Object**)	Overloaded. Determines whether two Object instances are equal.
GetBaseException (inherited from **System.Exception**)	When overridden in a derived class, returns the Exception that is the root cause of one or more subsequent exceptions.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetObjectData (inherited from **System.Exception**)	See **Exception.GetObjectData**.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
InvalidOperation	Describes the invalid operation that caused the exception to occur.
NullReference	Describes the null reference that caused the exception to occur.
Security	Describes the security violation that caused the exception to occur.
ToString	Overridden. Creates and returns a string representation of the current exception.
TypeLoad	Describes the type-loading failure that caused the exception.

See Also

MsDb2Exception Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Exception.Argument Method

Overload List

[Visual Basic] Overloads Protected Shared Function Argument(System.String, System.Exception) As Exception

[C#] protected static Exception Argument(System.String, System.Exception);

[C++] protected: static Exception* Argument(System.String, System.Exception);

[JScript] protected static function Argument(System.String, System.Exception) : Exception;

[Visual Basic] Overloads Protected Shared Function Argument(System.String, System.String) As Exception

[C#] protected static Exception Argument(System.String, System.String);

[C++] protected: static Exception* Argument(System.String, System.String);

[JScript] protected static function Argument(System.String, System.String) : Exception;

[Visual Basic]
Overloads Protected Shared Function Argument(System.String, System.String, System.Exception) As Exception

[C#] protected static Exception Argument(System.String, System.String, System.Exception);

[C++] protected: static Exception* Argument(System.String, System.String, System.Exception);

[JScript] protected static function Argument(System.String, System.String, System.Exception) : Exception;

See Also

MsDb2Exception Class | MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

MsDb2Exception.Argument Method (System.String, System.Exception)

Returns the arguments for the exception, using the error text and inner exception.

VB

```
Overloads Protected Shared Function Argument( _
   ByVal error As String, _
   ByVal inner As Exception _
) As Exception
[C#]
protected static Exception Argument(
   string error,
   Exception inner
);
[C++]
protected: static Exception* Argument(
   String* error,
   Exception* inner
);
[JScript]
protected static function Argument(
   error : String,
   inner : Exception
) : Exception;
```

Parameters

error
Text describing the error.
inner
The exception instance that caused the current exception.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Exception Class | MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Exception.Argument Overload List

MsDb2Exception.Argument Method (System.String, System.String)

Returns the arguments for the exception, using the error text and database parameter.

VB

```
Overloads Protected Shared Function Argument( _
   ByVal error As String, _
   ByVal parameter As String _
) As Exception
[C#]
protected static Exception Argument(
   string error,
   string parameter
);
[C++]
protected: static Exception* Argument(
   String* error,
   String* parameter
);
[JScript]
protected static function Argument(
   error : String,
   parameter : String
) : Exception;
```

Parameters

error
  Text describing the error.
parameter
  Database parameter in which the error occurred.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Exception Class | MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Exception.Argument Overload List

MsDb2Exception.Argument Method (System.String, System.String, System.Exception)

Returns the exception argument, using the error text, database parameter, and inner exception.

VB

```
Overloads Protected Shared Function Argument( _
   ByVal error As String, _
   ByVal parameter As String, _
   ByVal inner As Exception _
) As Exception
[C#]
protected static Exception Argument(
   string error,
   string parameter,
   Exception inner
);
[C++]
protected: static Exception* Argument(
   String* error,
   String* parameter,
   Exception* inner
);
[JScript]
protected static function Argument(
   error : String,
   parameter : String,
   inner : Exception
) : Exception;
```

Parameters

error
Text describing the error.
parameter
Database parameter in which the error occurred.
inner
The exception instance that caused the current exception.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Exception Class | MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Exception.Argument Overload List

MsDb2Exception.InvalidOperation Method

Describes the invalid operation that caused the exception to occur.

VB

```
Protected Shared Function InvalidOperation( _
   ByVal error As String, _
   ByVal inner As Exception _
) As Exception
[C#]
protected static Exception InvalidOperation(
   string error,
   Exception inner
);
[C++]
protected: static Exception* InvalidOperation(
   String* error,
   Exception* inner
);
[JScript]
protected static function InvalidOperation(
   error : String,
   inner : Exception
) : Exception;
```

Parameters

error
  Text describing the error.
inner
  The exception instance that caused the current exception.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Exception Class | MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Exception.NullReference Method

Describes the null reference that caused the exception to occur.

VB

```
Protected Shared Function NullReference( _
   ByVal error As String _
) As Exception
[C#]
protected static Exception NullReference(
   string error
);
[C++]
protected: static Exception* NullReference(
   String* error
);
[JScript]
protected static function NullReference(
   error : String
) : Exception;
```

Parameters

error
Text describing the error.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Exception Class | MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Exception.Security Method

Describes the security violation that caused the exception to occur.

VB

```
Protected Shared Function Security( _
   ByVal error As String, _
   ByVal inner As Exception _
) As Exception
[C#]
protected static Exception Security(
   string error,
   Exception inner
);
[C++]
protected: static Exception* Security(
   String* error,
   Exception* inner
);
[JScript]
protected static function Security(
   error : String,
   inner : Exception
) : Exception;
```

Parameters

error
  Text describing the error.
inner
  The exception instance that caused the current exception.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Exception Class | MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Exception.ToString Method

Creates and returns a string representation of the current exception.

VB

```
Overrides Public Function ToString() As String
[C#]
public override string ToString();
[C++]
public: String* ToString();
[JScript]
public override function ToString() : String;
```

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Exception Class | MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Exception.TypeLoad Method

Describes the type-loading failure that caused the exception.

VB

```
Protected Shared Function TypeLoad( _
   ByVal error As String _
) As Exception
[C#]
protected static Exception TypeLoad(
   string error
);
[C++]
protected: static Exception* TypeLoad(
   String* error
);
[JScript]
protected static function TypeLoad(
   error : String
) : Exception;
```

Parameters

error
Text describing the error.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Exception Class | MsDb2Exception Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkProperties Class

Abstract base class for defining network-specific connection properties to a DB2 host.

For a list of all members of this type, see MsDb2NetworkProperties Members.

System.Object
  Microsoft.HostIntegration.MsDb2Client.MsDb2NetworkProperties
    Microsoft.HostIntegration.MsDb2Client.MsDb2NetworkPropertiesAPPC
    Microsoft.HostIntegration.MsDb2Client.MsDb2NetworkPropertiesTCP

VB

```
MustInherit Public Class MsDb2NetworkProperties
[C#]
public abstract class MsDb2NetworkProperties
[C++]
public __gc __abstract class MsDb2NetworkProperties
[JScript]
public abstract class MsDb2NetworkProperties
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2NetworkProperties Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

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http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2NetworkProperties Members

MsDb2NetworkProperties overview

Public Methods

Equals (inherited from **System.Object**)	Determines whether two **Object** instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
ToString (inherited from **System.Object**)	Creates and returns a string representation of the current exception.

See Also

MsDb2NetworkProperties Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkProperties Constructor

Initializes a new instance of the MsDb2NetworkProperties class.

VB

```
Protected Sub New()
[C#]
protected MsDb2NetworkProperties();
[C++]
protected: MsDb2NetworkProperties();
[JScript]
protected function MsDb2NetworkProperties();
```

Remarks

This constructor is called by derived class constructors to initialize state in this type.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2NetworkProperties Class | MsDb2NetworkProperties Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkPropertiesAPPC Class

Defines the network-specific connection properties for connection to a DB2 host using the APPC protocol.

For a list of all members of this type, see MsDb2NetworkPropertiesAPPC Members.

System.Object
  Microsoft.HostIntegration.MsDb2Client.MsDb2NetworkProperties
    Microsoft.HostIntegration.MsDb2Client.MsDb2NetworkPropertiesAPPC

VB

```
NotInheritable Public Class MsDb2NetworkPropertiesAPPC
   Inherits MsDb2NetworkProperties
[C#]
public sealed class MsDb2NetworkPropertiesAPPC :
   MsDb2NetworkProperties
[C++]
public __gc __sealed class MsDb2NetworkPropertiesAPPC : public
   MsDb2NetworkProperties
[JScript]
public class MsDb2NetworkPropertiesAPPC extends
   MsDb2NetworkProperties
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server,

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2NetworkPropertiesAPPC Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2NetworkPropertiesAPPC Members

MsDb2NetworkPropertiesAPPC overview

Public Constructors

MsDb2NetworkPropertiesAPPC Constructor	Creates a new instance of the **MsDb2NetworkPropertiesAPPC** class.

Public Properties

APPCMode	Gets or sets the APPC mode to use.
LocalLU	Gets or sets the local LU alias for an APPC connection type to the remote host computer.
RemoteLU	Gets or sets the remote LU alias for an APPC connection type to the remote host computer.
TPName	Gets or sets the default transaction program name for the DB2 host server.

Public Methods

Equals (inherited from **System.Object**)	Determines whether two **Object** instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
ToString (inherited from **System.Object**)	Returns a String that represents the current **Object**.

Protected Methods

Finalize (inherited from **System.Object**)	Frees resources before the **Object** is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2NetworkPropertiesAPPC Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2NetworkPropertiesAPPC Constructor

Creates a new instance of the MsDb2NetworkPropertiesAPPC class.

VB

```
Public Sub New( _
   ByVal remoteLU As String, _
   ByVal localLU As String, _
   ByVal appcMode As String, _
   ByVal tpName As String _
)
[C#]
public MsDb2NetworkPropertiesAPPC(
   string remoteLU,
   string localLU,
   string appcMode,
   string tpName
);
[C++]
public: MsDb2NetworkPropertiesAPPC(
   String* remoteLU,
   String* localLU,
   String* appcMode,
   String* tpName
);
[JScript]
public function MsDb2NetworkPropertiesAPPC(
   remoteLU : String,
   localLU : String,
   appcMode : String,
   tpName : String
);
```

Parameters

remoteLU
  Remote LU alias for an APPC connection type to the remote host computer.
localLU
  Local LU alias for an APPC connection type to the remote host compute.
appcMode
  The APPC mode to use.
tpName
  Default transaction program name for the DB2 host server.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2NetworkPropertiesAPPC Class | MsDb2NetworkPropertiesAPPC Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkPropertiesAPPC Properties

This section lists the properties of the **MsDb2NetworkPropertiesAPPC** class. For a complete list of **MsDb2NetworkPropertiesAPPC** class members, see MsDb2NetworkPropertiesAPPC Members.

Public Properties

APPCMode	Gets or sets the APPC mode to use.
LocalLU	Gets or sets the local LU alias for an APPC connection type to the remote host computer.
RemoteLU	Gets or sets the remote LU alias for an APPC connection type to the remote host computer.
TPName	Gets or sets the default transaction program name for the DB2 host server.

MsDb2NetworkPropertiesAPPC.APPCMode Property

Gets or sets the APPC mode to use.

VB

```
Public Property APPCMode As String
[C#]
public string APPCMode {get; set;}
[C++]
public: __property String* get_APPCMode();
public: __property void set_APPCMode(String*);
[JScript]
public function get APPCMode() : String;
public function set APPCMode(String);
```

Value

The APPC mode to use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2NetworkPropertiesAPPC Class | MsDb2NetworkPropertiesAPPC Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkPropertiesAPPC.LocalLU Property

Gets or sets the local LU alias for an APPC connection type to the remote host computer.

VB

```
Public Property LocalLU As String
[C#]
public string LocalLU {get; set;}
[C++]
public: __property String* get_LocalLU();
public: __property void set_LocalLU(String*);
[JScript]
public function get LocalLU() : String;
public function set LocalLU(String);
```

Value

The local LU alias.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2NetworkPropertiesAPPC Class | MsDb2NetworkPropertiesAPPC Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkPropertiesAPPC.RemoteLU Property

Gets or sets the remote LU alias for an APPC connection type to the remote host computer.

VB

```
Public Property RemoteLU As String
[C#]
public string RemoteLU {get; set;}
[C++]
public: __property String* get_RemoteLU();
public: __property void set_RemoteLU(String*);
[JScript]
public function get RemoteLU() : String;
public function set RemoteLU(String);
```

Value

The remote LU.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2NetworkPropertiesAPPC Class | MsDb2NetworkPropertiesAPPC Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkPropertiesAPPC.TPName Property

Gets or sets the default transaction program name for the DB2 host server.

VB

```
Public Property TPName As String
[C#]
public string TPName {get; set;}
[C++]
public: __property String* get_TPName();
public: __property void set_TPName(String*);
[JScript]
public function get TPName() : String;
public function set TPName(String);
```

Value

The default transaction program name.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2NetworkPropertiesAPPC Class | MsDb2NetworkPropertiesAPPC Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkPropertiesTCP Class

Defines the network-specific connection properties for connection to a DB2 host using the TCP protocol.

For a list of all members of this type, see MsDb2NetworkPropertiesTCP Members.

System.Object
  Microsoft.HostIntegration.MsDb2Client.MsDb2NetworkProperties
    Microsoft.HostIntegration.MsDb2Client.MsDb2NetworkPropertiesTCP

VB

```
NotInheritable Public Class MsDb2NetworkPropertiesTCP
   Inherits MsDb2NetworkProperties
[C#]
public sealed class MsDb2NetworkPropertiesTCP :
   MsDb2NetworkProperties
[C++]
public __gc __sealed class MsDb2NetworkPropertiesTCP : public
   MsDb2NetworkProperties
[JScript]
public class MsDb2NetworkPropertiesTCP extends
   MsDb2NetworkProperties
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2NetworkPropertiesTCP Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkPropertiesTCP Members

MsDb2NetworkPropertiesTCP overview

Public Constructors

MsDb2NetworkPropertiesTCP Constructor	Creates a new instance of the **MsDb2NetworkPropertiesTCP** class.

Public Properties

NetAddress	Gets or sets the network address of the host platform.
Port	Gets or sets the port number of the host platform.

Public Methods

Equals (inherited from **System.Object**)	Determines whether two **Object** instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
ToString (inherited from **System.Object**)	Returns a String that represents the current **Object**.

Protected Methods

Finalize (inherited from **System.Object**)	Allows an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2NetworkPropertiesTCP Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2NetworkPropertiesTCP Constructor

Creates a new instance of the MsDb2NetworkPropertiesTCP class using the specified net address and port number.

VB

```
Public Sub New( _
   ByVal netAddress As String, _
   ByVal port As Integer _
)
[C#]
public MsDb2NetworkPropertiesTCP(
   string netAddress,
   int port
);
[C++]
public: MsDb2NetworkPropertiesTCP(
   String* netAddress,
   int port
);
[JScript]
public function MsDb2NetworkPropertiesTCP(
   netAddress : String,
   port : int
);
```

Parameters

netAddress
Network address of the host platform.
port
Port number of the host platform.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2NetworkPropertiesTCP Class | MsDb2NetworkPropertiesTCP Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2NetworkPropertiesTCP Properties

This section lists the properties of the **MsDb2NetworkPropertiesTCP** class. For a complete list of **MsDb2NetworkPropertiesTCP** class members, see MsDb2NetworkPropertiesTCP Members.

Public Properties

NetAddress	Gets or sets the network address of the host platform.
Port	Gets or sets the port number of the host platform.

MsDb2NetworkPropertiesTCP.NetAddress Property

Gets or sets the network address of the host platform.

VB

```
Public Property NetAddress As String
[C#]
public string NetAddress {get; set;}
[C++]
public: __property String* get_NetAddress();
public: __property void set_NetAddress(String*);
[JScript]
public function get NetAddress() : String;
public function set NetAddress(String);
```

Value

The network address of the host platform.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2NetworkPropertiesTCP Class | MsDb2NetworkPropertiesTCP Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2NetworkPropertiesTCP.Port Property

Gets or sets the port number of the host platform.

VB

```
Public Property Port As Integer
[C#]
public int Port {get; set;}
[C++]
public: __property int get_Port();
public: __property void set_Port(int);
[JScript]
public function get Port() : int;
public function set Port(int);
```

Value

The port number of the host platform.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2NetworkPropertiesTCP Class | MsDb2NetworkPropertiesTCP Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2RowUpdatedEventArgs Class

Provides data for the **RowUpdated** event.

For a list of all members of this type, see MsDb2RowUpdatedEventArgs Members.

System.Object
  System.EventArgs
    System.Data.Common.RowUpdatedEventArgs
      Microsoft.HostIntegration.MsDb2Client.MsDb2RowUpdatedEventArgs

VB

```
Public Class MsDb2RowUpdatedEventArgs
   Inherits RowUpdatedEventArgs
[C#]
public class MsDb2RowUpdatedEventArgs : RowUpdatedEventArgs
[C++]
public __gc class MsDb2RowUpdatedEventArgs : public
   RowUpdatedEventArgs
[JScript]
public class MsDb2RowUpdatedEventArgs extends RowUpdatedEventArgs
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2RowUpdatedEventArgs Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2RowUpdatedEventArgs Members

MsDb2RowUpdatedEventArgs overview

Public Constructors

MsDb2RowUpdatedEventArgs Constructor	Initializes a new instance of the **MsDb2RowUpdatedEventArgs** class.

Public Properties

Command	Gets the **MsDb2Command** executed when Update is called.
Errors (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets any errors generated by the .NET data provider when the **Command** was executed.
RecordsAffected (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the number of rows changed, inserted, or deleted by execution of the SQL statement.
Row (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the **DataRow** sent through an **Update**.
StatementType (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the type of SQL statement executed.
Status (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the **UpdateStatus** of the **Command**.
TableMapping (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the **DataTableMapping** sent through an **Update**.

Public Methods

Equals (inherited from **System.Object**)	Overloaded. Determines whether two **Object** instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
ToString (inherited from **System.Object**)	Returns a String that represents the current **Object**.

Protected Methods

Finalize (inherited from **System.Object**)	Overridden. Allows an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2RowUpdatedEventArgs Class | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2RowUpdatedEventArgs Constructor

Creates a new instance of the MsDb2RowUpdatedEventArgs class.

VB

```
Public Sub New( _
   ByVal row As DataRow, _
   ByVal command As IDbCommand, _
   ByVal statementType As StatementType, _
   ByVal tableMapping As DataTableMapping _
)
[C#]
public MsDb2RowUpdatedEventArgs(
   DataRow row,
   IDbCommand command,
   StatementType statementType,
   DataTableMapping tableMapping
);
[C++]
public: MsDb2RowUpdatedEventArgs(
   DataRow* row,
   IDbCommand* command,
   StatementType statementType,
   DataTableMapping* tableMapping
);
[JScript]
public function MsDb2RowUpdatedEventArgs(
   row : DataRow,
   command : IDbCommand,
   statementType : StatementType,
   tableMapping : DataTableMapping
);
```

Parameters

row
  The **DataRow** sent through an **Update**.
command
  The **IDbCommand** executed when **Update** is called.
statementType
  One of the **StatementType** values that specifies the type of query executed.
tableMapping
  The **DataTableMapping** sent through an **Update**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2RowUpdatedEventArgs Class | MsDb2RowUpdatedEventArgs Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2RowUpdatedEventArgs Properties

This section lists the properties of the **MsDb2RowUpdatedEventArgs** class. For a complete list of **MsDb2RowUpdatedEventArgs** class members, see MsDb2RowUpdatedEventArgs Members.

Public Properties

Command	Gets the **MsDb2Command** executed when **Update** is called.
Errors (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets any errors generated by the .NET data provider when the **Command** was executed.
RecordsAffected (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the number of rows changed, inserted, or deleted by execution of the SQL statement.
Row (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the **DataRow** sent through an **Update**.
StatementType (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the type of SQL statement executed.
Status (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the **UpdateStatus** of the **Command**.
TableMapping (inherited from **System.Data.Common.RowUpdatedEventArgs**)	Gets the **DataTableMapping** sent through an **Update**.

See Also

MsDb2RowUpdatedEventArgs Class | Microsoft.HostIntegration.MsDb2Client Namespace

MsDb2RowUpdatedEventArgs.Command Property

Gets the **MsDb2Command** executed when **Update** is called.

VB

```
Public Shadows ReadOnly Property Command As MsDb2Command
[C#]
public new MsDb2Command Command {get;}
[C++]
public: __property MsDb2Command* get_Command();
[JScript]
public hide function get Command() : MsDb2Command;
```

Property Value

The **MsDb2Command** executed when **Update** is called.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2RowUpdatedEventArgs Class | MsDb2RowUpdatedEventArgs Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2RowUpdatedEventHandler Delegate

Represents the method that will handle the **RowUpdated** event of an **MsBd2DataAdapter**.

VB

```
<Serializable>
Public Delegate Sub MsDb2RowUpdatedEventHandler( _
   ByVal sender As Object, _
   ByVal e As MsDb2RowUpdatedEventArgs _
)
[C#]
[Serializable]
public delegate void MsDb2RowUpdatedEventHandler(
   object sender,
   MsDb2RowUpdatedEventArgs e
);
[C++]
[Serializable]
public __gc __delegate void MsDb2RowUpdatedEventHandler(
   Object* sender,
   MsDb2RowUpdatedEventArgs* e
);
```

[JScript] In JScript, you can use the delegates in the .NET Framework, but you cannot define your own.

Parameters [Visual Basic, C#, C++]

The declaration of your event handler must have the same parameters as the **MsDb2RowUpdatedEventHandler** delegate declaration.

sender
The source of the event.

e
The **MsDb2RowUpdatedEventArgs** that contains the event data.

Remarks

The handler is not required perform any action, and your code should avoid generating exceptions or allowing exceptions to propagate to the calling method. Any exceptions that do reach the caller are ignored. When you create an **MsDb2RowUpdatedEventArgs** delegate, you identify the method that handles the event. To associate the event with your event handler, add an instance of the delegate to the event. The event handler is called whenever the event occurs, unless you remove the delegate.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2RowUpdatingEventArgs Class

Provides data for the **RowUpdating** event.

For a list of all members of this type, see MsDb2RowUpdatingEventArgs Members.

System.Object
  System.EventArgs
    System.Data.Common.RowUpdatingEventArgs
      Microsoft.HostIntegration.MsDb2Client.MsDb2RowUpdatingEventArgs

VB

```
Public Class MsDb2RowUpdatingEventArgs
   Inherits RowUpdatingEventArgs
[C#]
public class MsDb2RowUpdatingEventArgs : RowUpdatingEventArgs
[C++]
public __gc class MsDb2RowUpdatingEventArgs : public
   RowUpdatingEventArgs
[JScript]
public class MsDb2RowUpdatingEventArgs extends RowUpdatingEventArgs
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Remarks

The **RowUpdating** event is raised before an **Update** to a row.

When using **Update**, there are two events that occur for each data row updated. The order of execution is as follows:

1. The values in the **DataRow** are moved to the parameter values.
2. The **OnRowUpdating** event is raised.
3. The command executes.
4. If the command is set to **FirstReturnedRecord**, then the first returned result is placed in the **DataRow**.
5. If there are output parameters, they are placed in the **DataRow**.
6. The **OnRowUpdated** event is raised.
7. **AcceptChanges** is called.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2RowUpdatingEventArgs Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

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MsDb2RowUpdatingEventArgs Members

MsDb2RowUpdatingEventArgs overview

Public Constructors

MsDb2RowUpdatingEventArgs Constructor	Initializes a new instance of the **MsDb2RowUpdatingEventArgs** class.

Public Properties

Command	Gets or sets the **MsDb2Command** to execute when performing the **Update.**
Errors (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets any errors generated by the .NET data provider when the **Command** executes.
Row (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **DataRow** to send through an **Update**.
StatementType (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **Type** of SQL statement to execute.
Status (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **UpdateStatus** of the Command.
TableMapping (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **DataTableMapping** to send through the **Update**.

Public Methods

Equals (inherited from **System.Object**)	Overloaded. Determines whether two **Object** instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
ToString (inherited from **System.Object**)	Returns a String that represents the current **Object**.

Protected Methods

Finalize (inherited from **System.Object**)	Overridden. Allows an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by the garbage collection. In Microsoft Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow clone of the current **Object**.

See Also

MsDb2RowUpdatingEventArgs Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2RowUpdatingEventArgs Constructor

Initializes a new instance of the MsDb2RowUpdatingEventArgs class.

VB

```
Public Sub New( _
   ByVal row As DataRow, _
   ByVal command As IDbCommand, _
   ByVal statementType As StatementType, _
   ByVal tableMapping As DataTableMapping _
)
[C#]
public MsDb2RowUpdatingEventArgs(
   DataRow row,
   IDbCommand command,
   StatementType statementType,
   DataTableMapping tableMapping
);
[C++]
public: MsDb2RowUpdatingEventArgs(
   DataRow* row,
   IDbCommand* command,
   StatementType statementType,
   DataTableMapping* tableMapping
);
[JScript]
public function MsDb2RowUpdatingEventArgs(
   row : DataRow,
   command : IDbCommand,
   statementType : StatementType,
   tableMapping : DataTableMapping
);
```

Parameters

row
  The **DataRow** to **Update**..
command
  The **IDbCommand** to execute during **Update**.
statementType
  One of the **StatementType** values that specifies the type of query executed.
tableMapping
  The **DataTableMapping** sent through an **Update**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2RowUpdatingEventArgs Class | MsDb2RowUpdatingEventArgs Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2RowUpdatingEventArgs Properties

This section lists the properties of the **MsDb2RowUpdatingEventArgs** class. For a complete list of **MsDb2RowUpdatingEventArgs** class members, see MsDb2RowUpdatingEventArgs Members.

Public Properties

Command	Gets or sets the **MsDb2Command** to execute when performing the **Update**.
Errors (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets any errors generated by the .NET data provider when the **Command** executes.
Row (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **DataRow** to send through an **Update**.
StatementType (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **Type** of SQL statement to execute.
Status (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **UpdateStatus** of the **Command**.
TableMapping (inherited from **System.Data.Common.RowUpdatingEventArgs**)	Gets the **DataTableMapping** to send through the **Update**.

See Also

MsDb2RowUpdatingEventArgs Class | Microsoft.HostIntegration.MsDb2Client Namespace

MsDb2RowUpdatingEventArgs.Command Property

Gets or sets the **MsDb2Command** to execute when performing the **Update**.

VB

```
Public Shadows Property Command As MsDb2Command
[C#]
public new MsDb2Command Command {get; set;}
[C++]
public: __property MsDb2Command* get_Command();
public: __property void set_Command(MsDb2Command*);
[JScript]
public hide function get Command() : MsDb2Command;
public function set Command(MsDb2Command);
```

Property Value

The **MsDb2Command** to execute when performing the **Update**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2RowUpdatingEventArgs Class | MsDb2RowUpdatingEventArgs Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2RowUpdatingEventHandler Delegate

Represents the method that handles the **RowUpdating** event of an **MsDb2DataAdapter**.

VB

```
<Serializable>
Public Delegate Sub MsDb2RowUpdatingEventHandler( _
   ByVal sender As Object, _
   ByVal e As MsDb2RowUpdatingEventArgs _
)
[C#]
[Serializable]
public delegate void MsDb2RowUpdatingEventHandler(
   object sender,
   MsDb2RowUpdatingEventArgs e
);
[C++]
[Serializable]
public __gc __delegate void MsDb2RowUpdatingEventHandler(
   Object* sender,
   MsDb2RowUpdatingEventArgs* e
);
```

[JScript] In JScript, you can use the delegates in the .NET Framework, but you cannot define your own.

Parameters [Visual Basic, C#, C++]

The declaration of your event handler must have the same parameters as the **MsDb2RowUpdatingEventHandler** delegate declaration.

sender
The source of the event

e
The **MsDb2RowUpdatingEventArgs** that contains the event data.

Remarks

The handler is not required perform any action, and your code should avoid generating exceptions or allowing exceptions to propagate to the calling method. Any exceptions that do reach the caller are ignored.

The handler may use the **MsDb2RowUpdatingEventArgs** to influence the processing of the updates. For example, the handler may opt to skip the update of the current row or skip the update of all remaining rows. Note that the rows are updated in the order that they were received from the data source.

When you create an **MsDb2RowUpdatingEventArgs** delegate, you identify the method that handles the event. To associate the event with your event handler, add an instance of the delegate to the event. The event handler is called whenever the event occurs, unless you remove the delegate.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Parameter Class

Represents a placeholder for a parameter in an SQL command.

For a list of all members of this type, see MsDb2Parameter Members.

System.Object
  Microsoft.HostIntegration.MsDb2Client.MsDb2Parameter

VB

```
Public Class MsDb2Parameter
   Implements IDbDataParameter, IDataParameter
[C#]
public class MsDb2Parameter : IDbDataParameter, IDataParameter
[C++]
public __gc class MsDb2Parameter : public IDbDataParameter,
   IDataParameter
[JScript]
public class MsDb2Parameter implements IDbDataParameter,
   IDataParameter
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

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MsDb2Parameter Members

MsDb2Parameter overview

Public Constructors

MsDb2Parameter Constructor	Overloaded. Creates a new instance of the **MsDb2Parameter** class.

Public Properties

DbType	Gets or sets the database type of the parameter.
Direction	Gets or sets a value indicating whether the parameter is input-only, output-only, bidirectional, or a stored procedure return value parameter.
IsNullable	Gets or sets a value indicating whether the parameter accepts null values.
MsDb2Type	Gets or sets the **MsDb2Type** of the parameter.
ParameterName	Gets or sets the name of the **MsDb2Parameter**.
Precision	Gets or sets the maximum number of digits used to represent the **Value** property.
Scale	Gets or sets the number of decimal places to which **Value** is resolved.
Size	Gets or sets the maximum size, in bytes, of the data within the column.
SourceColumn	Gets or sets the name of the source column mapped to the **DataSet** and used for loading or returning the **Value**.
SourceVersion	Gets or sets the **DataRowVersion** to use when loading **Value**.
Value	Gets or sets the value of the parameter, or the destination of an output parameter.

Public Methods

Equals (inherited from **System.Object**)	Overloaded. Determines whether two **Object** instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
ToString (inherited from **System.Object**)	Overridden. Gets a string containing the **ParameterName**.

Protected Methods

Finalize (inherited from **System.Object**)	Overridden. Allows an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2Parameter Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Parameter Constructor

Creates a new instance of the **MsDb2Parameter** class.

Overload List

[Visual Basic] Public Sub New()

[C#] public MsDb2Parameter();

[C++] public: MsDb2Parameter();

[JScript] public function MsDb2Parameter();

[Visual Basic] Public Sub New(System.String, MsDb2Type)

[C#] public MsDb2Parameter(System.String, MsDb2Type);

[C++] public: MsDb2Parameter(System.String, MsDb2Type);

[JScript] public function MsDb2Parameter(System.String, MsDb2Type);

[Visual Basic] Public Sub New(System.String, System.Object)

[C#] public MsDb2Parameter(System.String, System.Object);

[C++] public: MsDb2Parameter(System.String, System.Object);

[JScript] public function MsDb2Parameter(System.String, System.Object);

[Visual Basic] Public Sub New(System.String, MsDb2Type, System.Int32)

[C#] public MsDb2Parameter(System.String, MsDb2Type, System.Int32);

[C++] public: MsDb2Parameter(System.String, MsDb2Type, System.Int32);

[JScript] public function MsDb2Parameter(System.String, MsDb2Type, System.Int32);

[Visual Basic] Public Sub New(System.String, MsDb2Type, System.Int32, System.String)

[C#] public MsDb2Parameter(System.String, MsDb2Type, System.Int32, System.String);

[C++] public: MsDb2Parameter(System.String, MsDb2Type, System.Int32, System.String);

[JScript] public function MsDb2Parameter(System.String, MsDb2Type, System.Int32, System.String);

[Visual Basic]
Public Sub New(System.String, MsDb2Type, System.Int32, System.Data.ParameterDirection, System.Boolean, System.Byte, System.Byte, System.String, System.Data.DataRowVersion, System.Object)

[C#]
public MsDb2Parameter(System.String, MsDb2Type, System.Int32, System.Data.ParameterDirection, System.Boolean, System.Byte, System.Byte, System.String, System.Data.DataRowVersion, System.Obje

[C++]
public: MsDb2Parameter(System.String, MsDb2Type, System.Int32, System.Data.ParameterDirection, System.Boolean, System.Byte, System.Byte, System.String, System.Data.DataRowVersion, System.Obje

[JScript]
public function MsDb2Parameter(System.String, MsDb2Type, System.Int32, System.Data.ParameterDirection, System.Boolean, System.Byte, System.Byte, System.String, System.Data.DataRowVersion, Sys

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Parameter Constructor ()

Creates a new instance of the MsDb2Parameter class.

VB

```
Public Sub New()
[C#]
public MsDb2Parameter();
[C++]
public: MsDb2Parameter();
[JScript]
public function MsDb2Parameter();
```

Remarks

The default constructor initializes any fields to their default values.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Parameter Constructor Overload List

MsDb2Parameter Constructor (System.String, MsDb2Type)

Creates a new instance of the MsDb2Parameter class using the specified parameter name and type.

VB

```
Public Sub New( _
   ByVal parameterName As String, _
   ByVal type As MsDb2Type _
)
[C#]
public MsDb2Parameter(
   string parameterName,
   MsDb2Type type
);
[C++]
public: MsDb2Parameter(
   String* parameterName,
   MsDb2Type type
);
[JScript]
public function MsDb2Parameter(
   parameterName : String,
   type : MsDb2Type
);
```

Parameters

parameterName
   The name of the parameter to map.
type
   One of the **MsDb2Type** values.

Remarks

The data type, and if appropriate, **Size** and **Precision** are inferred from the value of the **Type** parameter.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Parameter Constructor Overload List

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MsDb2Parameter Constructor (System.String, System.Object)

Creates a new instance of the MsDb2Parameter class using the specified parameter name and value.

VB

```
Public Sub New( _
   ByVal parameterName As String, _
   ByVal value As Object _
)
[C#]
public MsDb2Parameter(
   string parameterName,
   object value
);
[C++]
public: MsDb2Parameter(
   String* parameterName,
   Object* value
);
[JScript]
public function MsDb2Parameter(
   parameterName : String,
   value : Object
);
```

Parameters

parameterName
The name of the parameter to map.

value
The value of the new **MsDb2Parameter** object.

Remarks

When you specify an **Object** in the **value** parameter, the **MsDb2Type** is inferred from the .NET Framework type of the **Object**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Parameter Constructor Overload List

MsDb2Parameter Constructor (System.String, MsDb2Type, System.Int32)

Creates a new instance of the MsDb2Parameter class using the specified parameter name, type, and size.

VB

```
Public Sub New( _
   ByVal parameterName As String, _
   ByVal type As MsDb2Type, _
   ByVal size As Integer _
)
[C#]
public MsDb2Parameter(
   string parameterName,
   MsDb2Type type,
   int size
);
[C++]
public: MsDb2Parameter(
   String* parameterName,
   MsDb2Type type,
   int size
);
[JScript]
public function MsDb2Parameter(
   parameterName : String,
   type : MsDb2Type,
   size : int
);
```

Parameters

parameterName
  The name of the parameter to map.
type
  One of the **MsDb2Type** values.
size
  The width of the parameter.

Remarks

The **Size** is inferred from the value of the **dataType** parameter if it is not explicitly set in the **size** parameter.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Parameter Constructor Overload List

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MsDb2Parameter Constructor (System.String, MsDb2Type, System.Int32, System.String)

Creates a new instance of the MsDb2Parameter class using the specified parameter name, type, size, and source column name.

VB

```
Public Sub New( _
   ByVal parameterName As String, _
   ByVal type As MsDb2Type, _
   ByVal size As Integer, _
   ByVal sourceColumn As String _
)
[C#]
public MsDb2Parameter(
   string parameterName,
   MsDb2Type type,
   int size,
   string sourceColumn
);
[C++]
public: MsDb2Parameter(
   String* parameterName,
   MsDb2Type type,
   int size,
   String* sourceColumn
);
[JScript]
public function MsDb2Parameter(
   parameterName : String,
   type : MsDb2Type,
   size : int,
   sourceColumn : String
);
```

Parameters

parameterName
  The name of the parameter to map.
type
  One of the **MsDb2Type** values.
size
  The width of the parameter.
sourceColumn
  The name of the source column.

Remarks

The **Size** is inferred from the value of *type* if not explicitly set in *size*.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Parameter Constructor Overload List

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MsDb2Parameter Constructor (System.String, MsDb2Type, System.Int32, System.Data.ParameterDirection, System.Boolean, System.Byte, System.Byte, System.String, System.Data.DataRowVersion, System.Object)

Initializes a new instance of the MsDb2Parameter class.

VB

```
Public Sub New( _
   ByVal parameterName As String, _
   ByVal type As MsDb2Type, _
   ByVal size As Integer, _
   ByVal direction As ParameterDirection, _
   ByVal isNullable As Boolean, _
   ByVal precision As Byte, _
   ByVal scale As Byte, _
   ByVal sourceColumn As String, _
   ByVal sourceVersion As DataRowVersion, _
   ByVal value As Object _
)
[C#]
public MsDb2Parameter(
   string parameterName,
   MsDb2Type type,
   int size,
   ParameterDirection direction,
   bool isNullable,
   byte precision,
   byte scale,
   string sourceColumn,
   DataRowVersion sourceVersion,
   object value
);
[C++]
public: MsDb2Parameter(
   String* parameterName,
   MsDb2Type type,
   int size,
   ParameterDirection direction,
   bool isNullable,
   unsigned char precision,
   unsigned char scale,
   String* sourceColumn,
   DataRowVersion sourceVersion,
   Object* value
);
[JScript]
public function MsDb2Parameter(
   parameterName : String,
   type : MsDb2Type,
   size : int,
   direction : ParameterDirection,
   isNullable : Boolean,
   precision : Byte,
   scale : Byte,
   sourceColumn : String,
   sourceVersion : DataRowVersion,
   value : Object
);
```

Parameters

parameterName
The name of the parameter.
type
One of the **MsDb2Type** values.
size
The width of the parameter.
direction
One of the **ParameterDirection** values.
isNullable
true if the value of the field can be null; otherwise, false.
precision
The total number of digits to the left and right of the decimal point to which **Value** is resolved.
scale
The total number of decimal places to which **Value** is resolved.
sourceColumn
The name of the source column.
sourceVersion
One of the **DataRowVersion** values.
value
An **Object** that is the value of the **MsDb2Parameter**.

Remarks

The **Size** and **Precision** are inferred from the value of the **dataType** parameter if they are not explicitly set in the **size** and **precision** parameters.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2Parameter Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Parameter Properties

This section lists the properties of the **MsDb2Parameter** class. For a complete list of **MsDb2Parameter** class members, see MsDb2Parameter Members.

Public Properties

DbType	Gets or sets the **DbType** of the parameter.
Direction	Gets or sets a value indicating whether the parameter is input-only, output-only, bidirectional, or a stored procedure return value parameter.
IsNullable	Gets or sets a value indicating whether the parameter accepts null values.
MsDb2Type	Gets or sets the **MsDb2Type** of the parameter.
ParameterName	Gets or sets the name of the **MsDb2Parameter**.
Precision	Gets or sets the maximum number of digits used to represent the **Value** property.
Scale	Gets or sets the number of decimal places to which **Value** is resolved.
Size	Gets or sets the maximum size, in bytes, of the data within the column.
SourceColumn	Gets or sets the name of the source column mapped to the **DataSet** and used for loading or returning the **Value**.
SourceVersion	Gets or sets the **DataRowVersion** to use when loading **Value**.
Value	Gets or sets the value of the parameter, or the destination of an output parameter.

See Also

MsDb2Parameter Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Parameter.DbType Property

Gets or sets the parameter type.

VB

```
Public Overridable Property DbType As DbType  Implements _
   IDataParameter.DbType
[C#]
public virtual DbType DbType {get; set;}
[C++]
public: __property virtual DbType get_DbType();
public: __property virtual void set_DbType(DbType);
[JScript]
public function get DbType() : DbType;
public function set DbType(DbType);
```

Implements

IDataParameter.DbType

Property Value

DbType containing the parameter type. The default is string.

Remarks

The .NET type is converted to a DB2 type upon execution.

The **MsDb2Type** and **DbType** are linked. Therefore, setting the **DbType** changes the **MsDb2Type** to a supporting **MsDb2Type**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Parameter.Direction Property

Gets or sets the direction of the parameter.

VB

```
Public Overridable Property Direction As ParameterDirection  _
   Implements IDataParameter.Direction
[C#]
public virtual ParameterDirection Direction {get; set;}
[C++]
public: __property virtual ParameterDirection get_Direction();
public: __property virtual void set_Direction(ParameterDirection);
[JScript]
public function get Direction() : ParameterDirection;
public function set Direction(ParameterDirection);
```

Implements

IDataParameter.Direction

Property Value

ParameterDirection containing the direction of the parameter. The default value is **Input**.

Remarks

Parameter values are inputted and outputted based on their order.

If the **ParameterDirection** is output, and execution of the associated **MsDb2Command** does not return a value, the **MsDb2Parameter** contains a null value. After the last row from the last **resultset** is **read**, **Output**, **InputOut**, and **ReturnValue** parameters are updated.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Parameter.IsNullable Property

Gets or sets a value that describes if the parameter can be set to null or not.

VB

```
Public Overridable Property IsNullable As Boolean  Implements _
   IDataParameter.IsNullable
[C#]
public virtual bool IsNullable {get; set;}
[C++]
public: __property virtual bool get_IsNullable();
public: __property void set_IsNullable(bool);
[JScript]
public function get IsNullable() : Boolean;
public function set IsNullable(Boolean);
```

Implements

IDataParameter.IsNullable

Property Value

true if null values are accepted; otherwise, **false**. The default is false.

Remarks

Null values are handled using the **DBNull** class.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Parameter.MsDb2Type Property

Gets or sets the **MsDb2Type** of the parameter.

VB

```
Public Property MsDb2Type As MsDb2Type
[C#]
public MsDb2Type MsDb2Type {get; set;}
[C++]
public: __property MsDb2Type get_MsDb2Type();
public: __property void set_MsDb2Type(MsDb2Type);
[JScript]
public function get MsDb2Type() : MsDb2Type;
public function set MsDb2Type(MsDb2Type);
```

Property Value

The **MsDb2Type** of the parameter. The default is **VarWChar**

Remarks

The **MsDb2Type** and **DbType** are linked. Therefore, setting the **DbType** changes the **MsDb2Type** to a supporting **MsDb2Type**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Parameter.ParameterName Property

Gets or sets the parameter name.

VB

```
Public Overridable Property ParameterName As String  Implements _
   IDataParameter.ParameterName
[C#]
public virtual string ParameterName {get; set;}
[C++]
public: __property virtual String* get_ParameterName();
public: __property virtual void set_ParameterName(String*);
[JScript]
public function get ParameterName() : String;
public function set ParameterName(String);
```

Implements

IDataParameter.ParameterName

Property Value

String containing the parameter name. The default value is an empty string.

Remarks

The MsDB2 .NET Provider uses positional parameters that are marked with a question mark (?) instead of named parameters.

If parameters are not given names, then a default name will be generated as follows:

"MsDb2Parameter" + index number.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

MsDb2Parameter.Precision Property

Gets or sets the precision of the parameter.

VB

```
Public Overridable Property Precision As Byte  Implements _
   IDbDataParameter.Precision
[C#]
public virtual byte Precision {get; set;}
[C++]
public: __property virtual unsigned char get_Precision();
public: __property virtual void set_Precision(unsigned char);
[JScript]
public function get Precision() : Byte;
public function set Precision(Byte);
```

Property Value

The maximum number of digits used to represent the **Value** property. The default value is 0.

Implements

IDbDataParameter.Precision

Remarks

The **Precision** property is only used for decimal and numeric input parameters.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2Parameter.Scale Property

Gets or sets the scale of the parameter.

VB

```
Public Overridable Property Scale As Byte  Implements _
   IDbDataParameter.Scale
[C#]
public virtual byte Scale {get; set;}
[C++]
public: __property virtual unsigned char get_Scale();
public: __property virtual void set_Scale(unsigned char);
[JScript]
public function get Scale() : Byte;
public function set Scale(Byte);
```

Property Value

The number of decimal places to which **Value** is resolved. The default is 0.

Implements

IDbDataParameter.Scale

Remarks

Scale is used to describe numeric parameters.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Parameter.Size Property

Gets or sets the size of the parameter.

VB

```
Public Overridable Property Size As Integer  Implements _
   IDbDataParameter.Size
[C#]
public virtual int Size {get; set;}
[C++]
public: __property virtual int get_Size();
public: __property virtual void set_Size(int);
[JScript]
public function get Size() : int;
public function set Size(int);
```

Property Value

The maximum size, in bytes, of the data within the column. The default value is inferred from the parameter value.

Implements

IDbDataParameter.Size

Remarks

Size is used for all types of parameters.

For variable length data types, the **Size** property describes the maximum amount of data to transmit to the server. For example, the **Size** property can be used to limit the amount of data sent to the server for a string value to the first one hundred bytes.

For nonstring data types and ANSI string data, the **Size** property refers to the number of bytes. For Unicode string data, the **Size** property refers to the number of characters. The count for strings does not include the terminating character.

If not explicitly set, the size is inferred from the actual size of the specified parameter value. For fixed width data types, the value of **Size** is ignored. It can be retrieved for informational purposes, and returns the maximum amount of bytes the provider uses when transmitting the value of the parameter to the server.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Parameter.SourceColumn Property

Gets or sets the name of the source column mapped to the **DataSet** and used for loading or returning the **Value**.

VB

```
Public Overridable Property SourceColumn As String  Implements _
   IDataParameter.SourceColumn
[C#]
public virtual string SourceColumn {get; set;}
[C++]
public: __property virtual String* get_SourceColumn();
public: __property virtual void set_SourceColumn(String*);
[JScript]
public function get SourceColumn() : String;
public function set SourceColumn(String);
```

Property Value

The name of the source column mapped to the **DataSet** and used for loading or returning the **Value**.

Implements

IDataParameter.SourceColumn

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Parameter.SourceVersion Property

Gets or sets the name of the source column mapped to the **DataSet** and used for loading or returning the **Value**.

VB

```
Public Overridable Property SourceVersion As DataRowVersion  _
   Implements IDataParameter.SourceVersion
[C#]
public virtual DataRowVersion SourceVersion {get; set;}
[C++]
public: __property virtual DataRowVersion get_SourceVersion();
public: __property virtual void set_SourceVersion(DataRowVersion);
[JScript]
public function get SourceVersion() : DataRowVersion;
public function set SourceVersion(DataRowVersion);
```

Property Value

The name of the source column mapped to the **DataSet**. The default is an empty string.

Implements

IDataParameter.SourceVersion

Remarks

The link between the value of the **MsDb2Parameter** and the **DataTable** may be bidirectional depending on the value of the **Direction** property.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Parameter.Value Property

Gets or sets the value of the parameter, or the destination of an output parameter.

VB

```
Public Overridable Property Value As Object  Implements _
   IDataParameter.Value
[C#]
public virtual object Value {get; set;}
[C++]
public: __property virtual Object* get_Value();
public: __property virtual void set_Value(Object*);
[JScript]
public function get Value() : Object;
public function set Value(Object);
```

Property Value

The value of the parameter, or the destination of an output parameter. The default value is null.

Implements

IDataParameter.Value

Exceptions

Exception Type	Condition
BadOutputParameter()	The parameter is output and is not specified.

Remarks

For input parameters, the value is bound to the **MsDb2Command** that is sent to the server. For output and return value parameters, the value is set on completion of the **MsDb2Command** and after the **MsDb2DataReader** is closed.

When sending a null parameter value to the server, the user must specify **DBNull**, not null. The null value in the system is an empty object that has no value. **DBNull** is used to represent null values.

If the application specifies the database type, the bound value is converted to that type when the provider sends the data to the server. The provider attempts to convert any type of value if it supports the **IConvertible** interface. Conversion errors may result if the specified type is not compatible with the value.

Both the **DbType** and **MsDb2Type** properties can be inferred by setting the **Value**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Parameter Class | MsDb2Parameter Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2ParameterCollection Class

Represents a stronglytyped collection of **MsDb2Parameters**.

For a list of all members of this type, see MsDb2ParameterCollection Members.

System.Object
  Microsoft.HostIntegration.MsDb2Client.MsDb2ParameterCollection

VB

```
Public Class MsDb2ParameterCollection
   Implements IDataParameterCollection, IList, ICollection, _
   IEnumerable
[C#]
public class MsDb2ParameterCollection : IDataParameterCollection,
   IList, ICollection, IEnumerable
[C++]
public __gc class MsDb2ParameterCollection : public
   IDataParameterCollection, IList, ICollection, IEnumerable
[JScript]
public class MsDb2ParameterCollection implements
   IDataParameterCollection, IList, ICollection, IEnumerable
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Remarks

The number of parameters in the collection must be equal to the number of parameter placeholders within the command text, or the MsDb2 .NET Data Provider may raise an error.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2ParameterCollection Members

MsDb2ParameterCollection overview

Public Properties

Count	Gets the number of **MsDb2Parameter** objects in the collection.
Item	Overloaded. Gets or sets the **MsDb2Parameter** with a specified attribute. In Microsoft® Visual C#®, this property is the indexer for the **MsDb2ParameterCollection** class.

Public Methods

Add	Overloaded. Adds an **MsDb2Parameter** to the **MsDb2Command**.
Clear	Removes all items from the collection.
Contains	Overloaded. Checks to see if a parameter exists in the collection, based on its name.
CopyTo	Copies **MsDb2Parameter** objects from the **MsDb2ParameterCollection** to the specified array.
Equals (inherited from **System.Object**)	Determines whether two **Object** instances are equal.
GetEnumerator	Returns an enumerator for the collection.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
IndexOf	Overloaded. Returns the index of the parameter based on its name.
Insert	Inserts an **MsDb2Parameter** in the collection at the specified index.
Remove	Removes the specified **MsDb2Parameter** from the collection.
RemoveAt	Overloaded. Removes the specified **MsDb2Parameter** from the collection.
ToString (inherited from **System.Object**)	Returns a String that represents the current **Object**.

Protected Methods

Finalize (inherited from **System.Object**)	Allows an **Object** to attempt to free resources and perform other cleanup operations before the **Object** is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2ParameterCollection Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2ParameterCollection Properties

This section lists the properties of the **MsDb2ParameterCollection** class. For a complete list of **MsDb2ParameterCollection** class members, see MsDb2ParameterCollection Members.

Public Properties

Count	Gets the number of **MsDb2Parameter** objects in the collection.
Item	Overloaded. Gets or sets the **MsDb2Parameter** with a specified attribute. In Microsoft® Visual C#®, this property is the indexer for the **MsDb2ParameterCollection** class.

See Also

MsDb2ParameterCollection Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2ParameterCollection.Count Property

Gets the number of **MsDb2Parameter** objects in the collection.

VB

```
Public Overridable ReadOnly Property Count As Integer  Implements _
   ICollection.Count
[C#]
public virtual int Count {get;}
[C++]
public: __property virtual int get_Count();
[JScript]
public function get Count() : int;
```

Property Value

The number of MsDb2Parameter objects in the collection.

Implements

ICollection.Count

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2ParameterCollection.Item Property

Gets or sets the **MsDb2Parameter** with a specified attribute.

.

[C#] In C#, this property is the indexer for the **MsDb2ParameterCollection** class.

Overload List

[Visual Basic] Overloads Public Default Property Item(System.Int32) As MsDb2Parameter

[C#] public MsDb2Parameter this[System.Int32] {get; set;}

[C++] public: __property MsDb2Parameter* get_Item(System.Int32);
public: __property void set_Item(System.Int32, MsDb2Parameter*);

[JScript] MsDb2ParameterCollection.Item (System.Int32)

[Visual Basic] Overloads Public Default Property Item(System.String) As MsDb2Parameter

[C#] public MsDb2Parameter this[System.String] {get; set;}

[C++] public: __property MsDb2Parameter* get_Item(System.String);
public: __property void set_Item(System.String, MsDb2Parameter*);

[JScript] MsDb2ParameterCollection.Item (System.String)

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2ParameterCollection.Item Property (System.Int32)

Gets or sets the **MsDb2Parameter** with a specified attribute.

[C#] In C#, this property is the indexer for the **MsDb2ParameterCollection** class.

VB

```
Overloads Public Default Property Item( _
   ByVal index As Integer _
) As MsDb2Parameter
[C#]
public MsDb2Parameter this[
   int index
] {get; set;}
[C++]
public: __property MsDb2Parameter* get_Item(
   int index
);
public: __property void set_Item(
   int index,
   MsDb2Parameter*
);
[JScript]
returnValue = MsDb2ParameterCollectionObject.Item(index);
MsDb2ParameterCollectionObject.Item(index) = returnValue;
-or-
returnValue = MsDb2ParameterCollectionObject(index);
MsDb2ParameterCollectionObject(index) = returnValue;
```

[JScript] In JScript, you can use the default indexed properties defined by a type, but you cannot explicitly define your own. However, specifying the **expando** attribute on a class automatically provides a default indexed property whose type is **Object** and whose index type is **String**.

Arguments [JScript]

index
The zero-based index of the parameter to retrieve.

Parameters [Visual Basic, C#, C++]

index
The zero-based index of the parameter to retrieve.

Property Value

The MsDb2Parameter at the specified index.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Item Overload List

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MsDb2ParameterCollection.Item Property (System.String)

Gets or sets the **MsDb2Parameter** with the specified name.

[C#] In C#, this property is the indexer for the **MsDb2ParameterCollection** class.

VB

```
Overloads Public Default Property Item( _
   ByVal parameterName As String _
) As MsDb2Parameter
[C#]
public MsDb2Parameter this[
   string parameterName
] {get; set;}
[C++]
public: __property MsDb2Parameter* get_Item(
   String* parameterName
);
public: __property void set_Item(
   String* parameterName,
   MsDb2Parameter*
);
[JScript]
returnValue = MsDb2ParameterCollectionObject.Item(parameterName);
MsDb2ParameterCollectionObject.Item(parameterName) = returnValue;
-or-
returnValue = MsDb2ParameterCollectionObject(parameterName);
MsDb2ParameterCollectionObject(parameterName) = returnValue;
```

[JScript] In JScript, you can use the default indexed properties defined by a type, but you cannot explicitly define your own. However, specifying the **expando** attribute on a class automatically provides a default indexed property whose type is **Object** and whose index type is **String**.

Arguments [JScript]

parameterName
The name of the parameter to retrieve.

Parameters [Visual Basic, C#, C++]

parameterName
The name of the parameter to retrieve.

Property Value

The MsDb2Parameter with the specified name.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Item Overload List

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MsDb2ParameterCollection Methods

This section lists the methods of the **MsDb2ParameterCollection** class. For a complete list of **MsDb2ParameterCollection** class members, see MsDb2ParameterCollection Members.

Public Methods

Add	Overloaded. Adds an **MsDb2Parameter** to the **MsDb2Command**.
Clear	Removes all items from the collection.
Contains	Overloaded. Checks to see if a parameter exists in the collection, based on its name.
CopyTo	Copies **MsDb2Parameter** objects from the **MsDb2ParameterCollection** to the specified array.
Equals (inherited from **System.Object**)	Determines whether two **Object** instances are equal.
GetEnumerator	Retrieves an object that can iterate through the individual characters in this instance.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
IndexOf	Overloaded. Returns the index of the parameter based on its name.
Insert	Inserts an **MsDb2Parameter** in the collection at the specified index.
Remove	Removes the specified **MsDb2Parameter** from the collection.
RemoveAt	Overloaded. Removes the specified **MsDb2Parameter** from the collection.
ToString (inherited from **System.Object**)	Returns a **String** that represents the current **Object**.

Protected Methods

Finalize (inherited from **System.Object**)	Allows the object to attempt to free resources and perform other cleanup operations before the object is reclaimed by the garbage collection. In Microsoft Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2ParameterCollection Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2ParameterCollection.Add Method

Adds an **MsDb2Parameter** to the **MsDb2Command**.

Overload List

[Visual Basic] Overloads Public Function Add(MsDb2Parameter) As MsDb2Parameter

[C#] public MsDb2Parameter Add(MsDb2Parameter);

[C++] public: MsDb2Parameter* Add(MsDb2Parameter*);

[JScript] public function Add(MsDb2Parameter) : MsDb2Parameter;

[Visual Basic] Overloads Public Overridable Function Add(System.Object) As Integer Implements IList.Add

[C#] public virtual int Add(System.Object);

[C++] public: virtual int Add(System.Object);

[JScript] public function Add(System.Object) : int;

[Visual Basic] Overloads Public Function Add(System.String, MsDb2Type) As MsDb2Parameter

[C#] public MsDb2Parameter Add(System.String, MsDb2Type);

[C++] public: MsDb2Parameter* Add(System.String, MsDb2Type);

[JScript] public function Add(System.String, MsDb2Type) : MsDb2Parameter;

[Visual Basic] Overloads Public Function Add(System.String, System.Object) As MsDb2Parameter

[C#] public MsDb2Parameter Add(System.String, System.Object);

[C++] public: MsDb2Parameter* Add(System.String, System.Object);

[JScript] public function Add(System.String, System.Object) : MsDb2Parameter;

[Visual Basic] Overloads Public Function Add(System.String, MsDb2Type, System.Int32) As MsDb2Parameter

[C#] public MsDb2Parameter Add(System.String, MsDb2Type, System.Int32);

[C++] public: MsDb2Parameter* Add(System.String, MsDb2Type, System.Int32);

[JScript] public function Add(System.String, MsDb2Type, System.Int32) : MsDb2Parameter;

[Visual Basic]
Overloads Public Function Add(System.String, MsDb2Type, System.Int32, System.String) As MsDb2Parameter

[C#] public MsDb2Parameter Add(System.String, MsDb2Type, System.Int32, System.String);

[C++] public: MsDb2Parameter* Add(System.String, MsDb2Type, System.Int32, System.String);

[JScript] public function Add(System.String, MsDb2Type, System.Int32, System.String) : MsDb2Parameter;

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2ParameterCollection.Add Method (MsDb2Parameter)

Adds the specified **MsDb2Parameter** to the **MsDb2Command**.

VB

```
Overloads Public Function Add( _
   ByVal value As MsDb2Parameter _
) As MsDb2Parameter
[C#]
public MsDb2Parameter Add(
   MsDb2Parameter value
);
[C++]
public: MsDb2Parameter* Add(
   MsDb2Parameter* value
);
[JScript]
public function Add(
   value : MsDb2Parameter
) : MsDb2Parameter;
```

Parameters

value
The parameter to add to the collection.

Return Value

A reference to the new MsDb2Parameter.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Add Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2ParameterCollection.Add Method (System.Object)

Adds an **MsDb2Parameter** to the **MsDb2Command**.

VB

```
Overloads Public Overridable Function Add( _
   ByVal value As Object _
) As Integer Implements IList.Add
[C#]
public virtual int Add(
   object value
);
[C++]
public: virtual int Add(
   Object* value
);
[JScript]
public function Add(
   value : Object
) : int;
```

Parameters

value
The **MsDb2Parameter** to add to the collection.

Return Value

The index of the new MsDb2Parameter in the collection.

Implements

IList.Add

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Add Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2ParameterCollection.Add Method (System.String, MsDb2Type)

Adds an **MsDb2Parameter** to the **MsDb2Command** given the parameter name and data type.

VB

```
Overloads Public Function Add( _
   ByVal parameterName As String, _
   ByVal db2Type As MsDb2Type _
) As MsDb2Parameter
[C#]
public MsDb2Parameter Add(
   string parameterName,
   MsDb2Type db2Type
);
[C++]
public: MsDb2Parameter* Add(
   String* parameterName,
   MsDb2Type db2Type
);
[JScript]
public function Add(
   parameterName : String,
   db2Type : MsDb2Type
) : MsDb2Parameter;
```

Parameters

parameterName
  The name of the parameter.
MsDb2Type
  The type of parameter.

Return Value

A reference to the new MsDb2Parameter object.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Add Overload List

MsDb2ParameterCollection.Add Method (System.String, System.Object)

Adds an **MsDb2Parameter** to the **MsDb2Command** given the parameter name and value.

VB

```
Overloads Public Function Add( _
   ByVal parameterName As String, _
   ByVal value As Object _
) As MsDb2Parameter
[C#]
public MsDb2Parameter Add(
   string parameterName,
   object value
);
[C++]
public: MsDb2Parameter* Add(
   String* parameterName,
   Object* value
);
[JScript]
public function Add(
   parameterName : String,
   value : Object
) : MsDb2Parameter;
```

Parameters

parameterName
The name of the parameter.
value
The object value of the **MsDb2Parameter** to add to the collection.

Return Value

A reference to the new **MsDb2Parameter**.

Remarks

When you specify an **Object** in the value parameter, the **MsDb2Type** is inferred from the .NET Framework type of the **Object**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Add Overload List

MsDb2ParameterCollection.Add Method (System.String, MsDb2Type, System.Int32)

Adds an **MsDb2Parameter** to the **MsDb2Command** given the parameter name, data type, and column width.

VB

```
Overloads Public Function Add( _
   ByVal parameterName As String, _
   ByVal db2Type As MsDb2Type, _
   ByVal size As Integer _
) As MsDb2Parameter
[C#]
public MsDb2Parameter Add(
   string parameterName,
   MsDb2Type db2Type,
   int size
);
[C++]
public: MsDb2Parameter* Add(
   String* parameterName,
   MsDb2Type db2Type,
   int size
);
[JScript]
public function Add(
   parameterName : String,
   db2Type : MsDb2Type,
   size : int
) : MsDb2Parameter;
```

Parameters

parameterName
  The name of the parameter to add.
db2Type
  One of the **MsDb2Type** values.
size
  The width of the column.

Return Value

A reference to the **MsDb2Parameter** column.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Add Overload List

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MsDb2ParameterCollection.Add Method (System.String, MsDb2Type, System.Int32, System.String)

Adds an **MsDb2Parameter** to the **MsDb2Command** given the parameter name, data type, column width, and source column name.

VB

```
Overloads Public Function Add( _
   ByVal parameterName As String, _
   ByVal db2Type As MsDb2Type, _
   ByVal size As Integer, _
   ByVal sourceColumn As String _
) As MsDb2Parameter
[C#]
public MsDb2Parameter Add(
   string parameterName,
   MsDb2Type db2Type,
   int size,
   string sourceColumn
);
[C++]
public: MsDb2Parameter* Add(
   String* parameterName,
   MsDb2Type db2Type,
   int size,
   String* sourceColumn
);
[JScript]
public function Add(
   parameterName : String,
   db2Type : MsDb2Type,
   size : int,
   sourceColumn : String
) : MsDb2Parameter;
```

Parameters

parameterName
  The name of the parameter to add.
db2Type
  One of the **MsDb2Type** values.
size
  The width of the column.
sourceColumn
  The name of the source column.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Add Overload List

MsDb2ParameterCollection.Clear Method

Removes all items from the collection.

VB

```
Public Overridable Sub Clear() Implements IList.Clear
[C#]
public virtual void Clear();
[C++]
public: virtual void Clear();
[JScript]
public function Clear();
```

Implements

IList.Clear

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2ParameterCollection.Contains Method

Checks to see if a parameter exists in the collection, based on its name.

Overload List

[Visual Basic] Overloads Public Overridable Function Contains(System.Object) As Boolean Implements IList.Contains

[C#] public virtual bool Contains(System.Object);

[C++] public: virtual bool Contains(System.Object);

[JScript] public function Contains(System.Object) : Boolean;

[Visual Basic]
Overloads Public Overridable Function Contains(System.String) As Boolean Implements IDataParameterCollection.Contains

[C#] public virtual bool Contains(System.String);

[C++] public: virtual bool Contains(System.String);

[JScript] public function Contains(System.String) : Boolean;

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2ParameterCollection.Contains Method (System.Object)

Checks to see if a parameter exists in the collection, based on its name.

VB

```
Overloads Public Overridable Function Contains( _
   ByVal value As Object _
) As Boolean Implements IList.Contains
[C#]
public virtual bool Contains(
   object value
);
[C++]
public: virtual bool Contains(
   Object* value
);
[JScript]
public function Contains(
   value : Object
) : Boolean;
```

Parameters

value
The value of the **MsDb2Parameter** to find.

Return Value

true if the collection contains the **MsDb2Parameter**; otherwise, **false**.

Implements

IList.Contains

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Contains Overload List

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MsDb2ParameterCollection.Contains Method (System.String)

Gets a value indicating whether an **MsDb2Parameter** with the specified parameter name exists in the collection.

VB

```
Overloads Public Overridable Function Contains( _
   ByVal value As String _
) As Boolean Implements IDataParameterCollection.Contains
[C#]
public virtual bool Contains(
   string value
);
[C++]
public: virtual bool Contains(
   String* value
);
[JScript]
public function Contains(
   value : String
) : Boolean;
```

Parameters

value
The name of the parameter.

Return Value

true if the collection contains the parameter; otherwise, **false**.

Implements

IDataParameterCollection.Contains

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.Contains Overload List

MsDb2ParameterCollection.CopyTo Method

Copies **MsDb2Parameter** objects from the **MsDb2ParameterCollection** to the specified array.

VB

```
Public Overridable Sub CopyTo( _
   ByVal array As Array, _
   ByVal index As Integer _
) Implements ICollection.CopyTo
[C#]
public virtual void CopyTo(
   Array array,
   int index
);
[C++]
public: virtual void CopyTo(
   Array* array,
   int index
);
[JScript]
public function CopyTo(
   array : Array,
   index : int
);
```

Parameters

array
The array into which to copy the **MsDb2Parameter**.
index
The starting index of the array.

Implements

ICollection.CopyTo

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2ParameterCollection.GetEnumerator Method

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

VB

```
Public Overridable Function GetEnumerator() As IEnumerator _
   Implements IEnumerable.GetEnumerator
[C#]
public virtual IEnumerator GetEnumerator();
[C++]
public: virtual IEnumerator* GetEnumerator();
[JScript]
public function GetEnumerator() : IEnumerator;
```

Implements

IEnumerable.GetEnumerator

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsDb2ParameterCollection.IndexOf Method

Gets the location of the **MsDb2Parameter** in the collection.

Overload List

[Visual Basic] Overloads Public Overridable Function IndexOf(System.Object) As Integer Implements IList.IndexOf

[C#] public virtual int IndexOf(System.Object);

[C++] public: virtual int IndexOf(System.Object);

[JScript] public function IndexOf(System.Object) : int;

[Visual Basic]
Overloads Public Overridable Function IndexOf(System.String) As Integer Implements IDataParameterCollection.IndexOf

[C#] public virtual int IndexOf(System.String);

[C++] public: virtual int IndexOf(System.String);

[JScript] public function IndexOf(System.String) : int;

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2ParameterCollection.IndexOf Method (System.Object)

Gets the location of the **MsDb2Parameter** in the collection.

VB

```
Overloads Public Overridable Function IndexOf( _
   ByVal value As Object _
) As Integer Implements IList.IndexOf
[C#]
public virtual int IndexOf(
   object value
);
[C++]
public: virtual int IndexOf(
   Object* value
);
[JScript]
public function IndexOf(
   value : Object
) : int;
```

Parameters

value
The **MsDb2Parameter** to locate.

Return Value

The zero-based location of the **MsDb2Parameter** in the collection.

Implements

IList.IndexOf

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.IndexOf Overload List

MsDb2ParameterCollection.IndexOf Method (System.String)

Gets the location of the **MsDb2Parameter** in the collection with the specified parameter name.

VB

```
Overloads Public Overridable Function IndexOf( _
   ByVal parameterName As String _
) As Integer Implements IDataParameterCollection.IndexOf
[C#]
public virtual int IndexOf(
   string parameterName
);
[C++]
public: virtual int IndexOf(
   String* parameterName
);
[JScript]
public function IndexOf(
   parameterName : String
) : int;
```

Parameters

parameterName
Name of the parameter to return the index of.

Return Value

The location of the **MsDb2Parameter** in the collection.

Implements

IDataParameterCollection.IndexOf

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.IndexOf Overload List

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MsDb2ParameterCollection.Insert Method

Inserts an **MsDb2Parameter** into the collection at the specified index.

VB

```
Public Overridable Sub Insert( _
   ByVal index As Integer, _
   ByVal value As Object _
) Implements IList.Insert
[C#]
public virtual void Insert(
   int index,
   object value
);
[C++]
public: virtual void Insert(
   int index,
   Object* value
);
[JScript]
public function Insert(
   index : int,
   value : Object
);
```

Parameters

index
The zero-based index where the parameter is to be inserted into the collection.
value
The **MsDb2Parameter** to add to the collection.

Implements

IList.Insert

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2ParameterCollection.Remove Method

Removes the specified **MsDb2Parameter** from the collection.

VB

```
Public Overridable Sub Remove( _
   ByVal value As Object _
) Implements IList.Remove
[C#]
public virtual void Remove(
   object value
);
[C++]
public: virtual void Remove(
   Object* value
);
[JScript]
public function Remove(
   value : Object
);
```

Parameters

value
The **MsDb2Parameter** to remove from the collection.

Implements

IList.Remove

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2ParameterCollection.RemoveAt Method

Removes the specified **MsDb2Parameter** from the collection.

Overload List

[Visual Basic] Overloads Public Overridable Sub RemoveAt(System.Int32) Implements IList.RemoveAt

[C#] public virtual void RemoveAt(System.Int32);

[C++] public: virtual void RemoveAt(System.Int32);

[JScript] public function RemoveAt(System.Int32);

[Visual Basic]
Overloads Public Overridable Sub RemoveAt(System.String) Implements IDataParameterCollection.RemoveAt

[C#] public virtual void RemoveAt(System.String);

[C++] public: virtual void RemoveAt(System.String);

[JScript] public function RemoveAt(System.String);

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2ParameterCollection.RemoveAt Method (System.Int32)

Removes the **MsDb2Parameter** at the specified index from the collection.

VB

```
Overloads Public Overridable Sub RemoveAt( _
   ByVal index As Integer _
) Implements IList.RemoveAt
[C#]
public virtual void RemoveAt(
   int index
);
[C++]
public: virtual void RemoveAt(
   int index
);
[JScript]
public function RemoveAt(
   index : int
);
```

Parameters

index
The zero-based index of the parameter to remove.

Implements

IList.RemoveAt

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.RemoveAt Overload List

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MsDb2ParameterCollection.RemoveAt Method (System.String)

Removes the **MsDb2Parameter** at the specified name from the collection.

VB

```
Overloads Public Overridable Sub RemoveAt( _
   ByVal parameterName As String _
) Implements IDataParameterCollection.RemoveAt
[C#]
public virtual void RemoveAt(
   string parameterName
);
[C++]
public: virtual void RemoveAt(
   String* parameterName
);
[JScript]
public function RemoveAt(
   parameterName : String
);
```

Parameters

parameterName
  Name of the parameter to remove.

Implements

IDataParameterCollection.RemoveAt

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2ParameterCollection Class | MsDb2ParameterCollection Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide | MsDb2ParameterCollection.RemoveAt Overload List

MsDb2Transaction Class

Describes a transaction to be performed at a data source.

For a list of all members of this type, see MsDb2Transaction Members.

System.Object
  Microsoft.HostIntegration.MsDb2Client.MsDb2Transaction

VB

```
Public Class MsDb2Transaction
   Implements IDbTransaction, IDisposable
[C#]
public class MsDb2Transaction : IDbTransaction, IDisposable
[C++]
public __gc class MsDb2Transaction : public IDbTransaction,
   IDisposable
[JScript]
public class MsDb2Transaction implements IDbTransaction,
   IDisposable
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Remarks

MsDb2Transaction contains an implementation of the **IdbTransaction** interface.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

MsDb2Transaction Members | Microsoft.HostIntegration.MsDb2Client Namespace |
Managed Provider for DB2 Programmer's Guide

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MsDb2Transaction Members

MsDb2Transaction overview

Public Properties

Connection	Gets the connection that owns the transaction.
IsComplete	Gets a value that describes if the transaction is complete.
IsolationLevel	Gets the isolation level of the transaction as defined by the .NET values.

Public Methods

Commit	Commits all of the SQL commands that have been executed since the beginning of the transaction.
Dispose	Disposes of the resources used by the current instance.
Equals (inherited from **System.Object**)	Overloaded. Determines whether two **Object** instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance.
Rollback	Rolls back all of the SQL commands that have been executed since the beginning of the transaction.
ToString (inherited from **System.Object**)	Returns a string that represents the current **Object**.

Protected Methods

Finalize (inherited from **System.Object**)	Frees resources before the **MsDb2Transaction** is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current **Object**.

See Also

MsDb2Transaction Class | Microsoft.HostIntegration.MsDb2Client Namespace

MsDb2Transaction Properties

This section lists the properties of the **MsDb2Transaction** class. For a complete list of **MsDb2Transaction** class members, see MsDb2Transaction Members.

Public Properties

Connection	Gets the connection that owns the transaction.
IsComplete	Gets a value that describes if the transaction is complete.
IsolationLevel	Gets the isolation level of the transaction as defined by the .NET values.

See Also

MsDb2Transaction Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Transaction.Connection Property

Gets the connection that owns the transaction.

VB

```
Public ReadOnly Property Connection As MsDb2Connection
[C#]
public MsDb2Connection Connection {get;}
[C++]
public: __property MsDb2Connection* get_Connection();
[JScript]
public function get Connection() : MsDb2Connection;
```

Property Value

An **IDbConnection** containing the connection that owns the transaction, or a null reference (**Nothing** in Microsoft Visual Basic) if the transaction is no longer valid.

Remarks

A transaction can have only one parent connection.

A single application may have multiple database connections, each with zero or more transactions. This property enables you to determine the connection object associated with a particular transaction created by BeginTransaction.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Transaction Class | MsDb2Transaction Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Transaction.IsComplete Property

Gets a value that describes if the transaction is complete.

VB

```
Public ReadOnly Property IsComplete As Boolean
[C#]
public bool IsComplete {get;}
[C++]
public: __property bool get_IsComplete();
[JScript]
public function get IsComplete() : Boolean;
```

Property Value

true if the transaction is complete; otherwise, **false**. The default value is **false**.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Transaction Class | MsDb2Transaction Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Transaction.IsolationLevel Property

Gets the isolation level of the transaction as defined by the .NET values.

VB

```
Public Overridable ReadOnly Property IsolationLevel As _
   IsolationLevel  Implements IDbTransaction.IsolationLevel
[C#]
public virtual IsolationLevel IsolationLevel {get;}
[C++]
public: __property virtual IsolationLevel get_IsolationLevel();
[JScript]
public function get IsolationLevel() : IsolationLevel;
```

Implements

IDbTransaction.IsolationLevel

Property Value

IsolationLevel containing the isolation level of the transaction as defined by the .NET values. The default is **ReadCommitted**.

The following table describes the possible values for **IsolationLevel**.

Member name	Description
Chaos	The pending changes from more highly isolated transactions cannot be overwritten.
ReadCommitted	Shared locks are held while the data is being read to avoid dirty reads, but the data can be changed before the end of the transaction, resulting in nonrepeatable reads or phantom data.
ReadUncommitted	A dirty read is possible, meaning that no shared locks are issued, and no exclusive locks are honored.
RepeatableRead	Locks are placed on all data that is used in a query, preventing other users from updating the data. Prevents non-repeatable reads, but phantom rows are still possible.
Serializable	A range lock is placed on the **DataSet**, preventing other users from updating or inserting rows into the **DataSet** until the transaction is complete.
Unspecified	A different isolation level than the one specified is being used, but the level cannot be determined.

Remarks

Parallel transactions are not supported. Therefore, the **IsolationLevel** applies to the entire transaction.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Transaction Class | MsDb2Transaction Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Transaction Methods

This section lists the methods of the **MsDb2Transaction** class. For a complete list of **MsDb2Transaction** class members, see MsDb2Transaction Members.

Public Methods

Commit	Commits all of the SQL commands that have been executed since the beginning of the transaction.
Dispose	Disposes of the resources used by the current instance.
Equals (inherited from **System.Object**)	Determines whether two **Objects** are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for a particular type, suitable for use in hashing algorithms and data structures like a hash table.
GetType (inherited from **System.Object**)	Gets the **Type** of the current instance..
Rollback	Rolls back all of the SQL commands that have been executed since the beginning of the transaction.
ToString (inherited from **System.Object**)	Returns a string that represents the current **Object**.

Protected Methods

Finalize (inherited from **System.Object**)	Overridden. Frees resources before the **MsDb2Transaction** is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current Object.

See Also

MsDb2Transaction Class | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Transaction.Commit Method

Commits all of the SQL commands that have been executed since the beginning of the transaction.

VB

```
Public Overridable Sub Commit() Implements IDbTransaction.Commit
[C#]
public virtual void Commit();
[C++]
public: virtual void Commit();
[JScript]
public function Commit();
```

Implements

IDbTransaction.Commit

Exceptions

Exception	Situation
ConnectionNotOpenException	There is no connection.

Remarks

Calling **Commit** persists the **Insert**, **Update**, **Delete**, and similar commands on the DB2 system.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Transaction Class | MsDb2Transaction Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

MsDb2Transaction.Dispose Method

Disposes of the resources used by the current instance.

VB

```
Public Overridable Sub Dispose() Implements IDisposable.Dispose
[C#]
public virtual void Dispose();
[C++]
public: virtual void Dispose();
[JScript]
public function Dispose();
```

Implements

IDisposable.Dispose

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Transaction Class | MsDb2Transaction Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Transaction.Rollback Method

Rolls back all of the SQL commands that have been executed since the beginning of the transaction.

VB

```
Public Overridable Sub Rollback() Implements _
   IDbTransaction.Rollback
[C#]
public virtual void Rollback();
[C++]
public: virtual void Rollback();
[JScript]
public function Rollback();
```

Implements

IDbTransaction.Rollback

Exceptions

Exception	Situation
ConnectionNotOpenException	There is no connection.

Remarks

Calling **Rollback** rejects and rolls back the **Insert**, **Update**, **Delete**, and similar commands on the DB2 system.

The transaction can only be rolled back from a pending state (after **BeginTransaction** has been called, but before **Commit** is called).

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

MsDb2Transaction Class | MsDb2Transaction Members | Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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MsDb2Type Enumeration

Specifies the data type of a field, a property, or an **MsDb2Parameter**.

VB

```
<Serializable>
Public Enum MsDb2Type
[C#]
[Serializable]
public enum MsDb2Type
[C++]
[Serializable]
__value public enum MsDb2Type
[JScript]
public
   Serializable
enum MsDb2Type
```

Remarks

The following table shows mappings between **MsDb2Type** data types, OLE DB data types (shown in parentheses), and .NET Framework types.

Members

Member name	Description
BigInt	A 64-bit signed integer (DBTYPE_I8). This maps to **Int64**.
Binary	A stream of binary data (DBTYPE_BYTES). This maps to an Array of type **Byte**.
Bit	A Boolean value (DBTYPE_BOOL). This maps to **Boolean**.
Char	A character string (DBTYPE_STR). This maps to **String**.
Date	Date data, stored as a double (DBTYPE_DATE). The whole portion is the number of days since December 30, 1899, while the fractional portion is a fraction of a day. This maps to **DateTime**.
Decimal	fixed precision and scale numeric value between -1038 -1 and 10 38 -1 (DBTYPE_DECIMAL). This maps to **Decimal**.
Double	A floating point number within the range of -1.79E +308 through 1.79E +308 (DBTYPE_R8). This maps to **Double**.
Int	A 32-bit signed integer (DBTYPE_I4). This maps to **Int32**.o
Numeric	An exact numeric value with a fixed precision and scale (DBTYPE_NUMERIC). This maps to **Decimal**.
Real	Signed, approximate, numeric value with a binary precision 24 (zero or absolute value 10[–38] to 10[38]). (SQL_REAL). This maps to **Single**.
SmallInt	A 16-bit signed integer (DBTYPE_I2). This maps to **Int16**.
Time	Time data in the format hhmmss (DBTYPE_DBTIME). This maps to **TimeSpan**.
Timestamp	Data and time data in the format yyyymmddhhmmss (DBTYPE_DBTIMESTAMP). This maps to **DateTime**.
TinyInt	A 8-bit signed integer (DBTYPE_I1). This maps to **SByte**.
VarBinary	A variable-length stream of binary data (OleDbParameter only). This maps to an Array of type **Byte**.
VarChar	A variable-length stream of non-Unicode characters (OleDbParameter only). This maps to **String**.
VarWideChar	A variable-length, null-terminated stream of Unicode characters (OleDbParameter only). This maps to **String**.
WideChar	A null-terminated stream of Unicode characters (DBTYPE_WSTR). This maps to **String**.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server ™2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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UnitsOfWorkType Enumeration

The type of transaction supported by the provider.

VB

```
<Serializable>
Public Enum UnitsOfWorkType
[C#]
[Serializable]
public enum UnitsOfWorkType
[C++]
[Serializable]
__value public enum UnitsOfWorkType
[JScript]
public
   Serializable
enum UnitsOfWorkType
```

Members

Member name	Description
DistributedUnitOfWork	Distributed units of work. This option is currently not supported.
RemoteUnitOfWork	Remote units of work.

Requirements

Namespace: Microsoft.HostIntegration.MsDb2Client

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Msdb2client (in Microsoft.Hostintegration.Msdb2client.dll)

See Also

Microsoft.HostIntegration.MsDb2Client Namespace | Managed Provider for DB2 Programmer's Guide

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Data Access Library Programmer's Reference

The Data Access Library interface enables users to automate lengthy tasks normally performed through the Data Access Tool (DAT) user interface. This section provides the reference material needed to program the Data Access Library.

For information about the DAT, see About the Data Access Library Interface.

For general information about programming the Data Access Library, see the Data Access Library Programmer's Guide.

This section contains:

- Microsoft.HostIntegration.DataAccessLibrary Namespace
- BasicConnectionString Class
- ConnectionException Class
- CreatePackagesStatus Delegate
- DataAccessControl Class
- DataAccessSettings Class
- DB2OdbcConnectionString Class
- DB2OdbcFileConnectionString Class
- DB2OdbcRegConnectionString Class
- DB2OdbcSysConnectionString Class
- DB2OdbcUserConnectionString Class
- FileSysOleDbConnectionString Class
- DB2OleDbConnectionString Class
- HCDColumn Class
- HCDDataType Structure
- HCDDataTypes Class
- HCDFile Class
- HCDTable Class
- IConnectionString Class
- IHCDItem Class
- OleDbConnectionString Class

Microsoft.HostIntegration.DataAccessLibrary Namespace

The **Microsoft.HostIntegration.DataAccessLibrary** namespace contains objects that describe how to programmatically access the Data Access Tool.

Namespace hierarchy

Classes

Class	Description
BasicConnectionString	Describes a basic connection string.
ConnectionException	The exception that is thrown when an error occurs during a test connection.
DataAccessControl	Describes the data access control.
DataAccessSettings	Controls the computer settings for the Data Access Tool and Data Access Library.
DB2OdbcConnectionString	Describes a DB2 ODBC connection string.
DB2OdbcFileConnectionString	Describes a DB2 ODBC file connection string.
DB2OdbcRegConnectionString	Describes the DB2 ODBC registration connection string.
DB2OdbcSysConnectionString	Describes a DB2 ODBC system connection string.
DB2OdbcUserConnectionString	Describes a DB2 ODBC user connection string.
DB2OleDbConnectionString	Contains the DB2 OLEDB connection string.
FileSysOleDbConnectionString	Contains a file system OLEDB connection string.
HCDColumn	A host column description (HCD) file column.
HCDDataTypes	The collection of host and PC data types used in HCD items.
HCDFile	Describes a HCD file that can be used to connect to host file systems.
HCDTable	Describes a table within a HCD file.
IConnectionString	Represents a generic connection string.
IHCDItem	Provides the interface for loading, saving, deleting, and renaming an HCD item.
OleDbConnectionString	Describes an OLE DB connection string.

Structures

Structure	Description
HCDDataType	An allowable data type for an HCD item.

Delegates

Delegate	Description
CreatePackagesStatus	A delegate callback that is called when a status string message is available during the create package process.

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Microsoft.HostIntegration.DataAccessLibrary Hierarchy

- System.Object
  - Microsoft.HostIntegration.DataAccessLibrary.DataAccessControl
  - Microsoft.HostIntegration.DataAccessLibrary.DataAccessSettings
  - Microsoft.HostIntegration.DataAccessLibrary.HCDDataTypes
  - Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    - Microsoft.HostIntegration.DataAccessLibrary.BasicConnectionString
    - Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcConnectionString
      - Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcFileConnectionString
      - Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcRegConnectionString
        - Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcSysConnectionString
        - Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcUserConnectionString
    - Microsoft.HostIntegration.DataAccessLibrary.OleDbConnectionString
      - Microsoft.HostIntegration.DataAccessLibrary.DB2OleDbConnectionString
      - Microsoft.HostIntegration.DataAccessLibrary.FileSysOleDbConnectionString
  - Microsoft.HostIntegration.DataAccessLibrary.IHCDItem
    - Microsoft.HostIntegration.DataAccessLibrary.HCDColumn
    - Microsoft.HostIntegration.DataAccessLibrary.HCDFile
    - Microsoft.HostIntegration.DataAccessLibrary.HCDTable
  - System.Delegate
    - System.MulticastDelegate
      - Microsoft.HostIntegration.DataAccessLibrary.CreatePackagesStatus
  - System.Exception
    - Microsoft.HostIntegration.DataAccessLibrary.ConnectionException
  - System.ValueType
    - Microsoft.HostIntegration.DataAccessLibrary.HCDDataType

See Also

Microsoft.HostIntegration.DataAccessLibrary Namespace

BasicConnectionString Class

Describes a basic connection string.

For a list of all members of this type, see BasicConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.BasicConnectionString

VB

```
<Serializable>
Public Class BasicConnectionString
   Inherits IConnectionString
[C#]
[Serializable]
public class BasicConnectionString : IConnectionString
[C++]
[Serializable]
public __gc class BasicConnectionString : public IConnectionString
[JScript]
public
   Serializable
class BasicConnectionString extends IConnectionString
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace | Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

BasicConnectionString Members

BasicConnectionString overview

Public Constructors

BasicConnectionString Constructor	Overloaded. Initializes a new instance of the **BasicConnectionString** class.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of data base that the connection string connects to.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local LU name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name (inherited from **IConnectionString**)	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.

PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).
UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Overridden. Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Overridden. Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save	Overridden. Saves the connection string.
SetString	Overridden. Sets current string.
ToString (inherited from **System.Object**)	Returns a string that represents the current connection string.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
InternalDelete	Overridden. Deletes the connection string.
InternalRename	Overridden. Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

BasicConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

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BasicConnectionString Constructor

Creates a new instance of the **BasicConnectionString** class.

Overload List

Creates a new instance of the **BasicConnectionString** class.

[Visual Basic] Public Sub New()

[C#] public BasicConnectionString();

[C++] public: BasicConnectionString();

[JScript] public function BasicConnectionString();

Creates a new instance of the **BasicConnectionString** class using the specified connection string.

[Visual Basic] Public Sub New(IConnectionString)

[C#] public BasicConnectionString(IConnectionString);

[C++] public: BasicConnectionString(IConnectionString*);

[JScript] public function BasicConnectionString(IConnectionString);

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

BasicConnectionString Constructor ()

Initializes a new instance of the BasicConnectionString class.

VB

```
Public Sub New()
[C#]
public BasicConnectionString();
[C++]
public: BasicConnectionString();
[JScript]
public function BasicConnectionString();
```

Remarks

The default constructor initializes any fields to their default values.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace | BasicConnectionString Constructor Overload List| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

BasicConnectionString Constructor (IConnectionString)

Initializes a new instance of the BasicConnectionString class using the specified connection string.

VB

```
Public Sub New( _
   ByVal connStr As IConnectionString _
)
[C#]
public BasicConnectionString(
   IConnectionString connStr
);
[C++]
public: BasicConnectionString(
   IConnectionString* connStr
);
[JScript]
public function BasicConnectionString(
   connStr : IConnectionString
);
```

Parameters

connStr
Connection string for the new instance.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace | BasicConnectionString Constructor Overload List| Data Access Library Programmer's Guide

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BasicConnectionString Methods

The methods of the **BasicConnectionString** class are listed here. For a complete list of **BasicConnectionString** class members, see the BasicConnectionString Members topic.

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Overridden. Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Overridden. Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save	Overridden. Saves the connection string.
SetString	Overridden. Sets current string.
ToString (inherited from **System.Object**)	Returns a string that represents the current connection string.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
InternalDelete	Overridden. Deletes the connection string.
InternalRename	Overridden. Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

BasicConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

BasicConnectionString.Clone Method

Creates a deep copy of the current instance.

VB

```
Overrides Public Function Clone() As IConnectionString
[C#]
public override IConnectionString Clone();
[C++]
public: IConnectionString* Clone();
[JScript]
public override function Clone() : IConnectionString;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

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BasicConnectionString.Exists Method

Determines if the current instance is abstract or actually represents a connection string.

VB

```
Overrides Public Function Exists() As Boolean
[C#]
public override bool Exists();
[C++]
public: bool Exists();
[JScript]
public override function Exists() : Boolean;
```

Return value

true if the current instance is a connection string; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace

BasicConnectionString.GetString Method

Returns the connection string of the current instance.

VB

```
Overrides Public Function GetString() As String
[C#]
public override string GetString();
[C++]
public: String* GetString();
[JScript]
public override function GetString() : String;
```

Return value

The connection string of the current instance.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

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BasicConnectionString.InternalDelete Method

Deletes the connection string.

VB

```
Overrides Protected Function InternalDelete() As Boolean
[C#]
protected override bool InternalDelete();
[C++]
protected: bool InternalDelete();
[JScript]
protected override function InternalDelete() : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

BasicConnectionString.InternalRename Method

Renames the connection string.

VB

```
Overrides Protected Sub InternalRename( _
   ByVal destIdentifier As String _
)
[C#]
protected override void InternalRename(
   string destIdentifier
);
[C++]
protected: void InternalRename(
   String* destIdentifier
);
[JScript]
protected override function InternalRename(
   destIdentifier : String
);
```

Parameters

destIdentifier
New name of the connection string.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

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BasicConnectionString.Load Method

Loads the current instance.

VB

```
Overrides Public Sub Load()
[C#]
public override void Load();
[C++]
public: void Load();
[JScript]
public override function Load();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

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BasicConnectionString.Save Method

Saves the connection string.

VB

```
Overrides Public Sub Save()
[C#]
public override void Save();
[C++]
public: void Save();
[JScript]
public override function Save();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

BasicConnectionString.SetString Method

Sets the connection string.

VB

```
Overrides Public Sub SetString( _
   ByVal val As String _
)
[C#]
public override void SetString(
   string val
);
[C++]
public: void SetString(
   String* val
);
[JScript]
public override function SetString(
   val : String
);
```

Parameters

val

Value to set the connection string to.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

BasicConnectionString Class | BasicConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

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ConnectionException Class

The exception that is thrown when an error occurs during a test connection.

For a list of all members of this type, see ConnectionException Members.

System.Object
  System.Exception
    Microsoft.HostIntegration.DataAccessLibrary.ConnectionException

VB

```
<Serializable>
NotInheritable Public Class ConnectionException
   Inherits Exception
[C#]
[Serializable]
public sealed class ConnectionException : Exception
[C++]
[Serializable]
public __gc __sealed class ConnectionException : public Exception
[JScript]
public
   Serializable
class ConnectionException extends Exception
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

ConnectionException Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ConnectionException Members

ConnectionException overview

Public Constructors

ConnectionException Constructor	Overloaded. Initializes a new instance of the **ConnectionException** class.

Public Properties

HelpLink (inherited from **System.Exception**)	Gets or sets a link to the help file associated with this exception.
InnerException (inherited from **System.Exception**)	Gets the **Exception** instance that caused the current exception.
Message (inherited from **System.Exception**)	Gets a message that describes the current exception.
Source (inherited from **System.Exception**)	Gets or sets the name of the application or the object that causes the error.
StackTrace (inherited from **System.Exception**)	Gets a string representation of the frames on the call stack at the time the current exception was thrown.
TargetSite (inherited from **System.Exception**)	Gets the method that throws the current exception.

Public Methods

Equals (inherited from **System.Object**)	Determines whether two instances are equal.
GetBaseException (inherited from **System.Exception**)	Returns the exception that is the root cause of one or more subsequent exceptions.
GetHashCode (inherited from **System.Object**)	Servers as a hash function.
GetObjectData (inherited from **System.Exception**)	Gets the serialization information about the exception.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
ToString (inherited from **System.Exception**)	Creates and returns a string representation of the current exception.

Protected Properties

HResult (inherited from **System.Exception**)	Gets or sets HRESULT, a coded numerical value that is assigned to a specific exception.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the object is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current object.

See Also

ConnectionException Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

ConnectionException Constructor

Initializes a new instance of the **ConnectionException** class.

Overload List

Initializes a new instance of the **ConnectionException** class.

[Visual Basic] Public Sub New()

[C#] public ConnectionException();

[C++] public: ConnectionException();

[JScript] public function ConnectionException();

Initializes a new instance of the **ConnectionException** class.

[Visual Basic] Public Sub New(System.String)

[C#] public ConnectionException(System.String);

[C++] public: ConnectionException(System.String);

[JScript] public function ConnectionException(System.String);

Initializes a new instance of the **ConnectionException** class.

[Visual Basic] Public Sub New(System.Runtime.Serialization.SerializationInfo, System.Runtime.Serialization.StreamingContext)

[C#]
public ConnectionException(System.Runtime.Serialization.SerializationInfo, System.Runtime.Serialization.StreamingContext);

[C++]
public: ConnectionException(System.Runtime.Serialization.SerializationInfo, System.Runtime.Serialization.StreamingContext);

[JScript]
public function ConnectionException(System.Runtime.Serialization.SerializationInfo, System.Runtime.Serialization.StreamingContext);

Initializes a new instance of the **ConnectionException** class.

[Visual Basic] Public Sub New(System.String, System.Exception)

[C#] public ConnectionException(System.String, System.Exception);

[C++] public: ConnectionException(System.String, System.Exception);

[JScript] public function ConnectionException(System.String, System.Exception);

See Also

ConnectionException Class | ConnectionException Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

ConnectionException Constructor ()

Initializes a new instance of the ConnectionException class.

VB

```
Public Sub New()
[C#]
public ConnectionException();
[C++]
public: ConnectionException();
[JScript]
public function ConnectionException();
```

Remarks

The default constructor initializes any fields to their default values.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

ConnectionException Class | ConnectionException Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | ConnectionException Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ConnectionException Constructor (System.String)

Initializes a new instance of the ConnectionException class using the specified error message.

VB

```
Public Sub New( _
   ByVal s As String _
)
[C#]
public ConnectionException(
   string s
);
[C++]
public: ConnectionException(
   String* s
);
[JScript]
public function ConnectionException(
   s : String
);
```

Parameters

s

The message that describes the error.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

ConnectionException Class | ConnectionException Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | ConnectionException Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ConnectionException Constructor (System.Runtime.Serialization.SerializationInfo, System.Runtime.Serialization.StreamingContext)

Initializes a new instance of the ConnectionException class with serialized data.

VB

```
Public Sub New( _
   ByVal i As SerializationInfo, _
   ByVal c As StreamingContext _
)
[C#]
public ConnectionException(
   SerializationInfo i,
   StreamingContext c
);
[C++]
public: ConnectionException(
   SerializationInfo* i,
   StreamingContext c
);
[JScript]
public function ConnectionException(
   i : SerializationInfo,
   c : StreamingContext
);
```

Parameters

i
  The **SerializationInfo** that holds the serialized object data about the exception being thrown.
c
  The **StreamingContext** that contains contextual information about the source or destination.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

ConnectionException Class | ConnectionException Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | ConnectionException Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ConnectionException Constructor (System.String, System.Exception)

Initializes a new instance of the ConnectionException class with a specified error message and a reference to the inner exception that is the cause of this exception.

VB

```
Public Sub New( _
   ByVal s As String, _
   ByVal e As Exception _
)
[C#]
public ConnectionException(
   string s,
   Exception e
);
[C++]
public: ConnectionException(
   String* s,
   Exception* e
);
[JScript]
public function ConnectionException(
   s : String,
   e : Exception
);
```

Parameters

s
The error message that explains the reason for the exception.

e
The exception that is the cause of the current exception.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

ConnectionException Class | ConnectionException Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | ConnectionException Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CreatePackagesStatus Delegate

A delegate callback that is called when a status string message is available during the create package process.

VB

```
<Serializable>
Public Delegate Sub CreatePackagesStatus( _
   ByVal status As String _
)
[C#]
[Serializable]
public delegate void CreatePackagesStatus(
   string status
);
[C++]
[Serializable]
public __gc __delegate void CreatePackagesStatus(
   String* status
);
```

[JScript] In JScript®, you can use the delegates in the .NET Framework, but you cannot define your own parameters.

[Visual Basic, C#, C++]

The declaration of your callback method must have the same parameters as the **CreatePackagesStatus** delegate declaration.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

Microsoft.HostIntegration.DataAccessLibrary Namespace | Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessControl Class

Describes the Data Access control.

For a list of all members of this type, see DataAccessControl Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.DataAccessControl

VB

```
Public Class DataAccessControl
[C#]
public class DataAccessControl
[C++]
public __gc class DataAccessControl
[JScript]
public class DataAccessControl
```

Thread Safety

Any public static (**Shared** in Visual Basic) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

DataAccessControl Members | Microsoft.HostIntegration.DataAccessLibrary Namespace

DataAccessControl Members

DataAccessControl overview

Public Constructors

DataAccessControl Constructor	Initializes a new instance of the **DataAccessControl** class.

Public Methods

S ConvertTo	Converts a DB2 connection string to a DB2 connection string of another type.
S CreatePackages	Creates DB2 packages for a specific DB2 data source.
Equals (inherited from **System.Object**)	Determines if two instances are equal.
GetHashCode (inherited from **System.Object**)	Acts as a hash function.
GetType (inherited from **System.Object**)	Returns the type of the current instance.
S SampleQuery	Performs a sample query that fetches a list of available tables or files from a data source.
S TestConnection	Performs a test connection on a data source.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

DataAccessControl Class | Microsoft.HostIntegration.DataAccessLibrary Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessControl Constructor

Initializes a new instance of the DataAccessControl class.

VB

```
Public Sub New()
[C#]
public DataAccessControl();
[C++]
public: DataAccessControl();
[JScript]
public function DataAccessControl();
```

Remarks

The default constructor initializes any fields to their default values.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessControl Class | DataAccessControl Members | Microsoft.HostIntegration.DataAccessLibrary Namespace | Data Access Library Programmer's Guide

DataAccessControl Methods

The methods of the **DataAccessControl** class are listed here. For a complete list of **DataAccessControl** class members, see the DataAccessControl Members topic.

Public Methods

ConvertTo	Converts a DB2 connection string to a DB2 connection string of another type.
CreatePackages	Creates DB2 packages for a specific DB2 data source.
Equals (inherited from **System.Object**)	Determines if two instances are equal.
GetHashCode (inherited from **System.Object**)	Acts as a hash function.
GetType (inherited from **System.Object**)	Returns the type of the current instance.
SampleQuery	Performs a sample query that fetches a list of available tables or files from a data source.
TestConnection	Performs a test connection on a data source.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

DataAccessControl Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessControl.ConvertTo Method

Converts a DB2 connection string to a DB2 connection string of another type.

VB

```
Public Shared Function ConvertTo( _
   ByVal connStr As IConnectionString, _
   ByVal destType As Type _
) As IConnectionString
[C#]
public static IConnectionString ConvertTo(
   IConnectionString connStr,
   Type destType
);
[C++]
public: static IConnectionString* ConvertTo(
   IConnectionString* connStr,
   Type* destType
);
[JScript]
public static function ConvertTo(
   connStr : IConnectionString,
   destType : Type
) : IConnectionString;
```

Parameters

connStr
The source connection string.
destType
The type of the output connection string, such as typeof(DB2OleDbConnectionString).

Return Value

A new connection string.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessControl Class | DataAccessControl Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessControl.CreatePackages Method

Creates DB2 packages for a specific DB2 data source.

VB

```
Public Shared Function CreatePackages( _
   ByVal connStr As IConnectionString, _
   ByVal callback As CreatePackagesStatus _
) As Boolean
[C#]
public static bool CreatePackages(
   IConnectionString connStr,
   CreatePackagesStatus callback
);
[C++]
public: static bool CreatePackages(
   IConnectionString* connStr,
   CreatePackagesStatus* callback
);
[JScript]
public static function CreatePackages(
   connStr : IConnectionString,
   callback : CreatePackagesStatus
) : Boolean;
```

Parameters

connStr
The connection string to the data source.
callback
A CreatePackagesStatus containing a delegate that receives status messages.

Return Value

true if the call succeeded; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessControl Class | DataAccessControl Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessControl.SampleQuery Method

Performs a sample query that fetches a list of available tables or files from a data source.

VB

```
Public Shared Function SampleQuery( _
   ByVal connStr As IConnectionString _
) As DataTable
[C#]
public static DataTable SampleQuery(
   IConnectionString connStr
);
[C++]
public: static DataTable* SampleQuery(
   IConnectionString* connStr
);
[JScript]
public static function SampleQuery(
   connStr : IConnectionString
) : DataTable;
```

Parameters

connStr
A connection string that represents the data source.

Return Value

If successful, returns a data table with the values. Otherwise, null.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessControl Class | DataAccessControl Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessControl.TestConnection Method

Performs a test connection on a data source.

VB

```
Public Shared Sub TestConnection( _
   ByVal connStr As IConnectionString, _
   <Out()> ByRef serverClass As String, _
   <Out()> ByRef serverVersion As String _
)
[C#]
public static void TestConnection(
   IConnectionString connStr,
   out string serverClass,
   out string serverVersion
);
[C++]
public: static void TestConnection(
   IConnectionString* connStr,
   [
   Out
] String** serverClass,
   [
   Out
] String** serverVersion
);
[JScript]
public static function TestConnection(
   connStr : IConnectionString,
   serverClass : String,
   serverVersion : String
);
```

Parameters

connStr
The connection string item.
serverClass
An output string that contains the server class.
serverVersion
An output string that contains the server version.

Exceptions

Exception	Condition
ConnectionException	The connection attempt failed.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessControl Class | DataAccessControl Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings Class

Controls the computer settings for the Data Access Tool and Data Access Library.

For a list of all members of this type, see DataAccessSettings Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.DataAccessSettings

VB

```
Public Class DataAccessSettings
[C#]
public class DataAccessSettings
[C++]
public __gc class DataAccessSettings
[JScript]
public class DataAccessSettings
```

Thread Safety

Any public static (**Shared** in Visual Basic) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace | Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings Members

DataAccessSettings overview

Public Constructors

DataAccessSettings Constructor	Initializes a new instance of the **DataAccessSettings** class.

Public Properties

S DSNPath	Gets or sets the default path where file DSNs are located and saved in the Data Access Tool.
S HCDPath	Gets or sets the default path where host column description (HCD) files are located and saved in the Data Access Tool.
S ShowCrtPkgWarning	Gets or sets a value indicating whether to warn users before creating packages during the Data Source Wizard.
S ShowWizardWelcome	Gets or sets a value indicating whether to show the Data Source Wizard welcome screen.
S UDLPath	Gets or sets the default path where universal data links (UDLs) are located and saved in the Data Access Tool.

Public Methods

Equals (inherited from **System.Object**)	Determines if two instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
S MakeDSNPath	Creates a full path to a file DSN based on the default DSN directory.
S MakeHCDPath	Creates a full path to an HCD file based on the default HCD directory.
S MakeUDLPath	Creates a full path to a universal data link (UDL) file based on the default UDL directory.
ToString (inherited from **System.Object**)	Returns a string representation of the current instance.

Protected Methods

Finalize (inherited from **System.Object**)	Atempts to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a deep copy of the current instance.

See Also

DataAccessSettings Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings Constructor

Initializes a new instance of the DataAccessSettings class.

VB

```
Public Sub New()
[C#]
public DataAccessSettings();
[C++]
public: DataAccessSettings();
[JScript]
public function DataAccessSettings();
```

Remarks

The default constructor initializes any fields to their default values.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessSettings Class | DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DataAccessSettings Properties

The properties of the **DataAccessSettings** class are listed here. For a complete list of **DataAccessSettings** class members, see the DataAccessSettings Members topic.

Public Properties

DSNPath	Gets or sets the default path where file DSNs are located and saved in the Data Access Tool.
HCDPath	Gets or sets the default path where host column description (HCD) files are located and saved in the Data Access Tool.
ShowCrtPkgWarning	Gets or sets a value indicating whether to warn users before creating packages during the Data Source Wizard.
ShowWizardWelcome	Gets or sets a value indicating whether to show the Data Source Wizard Welcome screen.
UDLPath	Gets or sets the default path where universal data link (UDLs) are located and saved in the Data Access Tool.

See Also

DataAccessSettings Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DataAccessSettings.DSNPath Property

Gets or sets the default path where file DSNs are located and saved in the Data Access Tool.

VB

```
Public Shared Property DSNPath As String
[C#]
public static string DSNPath {get; set;}
[C++]
public: __property static String* get_DSNPath();
public: __property static void set_DSNPath(String*);
[JScript]
public static function get DSNPath() : String;
public static function set DSNPath(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessSettings Class | DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings.HCDPath Property

Gets or sets the default path where Host Column Description files are located and saved in the Data Access Tool.

VB

```
Public Shared Property HCDPath As String
[C#]
public static string HCDPath {get; set;}
[C++]
public: __property static String* get_HCDPath();
public: __property static void set_HCDPath(String*);
[JScript]
public static function get HCDPath() : String;
public static function set HCDPath(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessSettings Class | DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings.ShowCrtPkgWarning Property

Gets or sets a value indicating whether to warn users before creating packages during the data source wizard.

VB

```
Public Shared Property ShowCrtPkgWarning As Boolean
[C#]
public static bool ShowCrtPkgWarning {get; set;}
[C++]
public: __property static bool get_ShowCrtPkgWarning();
public: __property static void set_ShowCrtPkgWarning(bool);
[JScript]
public static function get ShowCrtPkgWarning() : Boolean;
public static function set ShowCrtPkgWarning(Boolean);
```

Property Value

true to warn users; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessSettings Class | DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings.ShowWizardWelcome Property

Gets or sets a value indicating whether to show the data source wizard welcome screen.

VB

```
Public Shared Property ShowWizardWelcome As Boolean
[C#]
public static bool ShowWizardWelcome {get; set;}
[C++]
public: __property static bool get_ShowWizardWelcome();
public: __property static void set_ShowWizardWelcome(bool);
[JScript]
public static function get ShowWizardWelcome() : Boolean;
public static function set ShowWizardWelcome(Boolean);
```

Property Value

true to show the Data Source Wizard Welcome screen; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessSettings Class | DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings.UDLPath Property

Gets or sets the default path where UDLs are located and saved in the Data Access Tool.

VB

```
Public Shared Property UDLPath As String
[C#]
public static string UDLPath {get; set;}
[C++]
public: __property static String* get_UDLPath();
public: __property static void set_UDLPath(String*);
[JScript]
public static function get UDLPath() : String;
public static function set UDLPath(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessSettings Class | DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings Methods

The methods of the **DataAccessSettings** class are listed here. For a complete list of **DataAccessSettings** class members, see the DataAccessSettings Members topic.

Public Methods

Equals (inherited from **System.Object**)	Determines if two instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
S MakeDSNPath	Creates a full path to a file DSN based on the default DSN directory.
S MakeHCDPath	Creates a full path to an HCD file based on the default HCD directory.
S MakeUDLPath	Creates a full path to a universal data link (UDL) file based on the default UDL directory.
ToString (inherited from **System.Object**)	Returns a string representation of the current instance.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a deep copy of the current instance.

See Also

DataAccessSettings Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings.MakeDSNPath Method

Creates a full path to a file DSN based on the default DSN directory.

VB

```
Public Shared Function MakeDSNPath( _
   ByVal name As String _
) As String
[C#]
public static string MakeDSNPath(
   string name
);
[C++]
public: static String* MakeDSNPath(
   String* name
);
[JScript]
public static function MakeDSNPath(
   name : String
) : String;
```

Parameters

name

The name of the file. Do not include the file extension or file path.

Return value.

The full path to the file.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessSettings Class | DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings.MakeHCDPath Method

Creates a full path to an host column description (HCD) file based on the default HCD directory.

VB

```
Public Shared Function MakeHCDPath( _
   ByVal name As String _
) As String
[C#]
public static string MakeHCDPath(
   string name
);
[C++]
public: static String* MakeHCDPath(
   String* name
);
[JScript]
public static function MakeHCDPath(
   name : String
) : String;
```

Parameters

name

The name of the file.

Return Value

The path to the file.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessSettings Class | DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DataAccessSettings.MakeUDLPath Method

Creates a full path to a universal data link (UDL) file based on the default UDL directory.

VB

```
Public Shared Function MakeUDLPath( _
   ByVal name As String _
) As String
[C#]
public static string MakeUDLPath(
   string name
);
[C++]
public: static String* MakeUDLPath(
   String* name
);
[JScript]
public static function MakeUDLPath(
   name : String
) : String;
```

Parameters

name

The name of the file. Do not include the file extension or the path.

Return Value

The full path of the file.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DataAccessSettings Class | DataAccessSettings Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcConnectionString Class

Describes a DB2 ODBC connection string.

For a list of all members of this type, see DB2OdbcConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcFileConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcRegConnectionString

VB

```
<Serializable>
MustInherit Public Class DB2OdbcConnectionString
   Inherits IConnectionString
[C#]
[Serializable]
public abstract class DB2OdbcConnectionString : IConnectionString
[C++]
[Serializable]
public __gc __abstract class DB2OdbcConnectionString : public
   IConnectionString
[JScript]
public
   Serializable
abstract class DB2OdbcConnectionString extends
   IConnectionString
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

DB2OdbcConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcConnectionString Members

DB2OdbcConnectionString overview

Public Fields

DriverName	The name of the driver. This field is constant.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of database to which the connection string connects.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local logical unit (LU) name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name (inherited from **IConnectionString**)	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.

PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).
UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone (inherited from **IConnectionString**)	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists (inherited from **IConnectionString**)	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **IConnectionString**)	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load (inherited from **IConnectionString**)	Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **IConnectionString**)	Saves the connection string.
SetString (inherited from **IConnectionString**)	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetString	Overloaded. Retrieves the connection string as a string.
InternalDelete (inherited from **IConnectionString**)	Overridden. Deletes the connection string.
InternalRename (inherited from **IConnectionString**)	Overridden. Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcConnectionString Fields

The fields of the **DB2OdbcConnectionString** class are listed here. For a complete list of **DB2OdbcConnectionString** class members, see the DB2OdbcConnectionString Members topic.

Public Fields

DriverName	The name of the driver. This field is constant.

See Also

DB2OdbcConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

DB2OdbcConnectionString.DriverName Field

The name of the driver. This field is constant.

VB

```
Public Const DriverName As String
[C#]
public const string DriverName;
[C++]
public: const String* DriverName;
[JScript]
public var DriverName : String;
```

Remarks

The value of this constant is "Microsoft ODBC Driver for DB2".

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

DB2OdbcConnectionString Class | DB2OdbcConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcConnectionString Methods

The methods of the **DB2OdbcConnectionString** class are listed here. For a complete list of **DB2OdbcConnectionString** class members, see the DB2OdbcConnectionString Members topic.

Public Methods

Clone (inherited from **IConnectionString**)	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists (inherited from **IConnectionString**)	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **IConnectionString**)	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load (inherited from **IConnectionString**)	Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **IConnectionString**)	Saves the connection string.
SetString (inherited from **IConnectionString**)	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetString	Overloaded. Retrieves the connection string as a string.
InternalDelete (inherited from **IConnectionString**)	Overridden. Deletes the connection string.
InternalRename (inherited from **IConnectionString**)	Overridden. Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcConnectionString.GetString Method

Retrieves the connection string.

Overload List

Retrieves the connection string.

[Visual Basic] Overloads Protected Function GetString(System.String) As String

[C#] protected string GetString(System.String);

[C++] protected: String* GetString(System.String);

[JScript] protected function GetString(System.String) : String;

Inherited from IConnectionString.

[Visual Basic] Overloads Public MustOverride Function GetString() As String

[C#] public abstract string GetString();

[C++] public: virtual String* GetString() = 0;

[JScript] public abstract function GetString() : String;

See Also

DB2OdbcConnectionString Class | DB2OdbcConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcConnectionString.GetString Method (System.String)

Retrieves the connection string.

VB

```
Overloads Protected Function GetString( _
   ByVal delimiter As String _
) As String
[C#]
protected string GetString(
   string delimiter
);
[C++]
protected: String* GetString(
   String* delimiter
);
[JScript]
protected function GetString(
   delimiter : String
) : String;
```

Parameters

delimiter
Connection string to retrieve.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcConnectionString Class | DB2OdbcConnectionString Members |
Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide |
DB2OdbcConnectionString.GetString Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString Class

Describes a DB2 ODBC file connection string.

For a list of all members of this type, see DB2OdbcFileConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcFileConnectionString

VB

```
<Serializable>
Public Class DB2OdbcFileConnectionString
   Inherits DB2OdbcConnectionString
[C#]
[Serializable]
public class DB2OdbcFileConnectionString : DB2OdbcConnectionString
[C++]
[Serializable]
public __gc class DB2OdbcFileConnectionString : public
   DB2OdbcConnectionString
[JScript]
public
   Serializable
class DB2OdbcFileConnectionString extends
   DB2OdbcConnectionString
```

Thread Safety

Any public static (**Shared** in Visual Basic) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

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DB2OdbcFileConnectionString Members

DB2OdbcFileConnectionString overview

Public Constructors

DB2OdbcFileConnectionString Constructor	Overloaded. Initializes a new instance of the **DB2OdbcFileConnectionString** class.

Public Fields

ODBCExtension	The file extension for the current instance. This field is constant.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of database to which the connection string connects.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
FilePath	Gets or sets the file path.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the Host Column Description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local LU name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.

PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.
PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).
UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
S IsFileDSN	Returns a value that determines if the specified file is a data source name.
Load	Retrieves the current instance.
S ReadFileDSN	Reads the specified file as though it were a data source name.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save	Saves the connection string.
SetString	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetString (inherited from **DB2OdbcConnectionString**)	Retrieves the connection string as a string.
InternalDelete	Overridden. Deletes the connection string.
InternalRename	Overridden. Renames the connection string.
MakePathFromIdentifier	Creates a path from the specified identifier.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcFileConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

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http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString Constructor

Creates a new instance of the **DB2OdbcFileConnectionString** class.

Overload List

Creates a new instance of the **DB2OdbcFileConnectionString** class.

[Visual Basic] Public Sub New(System.String, System.Boolean)

[C#] public DB2OdbcFileConnectionString(System.String, System.Boolean);

[C++] public: DB2OdbcFileConnectionString(System.String, System.Boolean);

[JScript] public function DB2OdbcFileConnectionString(System.String, System.Boolean);

Creates a new instance of the **DB2OdbcFileConnectionString** class.

[Visual Basic] Public Sub New(System.String, System.Boolean, IConnectionString)

[C#] public DB2OdbcFileConnectionString(System.String, System.Boolean, IConnectionString);

[C++] public: DB2OdbcFileConnectionString(System.String, System.Boolean, IConnectionString*);

[JScript] public function DB2OdbcFileConnectionString(System.String, System.Boolean, IConnectionString);

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members |
Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString Constructor (System.String, System.Boolean)

Initializes a new instance of the DB2OdbcFileConnectionString class using the specified name.

VB

```
Public Sub New( _
   ByVal name As String, _
   ByVal isFullPath As Boolean _
)
[C#]
public DB2OdbcFileConnectionString(
   string name,
   bool isFullPath
);
[C++]
public: DB2OdbcFileConnectionString(
   String* name,
   bool isFullPath
);
[JScript]
public function DB2OdbcFileConnectionString(
   name : String,
   isFullPath : Boolean
);
```

Parameters

name
Name of the new connection string.
isFullPath
true if the name contains the full connection path; otherwise, **false**.

Remarks

If *isFullPath* is false, then the new instance is created using the default path for the connection string.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OdbcFileConnectionString Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString Constructor (System.String, System.Boolean, IConnectionString)

Initializes a new instance of the DB2OdbcFileConnectionString class.

VB

```
Public Sub New( _
   ByVal name As String, _
   ByVal isFullPath As Boolean, _
   ByVal connStr As IConnectionString _
)
[C#]
public DB2OdbcFileConnectionString(
   string name,
   bool isFullPath,
   IConnectionString connStr
);
[C++]
public: DB2OdbcFileConnectionString(
   String* name,
   bool isFullPath,
   IConnectionString* connStr
);
[JScript]
public function DB2OdbcFileConnectionString(
   name : String,
   isFullPath : Boolean,
   connStr : IConnectionString
);
```

Parameters

name
Name of the new connection string.
isFullPath
true if the connection string contains a full path; otherwise, **false**.
connStr
A IConnectionString containing the new connection string.

Remarks

If *isFullPath* is **false**, then the new instance is created using the default path for the connection string.

This constructor is designed as a copy constructor. Using *connStr*, you can create a new instance of an existing connection string and give it a new friendly name.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OdbcFileConnectionString Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString Fields

The fields of the **DB2OdbcFileConnectionString** class are listed here. For a complete list of **DB2OdbcFileConnectionString** class members, see the DB2OdbcFileConnectionString Members topic.

Public Fields

ODBCExtension	The file extension for the current instance. This field is constant.

See Also

DB2OdbcFileConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

DB2OdbcFileConnectionString.ODBCExtension Field

The file extension for the current instance. This field is constant.

VB

```
Public Const ODBCExtension As String
[C#]
public const string ODBCExtension;
[C++]
public: const String* ODBCExtension;
[JScript]
public var ODBCExtension : String;
```

Remarks

The value of this constant is "dsn".

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcFileConnectionString Properties

The properties of the **DB2OdbcFileConnectionString** class are listed here. For a complete list of **DB2OdbcFileConnectionString** class members, see the DB2OdbcFileConnectionString Members topic.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of database to which the connection string connects.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
FilePath	Gets or sets the file path.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the Host Column Description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local LU name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.
PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).

UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

See Also

DB2OdbcFileConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

DB2OdbcFileConnectionString.FilePath Property

Gets or sets the file path.

VB

```
Public ReadOnly Property FilePath As String
[C#]
public string FilePath {get;}
[C++]
public: __property String* get_FilePath();
[JScript]
public function get FilePath() : String;
```

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

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DB2OdbcFileConnectionString.Name Property

Gets or sets the name of the connection string.

VB

```
Overrides Public Property Name As String
[C#]
public override string Name {get; set;}
[C++]
public: __property String* get_Name();
public: __property void set_Name(String*);
[JScript]
public override function get Name() : String;
public override function set Name(String);
```

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcFileConnectionString Methods

The methods of the **DB2OdbcFileConnectionString** class are listed here. For a complete list of **DB2OdbcFileConnectionString** class members, see the DB2OdbcFileConnectionString Members topic.

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
IsFileDSN	Returns a value that determines if the specified file is a data source name.
Load	Retrieves the current instance.
ReadFileDSN	Reads the specified file as though it were a data source name.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save	Saves the connection string.
SetString	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetString (inherited from **DB2OdbcConnectionString**)	Retrieves the connection string as a string.
InternalDelete	Overridden. Deletes the connection string.
InternalRename	Overridden. Renames the connection string.
MakePathFromIdentifier	Creates a path from the specified identifier.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcFileConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString.Clone Method

Creates a deep copy of the current instance.

VB

```
Overrides Public Function Clone() As IConnectionString
[C#]
public override IConnectionString Clone();
[C++]
public: IConnectionString* Clone();
[JScript]
public override function Clone() : IConnectionString;
```

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString.Exists Method

Determines if the current instance is abstract or actually represents a connection string.

VB

```
Overrides Public Function Exists() As Boolean
[C#]
public override bool Exists();
[C++]
public: bool Exists();
[JScript]
public override function Exists() : Boolean;
```

Return Value

true if the current instance represents a connection string; otherwise, **false**.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString.GetString Method

Retrieves the connection string.

Overload List

Retrieves the connection string.

[Visual Basic] Overloads Overrides Public Function GetString() As String

[C#] public override string GetString();

[C++] public: String* GetString();

[JScript] public override function GetString() : String;

Inherited from DB2OdbcConnectionString.

[Visual Basic] Overloads Protected Function GetString(System.String) As String

[C#] protected string GetString(System.String);

[C++] protected: String* GetString(System.String);

[JScript] protected function GetString(System.String) : String;

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString.GetString Method ()

Retrieves the connection string.

VB

```
Overrides Overloads Public Function GetString() As String
[C#]
public override string GetString();
[C++]
public: String* GetString();
[JScript]
public override function GetString() : String;
```

Return value

The connection string of the current instance.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OdbcFileConnectionString.GetString Overload List

DB2OdbcFileConnectionString.InternalDelete Method

Deletes the connection string.

VB

```
Overrides Protected Function InternalDelete() As Boolean
[C#]
protected override bool InternalDelete();
[C++]
protected: bool InternalDelete();
[JScript]
protected override function InternalDelete() : Boolean;
```

Return value

true if the deletion was successful; otherwise, **false**.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcFileConnectionString.InternalRename Method

Renames the connection string.

VB

```
Overrides Protected Sub InternalRename( _
   ByVal destIdentifier As String _
)
[C#]
protected override void InternalRename(
   string destIdentifier
);
[C++]
protected: void InternalRename(
   String* destIdentifier
);
[JScript]
protected override function InternalRename(
   destIdentifier : String
);
```

Parameters

destIdentifier
The new name for the connection string.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString.IsFileDSN Method

Returns a value that describes if the file is a data source name (DSN).

VB

```
Public Shared Function IsFileDSN( _
   ByVal file As String _
) As Boolean
[C#]
public static bool IsFileDSN(
   string file
);
[C++]
public: static bool IsFileDSN(
   String* file
);
[JScript]
public static function IsFileDSN(
   file : String
) : Boolean;
```

Parameters

file
The specified file.

Return value

true if the file is a DSN; otherwise, **false**.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcFileConnectionString.Load Method

Loads the connection string.

VB

```
Overrides Public Sub Load()
[C#]
public override void Load();
[C++]
public: void Load();
[JScript]
public override function Load();
```

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcFileConnectionString.MakePathFromIdentifier Method

Creates a path based on the specified identifier.

VB

```
Protected Function MakePathFromIdentifier( _
   ByVal identifier As String _
) As String
[C#]
protected string MakePathFromIdentifier(
   string identifier
);
[C++]
protected: String* MakePathFromIdentifier(
   String* identifier
);
[JScript]
protected function MakePathFromIdentifier(
   identifier : String
) : String;
```

Parameters

identifier
The identifier from which to create a path.

Return Value

A new path.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString.ReadFileDSN Method

Reads the specified file as a data source name.

VB

```
Public Shared Function ReadFileDSN( _
   ByVal file As String _
) As DB2OdbcFileConnectionString
[C#]
public static DB2OdbcFileConnectionString ReadFileDSN(
   string file
);
[C++]
public: static DB2OdbcFileConnectionString* ReadFileDSN(
   String* file
);
[JScript]
public static function ReadFileDSN(
   file : String
) : DB2OdbcFileConnectionString;
```

Parameters

file
The file to read.

Return value

A DB2OdbcFileConnectionString for the file.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcFileConnectionString.Save Method

Saves the connection string.

VB

```
Overrides Public Sub Save()
[C#]
public override void Save();
[C++]
public: void Save();
[JScript]
public override function Save();
```

Requirements

Platforms: Windows 2000

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcFileConnectionString.SetString Method

Sets the connection string.

VB

```
Overrides Public Sub SetString( _
   ByVal val As String _
)
[C#]
public override void SetString(
   string val
);
[C++]
public: void SetString(
   String* val
);
[JScript]
public override function SetString(
   val : String
);
```

Parameters

val
Value to set the connection string to.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcFileConnectionString Class | DB2OdbcFileConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString Class

Describes the DB2 ODBC registration connection string.

For a list of all members of this type, see DB2OdbcRegConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcRegConnectionString
        Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcSysConnectionString
        Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcUserConnectionString

VB

```
<Serializable>
MustInherit Public Class DB2OdbcRegConnectionString
   Inherits DB2OdbcConnectionString
[C#]
[Serializable]
public abstract class DB2OdbcRegConnectionString :
   DB2OdbcConnectionString
[C++]
[Serializable]
public __gc __abstract class DB2OdbcRegConnectionString : public
   DB2OdbcConnectionString
[JScript]
public
   Serializable
abstract class DB2OdbcRegConnectionString extends
   DB2OdbcConnectionString
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace

DB2OdbcRegConnectionString Members

DB2OdbcRegConnectionString overview

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of data base the connection string connects to.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local logical unit (LU) name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.
PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).
UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.

UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone (inherited from **IConnectionString**)	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save	Saves the connection string.
SetString	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetDSNs	Retrieves data source names.
GetString (inherited from **DB2OdbcConnectionString**)	Overloaded. Retrieves the connection string as a string.
InternalDelete	Overridden. Deletes the connection string.
InternalRename	Overridden. Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcRegConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace | Data Access Library Programmer's Guide

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DB2OdbcRegConnectionString Properties

The properties of the **DB2OdbcRegConnectionString** class are listed here. For a complete list of **DB2OdbcRegConnectionString** class members, see the DB2OdbcRegConnectionString Members topic.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of data base to which the connection string connects.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local logical unit (LU) name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.
PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).

UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

See Also

DB2OdbcRegConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

DB2OdbcRegConnectionString.Name Property

Gets or sets the name of the connection string.

VB

```
Overrides Public Property Name As String
[C#]
public override string Name {get; set;}
[C++]
public: __property String* get_Name();
public: __property void set_Name(String*);
[JScript]
public override function get Name() : String;
public override function set Name(String);
```

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString Methods

The methods of the **DB2OdbcRegConnectionString** class are listed here. For a complete list of **DB2OdbcRegConnectionString** class members, see the DB2OdbcRegConnectionString Members topic.

Public Methods

Clone (inherited from **IConnectionString**)	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save	Saves the connection string.
SetString	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetDSNs	Retrieves data source names.
GetString (inherited from **DB2OdbcConnectionString**)	Overloaded. Retrieves the connection string as a string.
InternalDelete	Overridden. Deletes the connection string.
InternalRename	Overridden. Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcRegConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString.Exists Method

Determines if the current instance is abstract or actually represents a connection string.

VB

```
Overrides Public Function Exists() As Boolean
[C#]
public override bool Exists();
[C++]
public: bool Exists();
[JScript]
public override function Exists() : Boolean;
```

Return value

true if the instance is a connection string; otherwise, **false**.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString.GetDSNs Method

Retrieves one or more data source names.

VB

```
Protected Shared Function GetDSNs( _
   ByVal isSystem As Boolean _
) As ArrayList
[C#]
protected static ArrayList GetDSNs(
   bool isSystem
);
[C++]
protected: static ArrayList* GetDSNs(
   bool isSystem
);
[JScript]
protected static function GetDSNs(
   isSystem : Boolean
) : ArrayList;
```

Parameters

isSystem
true if the current string is a system connection string; otherwise, **false**.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString.GetString Method

Retrieves the connection string of the current instance.

Overload List

Retrieves the connection string of the current instance.

[Visual Basic] Overloads Overrides Public Function GetString() As String

[C#] public override string GetString();

[C++] public: String* GetString();

[JScript] public override function GetString() : String;

Inherited from DB2OdbcConnectionString.

[Visual Basic] Overloads Protected Function GetString(System.String) As String

[C#] protected string GetString(System.String);

[C++] protected: String* GetString(System.String);

[JScript] protected function GetString(System.String) : String;

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString.GetString Method ()

Retrieves the connection string of the current instance.

VB

```
Overrides Overloads Public Function GetString() As String
[C#]
public override string GetString();
[C++]
public: String* GetString();
[JScript]
public override function GetString() : String;
```

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OdbcRegConnectionString.GetString Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString.InternalDelete Method

Deletes the connection string.

VB

```
Overrides Protected Function InternalDelete() As Boolean
[C#]
protected override bool InternalDelete();
[C++]
protected: bool InternalDelete();
[JScript]
protected override function InternalDelete() : Boolean;
```

Return value

true if the deletion was successful; otherwise, **false**.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server**.NET Framework Security:**

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcRegConnectionString.InternalRename Method

Renames the connection string.

VB

```
Overrides Protected Sub InternalRename( _
   ByVal destIdentifier As String _
)
[C#]
protected override void InternalRename(
   string destIdentifier
);
[C++]
protected: void InternalRename(
   String* destIdentifier
);
[JScript]
protected override function InternalRename(
   destIdentifier : String
);
```

Parameters

destIdentifier
New name for the connection string.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString.Load Method

Retrieves the current instance.

VB

```
Overrides Public Sub Load()
[C#]
public override void Load();
[C++]
public: void Load();
[JScript]
public override function Load();
```

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString.Save Method

Saves the current instance.

VB

```
Overrides Public Sub Save()
[C#]
public override void Save();
[C++]
public: void Save();
[JScript]
public override function Save();
```

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcRegConnectionString.SetString Method

Sets the value of the connection string.

VB

```
Overrides Public Sub SetString( _
   ByVal val As String _
)
[C#]
public override void SetString(
   string val
);
[C++]
public: void SetString(
   String* val
);
[JScript]
public override function SetString(
   val : String
);
```

Parameters

val
Value to set the connection string to.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcRegConnectionString Class | DB2OdbcRegConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcSysConnectionString Class

Describes a DB2 ODBC system connection string.

For a list of all members of this type, see DB2OdbcSysConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcRegConnectionString
        Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcSysConnectionString

VB

```
<Serializable>
Public Class DB2OdbcSysConnectionString
   Inherits DB2OdbcRegConnectionString
[C#]
[Serializable]
public class DB2OdbcSysConnectionString :
   DB2OdbcRegConnectionString
[C++]
[Serializable]
public __gc class DB2OdbcSysConnectionString : public
   DB2OdbcRegConnectionString
[JScript]
public
   Serializable
class DB2OdbcSysConnectionString extends
   DB2OdbcRegConnectionString
```

Thread Safety

Any public static (**Shared** in Visual Basic) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

DB2OdbcSysConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcSysConnectionString Members

DB2OdbcSysConnectionString overview

Public Constructors

DB2OdbcSysConnectionString Constructor	Overloaded. Initializes a new instance of the **DB2OdbcSysConnectionString** class.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of database to which the connection string connects.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the Host Column Description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local LU name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name (inherited from **DB2OdbcRegConnectionString**)	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.

PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).
UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists (inherited from **DB2OdbcRegConnectionString**)	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **DB2OdbcRegConnectionString**)	Overloaded. Retrieves the connection string.
S GetSystemDSNs	Gets the type of the current instance.
GetType (inherited from **System.Object**)	Gets the user DSN.
Load (inherited from **DB2OdbcRegConnectionString**)	Overridden. Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **DB2OdbcRegConnectionString**)	Overridden. Saves the connection string.
SetString (inherited from **DB2OdbcRegConnectionString**)	Overridden. Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In C# and C++, finalizers are expressed using destructor syntax.
GetString (inherited from **DB2OdbcConnectionString**)	Overloaded. Retrieves the connection string as a string.
InternalDelete (inherited from **DB2OdbcRegConnectionString**)	Overridden. Deletes the connection string.
InternalRename (inherited from **DB2OdbcRegConnectionString**)	Overridden. Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcSysConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcSysConnectionString Constructor

Creates a new instance of the **DB2OdbcSysConnectionString** class.

Overload List

Creates a new instance of the **DB2OdbcSysConnectionString** class using the specified name.

[Visual Basic] Public Sub New(System.String)

[C#] public DB2OdbcSysConnectionString(System.String);

[C++] public: DB2OdbcSysConnectionString(System.String);

[JScript] public function DB2OdbcSysConnectionString(System.String);

Creates a new instance of the **DB2OdbcSysConnectionString** class using the specified name and connection string.

[Visual Basic] Public Sub New(System.String, IConnectionString)

[C#] public DB2OdbcSysConnectionString(System.String, IConnectionString);

[C++] public: DB2OdbcSysConnectionString(System.String, IConnectionString*);

[JScript] public function DB2OdbcSysConnectionString(System.String, IConnectionString);

See Also

DB2OdbcSysConnectionString Class | DB2OdbcSysConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcSysConnectionString Constructor (System.String)

Initializes a new instance of the DB2OdbcSysConnectionString class using the specified name.

VB

```
Public Sub New( _
   ByVal name As String _
)
[C#]
public DB2OdbcSysConnectionString(
   string name
);
[C++]
public: DB2OdbcSysConnectionString(
   String* name
);
[JScript]
public function DB2OdbcSysConnectionString(
   name : String
);
```

Parameters

name
Name of the connection string.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcSysConnectionString Class | DB2OdbcSysConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OdbcSysConnectionString Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcSysConnectionString Constructor (System.String, IConnectionString)

Initializes a new instance of the DB2OdbcSysConnectionString class using the specified name and connection string.

VB

```
Public Sub New( _
   ByVal name As String, _
   ByVal connStr As IConnectionString _
)
[C#]
public DB2OdbcSysConnectionString(
   string name,
   IConnectionString connStr
);
[C++]
public: DB2OdbcSysConnectionString(
   String* name,
   IConnectionString* connStr
);
[JScript]
public function DB2OdbcSysConnectionString(
   name : String,
   connStr : IConnectionString
);
```

Parameters

name
Name of the new connection string.
connStr
A IConnectionString containing the new connection string.

Remarks

This constructor is designed as a copy constructor. Using *connStr*, you can create a new instance of an existing connection string and give it a new friendly name.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcSysConnectionString Class | DB2OdbcSysConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OdbcSysConnectionString Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcSysConnectionString Methods

The methods of the **DB2OdbcSysConnectionString** class are listed here. For a complete list of **DB2OdbcSysConnectionString** class members, see the DB2OdbcSysConnectionString Members topic.

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists (inherited from **DB2OdbcRegConnectionString**)	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **DB2OdbcRegConnectionString**)	Overloaded. Retrieves the connection string.
GetSystemDSNs	Gets the type of the current instance.
GetType (inherited from **System.Object**)	Gets the user DSN.
Load (inherited from **DB2OdbcRegConnectionString**)	Overridden. Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **DB2OdbcRegConnectionString**)	Overridden. Saves the connection string.
SetString (inherited from **DB2OdbcRegConnectionString**)	Overridden. Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In C# and C++, finalizers are expressed using destructor syntax.
GetString (inherited from **DB2OdbcConnectionString**)	Overloaded. Retrieves the connection string as a string.
InternalDelete (inherited from **DB2OdbcRegConnectionString**)	Overridden. Deletes the connection string.
InternalRename (inherited from **DB2OdbcRegConnectionString**)	Overridden. Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcSysConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

DB2OdbcSysConnectionString.Clone Method

Creates a deep copy of the current instance.

VB

```
Overrides Public Function Clone() As IConnectionString
[C#]
public override IConnectionString Clone();
[C++]
public: IConnectionString* Clone();
[JScript]
public override function Clone() : IConnectionString;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcSysConnectionString Class | DB2OdbcSysConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcSysConnectionString.GetSystemDSNs Method

Retrieves the system data source name.

VB

```
Public Shared Function GetSystemDSNs() As ArrayList
[C#]
public static ArrayList GetSystemDSNs();
[C++]
public: static ArrayList* GetSystemDSNs();
[JScript]
public static function GetSystemDSNs() : ArrayList;
```

Return Value

An array of one or more data source names.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcSysConnectionString Class | DB2OdbcSysConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcUserConnectionString Class

Describes a DB2 ODBC user connection string.

For a list of all members of this type, see DB2OdbcUserConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcRegConnectionString
        Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcUserConnectionString

VB

```
<Serializable>
Public Class DB2OdbcUserConnectionString
   Inherits DB2OdbcRegConnectionString
[C#]
[Serializable]
public class DB2OdbcUserConnectionString :
   DB2OdbcRegConnectionString
[C++]
[Serializable]
public __gc class DB2OdbcUserConnectionString : public
   DB2OdbcRegConnectionString
[JScript]
public
   Serializable
class DB2OdbcUserConnectionString extends
   DB2OdbcRegConnectionString
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

DB2OdbcUserConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcUserConnectionString Members

DB2OdbcUserConnectionString overview

Public Constructors

DB2OdbcUserConnectionString Constructor	Overloaded. Initializes a new instance of the **DB2OdbcUserConnectionString** class.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of database to which the connection string connects.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the Host Column Description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local LU name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name (inherited from **DB2OdbcRegConnectionString**)	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.

PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).
UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists (inherited from **DB2OdbcRegConnectionString**)	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **DB2OdbcRegConnectionString**)	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
S GetUserDSNs	Gets the user DSN.
Load (inherited from **DB2OdbcRegConnectionString**)	Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **DB2OdbcRegConnectionString**)	Saves the connection string.
SetString (inherited from **DB2OdbcRegConnectionString**)	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetString (inherited from **DB2OdbcConnectionString**)	Retrieves the connection string as a string.
InternalDelete (inherited from **DB2OdbcRegConnectionString**)	Deletes the connection string.
InternalRename (inherited from **DB2OdbcRegConnectionString**)	Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcUserConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

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DB2OdbcUserConnectionString Constructor

Creates a new instance of the **DB2OdbcUserConnectionString** class.

Overload List

Creates a new instance of the **DB2OdbcUserConnectionString** class.

[Visual Basic] Public Sub New(System.String)

[C#] public DB2OdbcUserConnectionString(System.String);

[C++] public: DB2OdbcUserConnectionString(System.String);

[JScript] public function DB2OdbcUserConnectionString(System.String);

Creates a new instance of the **DB2OdbcUserConnectionString** class.

[Visual Basic] Public Sub New(System.String, IConnectionString)

[C#] public DB2OdbcUserConnectionString(System.String, IConnectionString);

[C++] public: DB2OdbcUserConnectionString(System.String, IConnectionString*);

[JScript] public function DB2OdbcUserConnectionString(System.String, IConnectionString);

See Also

DB2OdbcUserConnectionString Class | DB2OdbcUserConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcUserConnectionString Constructor (System.String)

Initializes a new instance of the DB2OdbcUserConnectionString class.

VB

```
Public Sub New( _
   ByVal name As String _
)
[C#]
public DB2OdbcUserConnectionString(
   string name
);
[C++]
public: DB2OdbcUserConnectionString(
   String* name
);
[JScript]
public function DB2OdbcUserConnectionString(
   name : String
);
```

Parameters

name
Name of the new connection string.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcUserConnectionString Class | DB2OdbcUserConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OdbcUserConnectionString Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OdbcUserConnectionString Constructor (System.String, IConnectionString)

Initializes a new instance of the DB2OdbcUserConnectionString class.

VB

```
Public Sub New( _
   ByVal name As String, _
   ByVal connStr As IConnectionString _
)
[C#]
public DB2OdbcUserConnectionString(
   string name,
   IConnectionString connStr
);
[C++]
public: DB2OdbcUserConnectionString(
   String* name,
   IConnectionString* connStr
);
[JScript]
public function DB2OdbcUserConnectionString(
   name : String,
   connStr : IConnectionString
);
```

Parameters

name
Name of the connection string.
connStr
Connection string to use for the connection.

Remarks

This constructor is designed as a copy constructor. Using *connStr*, you can create a new instance of an existing connection string and give it a new friendly name.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcUserConnectionString Class | DB2OdbcUserConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OdbcUserConnectionString Constructor Overload List

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DB2OdbcUserConnectionString Methods

The methods of the **DB2OdbcUserConnectionString** class are listed here. For a complete list of **DB2OdbcUserConnectionString** class members, see the DB2OdbcUserConnectionString Members topic.

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Overridden. Determines whether two connection strings are equal.
Exists (inherited from **DB2OdbcRegConnectionString**)	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **DB2OdbcRegConnectionString**)	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
GetUserDSNs	Retrieves the user data source name (DSN).
Load (inherited from **DB2OdbcRegConnectionString**)	Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **DB2OdbcRegConnectionString**)	Saves the connection string.
SetString (inherited from **DB2OdbcRegConnectionString**)	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetString (inherited from **DB2OdbcConnectionString**)	Retrieves the connection string as a string.
InternalDelete (inherited from **DB2OdbcRegConnectionString**)	Deletes the connection string.
InternalRename (inherited from **DB2OdbcRegConnectionString**)	Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OdbcUserConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

DB2OdbcUserConnectionString.Clone Method

Creates a deep copy of the current instance.

VB

```
Overrides Public Function Clone() As IConnectionString
[C#]
public override IConnectionString Clone();
[C++]
public: IConnectionString* Clone();
[JScript]
public override function Clone() : IConnectionString;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcUserConnectionString Class | DB2OdbcUserConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OdbcUserConnectionString.GetUserDSNs Method

Retrieves the user data source names (DSNs).

VB

```
Public Shared Function GetUserDSNs() As ArrayList
[C#]
public static ArrayList GetUserDSNs();
[C++]
public: static ArrayList* GetUserDSNs();
[JScript]
public static function GetUserDSNs() : ArrayList;
```

Return Value

A list of the user data source names.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OdbcUserConnectionString Class | DB2OdbcUserConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

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FileSysOleDbConnectionString Class

Contains a file system OLEDB connection string.

For a list of all members of this type, see FileSysOleDbConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.OleDbConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.FileSysOleDbConnectionString

VB

```
<Serializable>
Public Class FileSysOleDbConnectionString
   Inherits OleDbConnectionString
[C#]
[Serializable]
public class FileSysOleDbConnectionString : OleDbConnectionString
[C++]
[Serializable]
public __gc class FileSysOleDbConnectionString : public
   OleDbConnectionString
[JScript]
public
   Serializable
class FileSysOleDbConnectionString extends
   OleDbConnectionString
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

FileSysOleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

FileSysOleDbConnectionString Members

FileSysOleDbConnectionString overview

Public Constructors

FileSysOleDbConnectionString Constructor	Overloaded. Initializes a new instance of the **FileSysOleDbConnectionString** class.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of database to which the connection string connects.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
FilePath (inherited from **OleDbConnectionString**)	Gets the format for the string.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local logical unit (LU) name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name (inherited from **OleDbConnectionString**)	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.

Password (inherited from **IConnectionString**)	Gets or sets the user password.
PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).
UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists (inherited from **OleDbConnectionString**)	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **OleDbConnectionString**)	Overridden. Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
S IsUDL	Determines if the specified file is a universal data link (UDL) file.
Load (inherited from **OleDbConnectionString**)	Overridden. Retrieves the current instance.
S ReadUDL	Returns a connection string for the specified file.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **OleDbConnectionString**)	Overridden. Saves the connection string.
SaveAsText (inherited from **OleDbConnectionString**)	Saves the connection string as text.
SetString (inherited from **OleDbConnectionString**)	Overridden. Sets current string.
ToString (inherited from **System.Object**)	Returns a string that represents the current connection string.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetKey (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework documentation available from Visual Studio .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.
InternalDelete (inherited from **OleDbConnectionString**)	Overridden. Deletes the connection string.
InternalRename (inherited from **OleDbConnectionString**)	Overridden. Renames the connection string.
MakePathFromIdentifier (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework documentation available from Visual Studio .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.

MakeTextPathFromIdentifier (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework documentation available from Visual Studio .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

FileSysOleDbConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

FileSysOleDbConnectionString Constructor

Creates a new instance of the **FileSysOleDbConnectionString** class.

Overload List

Creates a new instance of the **FileSysOleDbConnectionString** class.

[Visual Basic] Public Sub New(System.String, System.Boolean)

[C#] public FileSysOleDbConnectionString(System.String, System.Boolean);

[C++] public: FileSysOleDbConnectionString(System.String, System.Boolean);

[JScript] public function FileSysOleDbConnectionString(System.String, System.Boolean);

Creates a new instance of the **FileSysOleDbConnectionString** class.

[Visual Basic] Public Sub New(System.String, System.Boolean, IConnectionString)

[C#] public FileSysOleDbConnectionString(System.String, System.Boolean, IConnectionString);

[C++] public: FileSysOleDbConnectionString(System.String, System.Boolean, IConnectionString*);

[JScript] public function FileSysOleDbConnectionString(System.String, System.Boolean, IConnectionString);

See Also

FileSysOleDbConnectionString Class | FileSysOleDbConnectionString Members |
Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

FileSysOleDbConnectionString Constructor (System.String, System.Boolean)

Initializes a new instance of the FileSysOleDbConnectionString class using the specified name.

VB

```
Public Sub New( _
   ByVal name As String, _
   ByVal isFullPath As Boolean _
)
[C#]
public FileSysOleDbConnectionString(
   string name,
   bool isFullPath
);
[C++]
public: FileSysOleDbConnectionString(
   String* name,
   bool isFullPath
);
[JScript]
public function FileSysOleDbConnectionString(
   name : String,
   isFullPath : Boolean
);
```

Parameters

name
Name of the connection string.
isFullPath
true if the connection string contains the full path; otherwise, **false**.

Remarks

If *isFullPath* is false, then the instance is created using the default file path.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

FileSysOleDbConnectionString Class | FileSysOleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | FileSysOleDbConnectionString Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

FileSysOleDbConnectionString Constructor (System.String, System.Boolean, IConnectionString)

Initializes a new instance of the FileSysOleDbConnectionString class.

VB

```
Public Sub New( _
   ByVal name As String, _
   ByVal isFullPath As Boolean, _
   ByVal connStr As IConnectionString _
)
[C#]
public FileSysOleDbConnectionString(
   string name,
   bool isFullPath,
   IConnectionString connStr
);
[C++]
public: FileSysOleDbConnectionString(
   String* name,
   bool isFullPath,
   IConnectionString* connStr
);
[JScript]
public function FileSysOleDbConnectionString(
   name : String,
   isFullPath : Boolean,
   connStr : IConnectionString
);
```

Parameters

name
Name of the connection string.
isFullPath
true if the connection string contains the full path; otherwise, **false**.
connStr
An IConnectionString containing an existing connection string.

Remarks

If *isFullPath* is false, then the instance is created using the default file path.

This constructor is designed as a copy constructor. Using *connStr*, you can create a new instance of an existing connection string and give it a new friendly name.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

FileSysOleDbConnectionString Class | FileSysOleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | FileSysOleDbConnectionString Constructor Overload List

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FileSysOleDbConnectionString Methods

The methods of the **FileSysOleDbConnectionString** class are listed here. For a complete list of **FileSysOleDbConnectionString** class members, see the FileSysOleDbConnectionString Members topic.

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists (inherited from **OleDbConnectionString**)	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **OleDbConnectionString**)	Overridden. Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
S IsUDL	Determines if the specified file is a universal data link (.udl) file.
Load (inherited from **OleDbConnectionString**)	Overridden. Retrieves the current instance.
S ReadUDL	Returns a connection string for the specified file.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **OleDbConnectionString**)	Overridden. Saves the connection string.
SaveAsText (inherited from **OleDbConnectionString**)	Saves the connection string as text.
SetString (inherited from **OleDbConnectionString**)	Overridden. Sets current string.
ToString (inherited from **System.Object**)	Returns a string that represents the current connection string.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetKey (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework documentation available from Visual Studio .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.
InternalDelete (inherited from **OleDbConnectionString**)	Overridden. Deletes the connection string.
InternalRename (inherited from **OleDbConnectionString**)	Overridden. Renames the connection string.
MakePathFromIdentifier (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework Help available from Visual Studio® .NET at http://go.microsoft.com/fwlink/?LinkID=9677.
MakeTextPathFromIdentifier (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework Help available from Visual Studio .NET at http://go.microsoft.com/fwlink/?LinkID=9677.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

FileSysOleDbConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

FileSysOleDbConnectionString.Clone Method

Creates a deep copy of the current instance.

VB

```
Overrides Public Function Clone() As IConnectionString
[C#]
public override IConnectionString Clone();
[C++]
public: IConnectionString* Clone();
[JScript]
public override function Clone() : IConnectionString;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

FileSysOleDbConnectionString Class | FileSysOleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

FileSysOleDbConnectionString.IsUDL Method

Determines if the specified file name describes a universal data link (UDL).

VB

```
Public Shared Function IsUDL( _
   ByVal file As String _
) As Boolean
[C#]
public static bool IsUDL(
   string file
);
[C++]
public: static bool IsUDL(
   String* file
);
[JScript]
public static function IsUDL(
   file : String
) : Boolean;
```

Parameters

file
Path to the specified file.

Return value

true if the file is a UDL; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

FileSysOleDbConnectionString Class | FileSysOleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

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FileSysOleDbConnectionString.ReadUDL Method

Returns a connection string for the specified file.

VB

```
Public Shared Function ReadUDL( _
   ByVal file As String _
) As IConnectionString
[C#]
public static IConnectionString ReadUDL(
   string file
);
[C++]
public: static IConnectionString* ReadUDL(
   String* file
);
[JScript]
public static function ReadUDL(
   file : String
) : IConnectionString;
```

Parameters

file
Name of the file to return a connection string for..

Return value

An IConnectionString containing the connection string for the file in question.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

FileSysOleDbConnectionString Class | FileSysOleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

DB2OleDbConnectionString Class

Contains the DB2 OLEDB connection string.

For a list of all members of this type, see DB2OleDbConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.OleDbConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.DB2OleDbConnectionString

VB

```
<Serializable>
Public Class DB2OleDbConnectionString
   Inherits OleDbConnectionString
[C#]
[Serializable]
public class DB2OleDbConnectionString : OleDbConnectionString
[C++]
[Serializable]
public __gc class DB2OleDbConnectionString : public
   OleDbConnectionString
[JScript]
public
   Serializable
class DB2OleDbConnectionString extends OleDbConnectionString
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

DB2OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

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DB2OleDbConnectionString Members

DB2OleDbConnectionString overview

Public Constructors

DB2OleDbConnectionString Constructor	Overloaded. Initializes a new instance of the **DB2OleDbConnectionString** class.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of database the connection string will connect to.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
FilePath (inherited from **OleDbConnectionString**)	Gets the format for the string.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local logical unit (LU) name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name (inherited from **OleDbConnectionString**)	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.

Password (inherited from **IConnectionString**)	Gets or sets the user password.
PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).
UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists (inherited from **OleDbConnectionString**)	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **OleDbConnectionString**)	Overridden. Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
IsUDL	Determines if the specified file is a universal data link (.udl) file.
Load (inherited from **OleDbConnectionString**)	Overridden. Retrieves the current instance.
ReadUDL	Returns a connection string for the specified file.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **OleDbConnectionString**)	Overridden. Saves the connection string.
SaveAsText (inherited from **OleDbConnectionString**)	Saves the connection string as text.
SetString (inherited from **OleDbConnectionString**)	Overridden. Sets current string.
ToString (inherited from **System.Object**)	Returns a string that represents the current connection string.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetKey (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework Help available from Microsoft Visual Studio® .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.
InternalDelete (inherited from **OleDbConnectionString**)	Overridden. Deletes the connection string.
InternalRename (inherited from **OleDbConnectionString**)	Overridden. Renames the connection string.
MakePathFromIdentifier (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework documentation available from Visual Studio .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.

MakeTextPathFromIdentifier (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework documentation available from Visual Studio .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OleDbConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

DB2OleDbConnectionString Constructor

Creates a new instance of the **DB2OleDbConnectionString** class.

Overload List

Creates a new instance of the **DB2OleDbConnectionString** class using the specified string name.

[Visual Basic] Public Sub New(System.String, System.Boolean)

[C#] public DB2OleDbConnectionString(System.String, System.Boolean);

[C++] public: DB2OleDbConnectionString(System.String, System.Boolean);

[JScript] public function DB2OleDbConnectionString(System.String, System.Boolean);

Creates a new instance of the **DB2OleDbConnectionString** class using the specified string name and connection string.

[Visual Basic] Public Sub New(System.String, System.Boolean, IConnectionString)

[C#] public DB2OleDbConnectionString(System.String, System.Boolean, IConnectionString);

[C++] public: DB2OleDbConnectionString(System.String, System.Boolean, IConnectionString*);

[JScript] public function DB2OleDbConnectionString(System.String, System.Boolean, IConnectionString);

See Also

DB2OleDbConnectionString Class | DB2OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace | Data Access Library Programmer's Guide

DB2OleDbConnectionString Constructor (System.String, System.Boolean)

Initializes a new instance of the DB2OleDbConnectionString class.

VB

```
Public Sub New( _
   ByVal name As String, _
   ByVal isFullPath As Boolean _
)
[C#]
public DB2OleDbConnectionString(
   string name,
   bool isFullPath
);
[C++]
public: DB2OleDbConnectionString(
   String* name,
   bool isFullPath
);
[JScript]
public function DB2OleDbConnectionString(
   name : String,
   isFullPath : Boolean
);
```

Parameters

name
Name of the connection string.
isFullPath
true if the name contains the full connection string path; otherwise, **false**.

Remarks

If *isFullPath* is false, then the new instance is created using the default path for the connection string.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OleDbConnectionString Class | DB2OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OleDbConnectionString Constructor Overload List

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DB2OleDbConnectionString Constructor (System.String, System.Boolean, IConnectionString)

Initializes a new instance of the DB2OleDbConnectionString class using the specified name and connection string.

VB

```
Public Sub New( _
   ByVal name As String, _
   ByVal isFullPath As Boolean, _
   ByVal connStr As IConnectionString _
)
[C#]
public DB2OleDbConnectionString(
   string name,
   bool isFullPath,
   IConnectionString connStr
);
[C++]
public: DB2OleDbConnectionString(
   String* name,
   bool isFullPath,
   IConnectionString* connStr
);
[JScript]
public function DB2OleDbConnectionString(
   name : String,
   isFullPath : Boolean,
   connStr : IConnectionString
);
```

Parameters

name
  Name of the connection string.
isFullPath
  true if the name contains the full connection string; otherwise, **false**.
connStr
  The connection string.

Remarks

This constructor is designed as a copy constructor. Using *connStr*, you can create a new instance of an existing connection string and give it a new friendly name.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OleDbConnectionString Class | DB2OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | DB2OleDbConnectionString Constructor Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OleDbConnectionString Methods

The methods of the **DB2OleDbConnectionString** class are listed here. For a complete list of **DB2OleDbConnectionString** class members, see the DB2OleDbConnectionString Members topic.

Public Methods

Clone	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists (inherited from **OleDbConnectionString**)	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString (inherited from **OleDbConnectionString**)	Overridden. Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
S IsUDL	Determines if the specified file is a universal data link (.udl) file.
Load (inherited from **OleDbConnectionString**)	Overridden. Retrieves the current instance.
S ReadUDL	Returns a connection string for the specified file.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save (inherited from **OleDbConnectionString**)	Overridden. Saves the connection string.
SaveAsText (inherited from **OleDbConnectionString**)	Saves the connection string as text.
SetString (inherited from **OleDbConnectionString**)	Overridden. Sets current string.
ToString (inherited from **System.Object**)	Returns a string that represents the current connection string.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetKey (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework documentation available from Visual Studio .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.
InternalDelete (inherited from **OleDbConnectionString**)	Overridden. Deletes the connection string.
InternalRename (inherited from **OleDbConnectionString**)	Overridden. Renames the connection string.
MakePathFromIdentifier (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework documentation available from Visual Studio .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.
MakeTextPathFromIdentifier (inherited from **OleDbConnectionString**)	For additional information about the System namespace, see the .NET Framework documentation available from Visual Studio .NET or online at http://go.microsoft.com/fwlink/?LinkID=9677.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

DB2OleDbConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

DB2OleDbConnectionString.Clone Method

Creates a deep copy of the current instance.

VB

```
Overrides Public Function Clone() As IConnectionString
[C#]
public override IConnectionString Clone();
[C++]
public: IConnectionString* Clone();
[JScript]
public override function Clone() : IConnectionString;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OleDbConnectionString Class | DB2OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace | Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OleDbConnectionString.IsUDL Method

Returns a value that describes if the specified file is a universal data link (UDL) file.

VB

```
Public Shared Function IsUDL( _
   ByVal file As String _
) As Boolean
[C#]
public static bool IsUDL(
   string file
);
[C++]
public: static bool IsUDL(
   String* file
);
[JScript]
public static function IsUDL(
   file : String
) : Boolean;
```

Parameters

file
Name of the specified file.

Return Value

true if the file is a UDL file; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OleDbConnectionString Class | DB2OleDbConnectionString Members |
Microsoft.HostIntegration.DataAccessLibrary Namespace | Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DB2OleDbConnectionString.ReadUDL Method

Returns a connection string for the specified file.

VB

```
Public Shared Function ReadUDL( _
   ByVal file As String _
) As IConnectionString
[C#]
public static IConnectionString ReadUDL(
   string file
);
[C++]
public: static IConnectionString* ReadUDL(
   String* file
);
[JScript]
public static function ReadUDL(
   file : String
) : IConnectionString;
```

Parameters

file
Name of the file to return a connection string for.

Return value

An IConnectionString containing the connection string for the file in question.

Remarks

In addition to creating a connection string for the specified file, **ReadUDL** will load the file into active memory.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

DB2OleDbConnectionString Class | DB2OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace | Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn Class

A host column description (HCD) file column.

For a list of all members of this type, see HCDColumn Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IHCDItem
    Microsoft.HostIntegration.DataAccessLibrary.HCDColumn

VB

```
<Serializable>
NotInheritable Public Class HCDColumn
   Inherits IHCDItem
[C#]
[Serializable]
public sealed class HCDColumn : IHCDItem
[C++]
[Serializable]
public __gc __sealed class HCDColumn : public IHCDItem
[JScript]
public
   Serializable
class HCDColumn extends IHCDItem
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn Members

HCDColumn overview

Public Fields

Format	A format identifier.

Public Properties

ColumnNumber	Gets the ordinal of the column.
Comment	Gets and sets a comment on the current instance.
HostCCSID	Gets and sets the host character code set identifier (CCSID) of the column.
Label	Gets and sets the alias label of the column.
Length	Gets and sets the length of the column.
Name	Gets and sets the name of the column.
Nullable	Gets and sets a value that determines whether the column can be set to null.
Precision	Gets and sets the precision of the column.
Scale	Gets and sets the scale of the column.
SqlTypeHost	Gets and sets the host type name of the column.
SqlTypeLocal	Gets and sets the local type name of the column.
UseQualifier	Gets and sets a value that determines the user qualifier for the column.

Public Methods

Delete (inherited from **IHCDItem**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load (inherited from **IHCDItem**)	Loads the HCD item from persistent storage.
MoveDown	Moves the column down in the parent table.
MoveUp	Moves the column up in the parent table.
Rename	Renames the item in persistent storage.
Save (inherited from **IHCDItem**)	Saves the HCD item to persistent storage.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Properties

ChildCount (inherited from **IHCDItem**)	Gets the number of HCD item children for the item.

Protected Methods

ChildExists (inherited from **IHCDItem**)	Returns a value that describes whether a child with the specified name exists inside the current instance.
Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetChild (inherited from **IHCDItem**)	Retrieves an HCD item child at the specified index.
InternalDelete	Deletes the current instance.
InternalLoad	Loads the HCD item from persistent storage.
InternalSave	Saves the HCD item to permanent storage.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

HCDColumn Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDColumn Fields

The fields of the **HCDColumn** class are listed here. For a complete list of **HCDColumn** class members, see the HCDColumn Members topic.

Public Fields

◆ S Format	A format identifier.

See Also

HCDColumn Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDColumn.Format Field

A format identifier.

VB

```
Public Shared Format As DataFormats.Format
[C#]
public static DataFormats.Format Format;
[C++]
public: static DataFormats.Format* Format;
[JScript]
public static var Format : DataFormats.Format;
```

Remarks

Format is designed to be used for copying and pasting the current instance in a user interface.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

HCDColumn Properties

The properties of the **HCDColumn** class are listed here. For a complete list of **HCDColumn** class members, see the HCDColumn Members topic.

Public Properties

ColumnNumber	Gets the ordinal of the column.
Comment	Gets and sets a comment on the current instance.
HostCCSID	Gets and sets the host character code set identifier (CCSID) of the column.
Label	Gets and sets the alias label of the column.
Length	Gets and sets the length of the column.
Name	Gets and sets the name of the column.
Nullable	Gets and sets a value that determines whether the column can be set to null.
Precision	Gets and sets the precision of the column.
Scale	Gets and sets the scale of the column.
SqlTypeHost	Gets and sets the host type name of the column.
SqlTypeLocal	Gets and sets the local type name of the column.
UseQualifier	Gets and sets a value that determines the user qualifier for the column.

Protected Properties

ChildCount (inherited from **IHCDItem**)	Gets the number of HCD item children for the item.

See Also

HCDColumn Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.ColumnNumber Property

Gets the ordinal of the column.

VB

```
Public ReadOnly Property ColumnNumber As Integer
[C#]
public int ColumnNumber {get;}
[C++]
public: __property int get_ColumnNumber();
[JScript]
public function get ColumnNumber() : int;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDColumn.Comment Property

Gets and sets a comment on the current instance.

VB

```
Public Property Comment As String
[C#]
public string Comment {get; set;}
[C++]
public: __property String* get_Comment();
public: __property void set_Comment(String*);
[JScript]
public function get Comment() : String;
public function set Comment(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.HostCCSID Property

Gets and sets the Host CCSID of the column.

VB

```
Public Property HostCCSID As Integer
[C#]
public int HostCCSID {get; set;}
[C++]
public: __property int get_HostCCSID();
public: __property void set_HostCCSID(int);
[JScript]
public function get HostCCSID() : int;
public function set HostCCSID(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.Label Property

Gets and sets the alias label of the column.

VB

```
Public Property Label As String
[C#]
public string Label {get; set;}
[C++]
public: __property String* get_Label();
public: __property void set_Label(String*);
[JScript]
public function get Label() : String;
public function set Label(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.Length Property

Gets and sets the length of the column.

VB

```
Public Property Length As Integer
[C#]
public int Length {get; set;}
[C++]
public: __property int get_Length();
public: __property void set_Length(int);
[JScript]
public function get Length() : int;
public function set Length(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.Name Property

Gets and sets the name of the column.

VB

```
Overrides Public Property Name As String
[C#]
public override string Name {get; set;}
[C++]
public: __property String* get_Name();
public: __property void set_Name(String*);
[JScript]
public override function get Name() : String;
public override function set Name(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.Nullable Property

Gets and sets a value that determines whether the column can be set to null.

VB

```
Public Property Nullable As Boolean
[C#]
public bool Nullable {get; set;}
[C++]
public: __property bool get_Nullable();
public: __property void set_Nullable(bool);
[JScript]
public function get Nullable() : Boolean;
public function set Nullable(Boolean);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.Precision Property

Gets and sets the precision of the column.

VB

```
Public Property Precision As Integer
[C#]
public int Precision {get; set;}
[C++]
public: __property int get_Precision();
public: __property void set_Precision(int);
[JScript]
public function get Precision() : int;
public function set Precision(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.Scale Property

Gets and sets the scale of the column.

VB

```
Public Property Scale As Integer
[C#]
public int Scale {get; set;}
[C++]
public: __property int get_Scale();
public: __property void set_Scale(int);
[JScript]
public function get Scale() : int;
public function set Scale(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.SqlTypeHost Property

Gets and sets the host type name of the column.

VB

```
Public Property SqlTypeHost As String
[C#]
public string SqlTypeHost {get; set;}
[C++]
public: __property String* get_SqlTypeHost();
public: __property void set_SqlTypeHost(String*);
[JScript]
public function get SqlTypeHost() : String;
public function set SqlTypeHost(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.SqlTypeLocal Property

Gets and sets the local type name of the column.

VB

```
Public Property SqlTypeLocal As String
[C#]
public string SqlTypeLocal {get; set;}
[C++]
public: __property String* get_SqlTypeLocal();
public: __property void set_SqlTypeLocal(String*);
[JScript]
public function get SqlTypeLocal() : String;
public function set SqlTypeLocal(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

HCDColumn.UseQualifier Property

Gets and sets a value that determines the user qualifier for the column.

VB

```
Public Property UseQualifier As Boolean
[C#]
public bool UseQualifier {get; set;}
[C++]
public: __property bool get_UseQualifier();
public: __property void set_UseQualifier(bool);
[JScript]
public function get UseQualifier() : Boolean;
public function set UseQualifier(Boolean);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn Methods

The methods of the **HCDColumn** class are listed here. For a complete list of **HCDColumn** class members, see the HCDColumn Members topic.

Public Methods

Delete (inherited from **IHCDItem**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load (inherited from **IHCDItem**)	Loads the HCD item from persistent storage.
MoveDown	Moves the column down in the parent table.
MoveUp	Moves the column up in the parent table.
Rename	Renames the item in persistent storage.
Save (inherited from **IHCDItem**)	Saves the HCD item to persistent storage.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Methods

ChildExists (inherited from **IHCDItem**)	Returns a value that describes whether a child with the specified name exists inside the current instance.
Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetChild (inherited from **IHCDItem**)	Retrieves an HCD item child at the specified index.
InternalDelete	Deletes the current instance.
InternalLoad	Loads the HCD item from persistent storage.
InternalSave	Saves the HCD item to permanent storage.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

HCDColumn Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.InternalDelete Method

Deletes the column.

VB

```
Overrides Protected Function InternalDelete() As Boolean
[C#]
protected override bool InternalDelete();
[C++]
protected: bool InternalDelete();
[JScript]
protected override function InternalDelete() : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.InternalLoad Method

Loads the column from persistent storage.

VB

```
Overrides Protected Sub InternalLoad()
[C#]
protected override void InternalLoad();
[C++]
protected: void InternalLoad();
[JScript]
protected override function InternalLoad();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.InternalSave Method

Saves the column to persistent storage.

VB

```
Overrides Protected Sub InternalSave()
[C#]
protected override void InternalSave();
[C++]
protected: void InternalSave();
[JScript]
protected override function InternalSave();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDColumn.MoveDown Method

Moves the column down in the parent table.

VB

```
Public Sub MoveDown()
[C#]
public void MoveDown();
[C++]
public: void MoveDown();
[JScript]
public function MoveDown();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDColumn.MoveUp Method

Moves the column up in the parent table.

VB

```
Public Sub MoveUp()
[C#]
public void MoveUp();
[C++]
public: void MoveUp();
[JScript]
public function MoveUp();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDColumn.Rename Method

Renames the column in persistent storage.

VB

```
Overrides Public Sub Rename( _
   ByVal newName As String _
)
[C#]
public override void Rename(
   string newName
);
[C++]
public: void Rename(
   String* newName
);
[JScript]
public override function Rename(
   newName : String
);
```

Parameters

newName
The new name of the column.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDColumn Class | HCDColumn Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataType Structure

An allowable data type for an HCD item.

For a list of all members of this type, see HCDDataType Members.

System.Object
  System.ValueType
    Microsoft.HostIntegration.DataAccessLibrary.HCDDataType

VB

```
Public Structure HCDDataType
[C#]
public struct HCDDataType
[C++]
public __value struct HCDDataType
```

[JScript] In JScript®, you can use the structures in the .NET Framework, but you cannot define your own.

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

HCDDataType Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDDataType Members

HCDDataType overview

Public Fields

DefaultLength	The default length of the data type.
DefaultPrecision	The default precision of the data type.
DefaultScale	The default scale of the data type.
EditableLength	Determines whether the length of the data type is editable.
EditablePrecision	Determines if the precision of the data type is editable.
EditableScale	Determines if the scale of the data type is editable.
FriendlyName	The friendly name of the data type.
Name	The name of the data type.

Public Methods

Equals (inherited from **System.ValueType**)	Indicates whether this instance and a specified object are equal.
GetHashCode (inherited from **System.ValueType**)	Returns the hash code for this instance.
GetType (inherited from **System.Object**)	Returns the type of the current instance.
ToString (inherited from **System.ValueType**)	Returns the fully qualified type name of this instance.

Protected Methods

Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

HCDDataType Structure | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataType Fields

The fields of the **HCDDataType** structure are listed here. For a complete list of **HCDDataType** structure members, see the HCDDataType Members topic.

Public Fields

DefaultLength	The default length of the data type.
DefaultPrecision	The default precision of the data type.
DefaultScale	The default scale of the data type.
EditableLength	Determines whether the length of the data type is editable.
EditablePrecision	Determines if the precision of the data type is editable.
EditableScale	Determines if the scale of the data type is editable.
FriendlyName	The friendly name of the data type.
Name	The name of the data type.

See Also

HCDDataType Structure | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataType.DefaultLength Field

The default length of the data type.

VB

```
Public DefaultLength As Integer
[C#]
public int DefaultLength;
[C++]
public: int DefaultLength;
[JScript]
public var DefaultLength : int;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataType Structure | HCDDataType Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataType.DefaultPrecision Field

The default precision of the data type.

VB

```
Public DefaultPrecision As Integer
[C#]
public int DefaultPrecision;
[C++]
public: int DefaultPrecision;
[JScript]
public var DefaultPrecision : int;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataType Structure | HCDDataType Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDDataType.DefaultScale Field

The default scale of the data type.

VB

```
Public DefaultScale As Integer
[C#]
public int DefaultScale;
[C++]
public: int DefaultScale;
[JScript]
public var DefaultScale : int;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataType Structure | HCDDataType Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataType.EditableLength Field

Determines whether the length of the data type is editable.

VB

```
Public EditableLength As Boolean
[C#]
public bool EditableLength;
[C++]
public: bool EditableLength;
[JScript]
public var EditableLength : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataType Structure | HCDDataType Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataType.EditablePrecision Field

Determines if the precision of the data type is editable.

VB

```
Public EditablePrecision As Boolean
[C#]
public bool EditablePrecision;
[C++]
public: bool EditablePrecision;
[JScript]
public var EditablePrecision : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataType Structure | HCDDataType Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataType.EditableScale Field

Determines if the scale of the data type is editable.

VB

```
Public EditableScale As Boolean
[C#]
public bool EditableScale;
[C++]
public: bool EditableScale;
[JScript]
public var EditableScale : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataType Structure | HCDDataType Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataType.FriendlyName Field

The friendly name of the data type.

VB

```
Public FriendlyName As String
[C#]
public string FriendlyName;
[C++]
public: String* FriendlyName;
[JScript]
public var FriendlyName : String;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataType Structure | HCDDataType Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDDataType.Name Field

The name of the data type.

VB

```
Public Name As String
[C#]
public string Name;
[C++]
public: String* Name;
[JScript]
public var Name : String;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataType Structure | HCDDataType Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataTypes Class

The collection of host and PC data types used in HCD items.

For a list of all members of this type, see HCDDataTypes Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.HCDDataTypes

VB

```
Public Class HCDDataTypes
[C#]
public class HCDDataTypes
[C++]
public __gc class HCDDataTypes
[JScript]
public class HCDDataTypes
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

HCDDataTypes Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDDataTypes Members

HCDDataTypes overview

Public Constructors

HCDDataTypes Constructor	Initializes a new instance of the **HCDDataTypes** class.

Public Fields

S HostTypes	The allowable host data types in HCD items.
S LocalTypes	The allowable PC data types in HCD items.

Public Methods

Equals (inherited from **System.Object**)	Determines whether two instances are equal.
S FriendlyNameToName	Converts a friendly name to a simple name.
S FriendlyNameToType	Converts a friendly name to an HCD data type.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Returns the type of the current instance.
S NameToFriendlyName	Converts a friendly name to a simple name.
ToString (inherited from **System.Object**)	Returns a string that represents the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

HCDDataTypes Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataTypes Constructor

Initializes a new instance of the HCDDataTypes class.

VB

```
Public Sub New()
[C#]
public HCDDataTypes();
[C++]
public: HCDDataTypes();
[JScript]
public function HCDDataTypes();
```

Remarks

The default constructor initializes any fields to their default values.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDDataTypes Class | HCDDataTypes Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataTypes Fields

The fields of the **HCDDataTypes** class are listed here. For a complete list of **HCDDataTypes** class members, see the HCDDataTypes Members topic.

Public Fields

HostTypes	The allowable host data types in HCD items.
LocalTypes	The allowable PC data types in HCD items.

See Also

HCDDataTypes Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataTypes.HostTypes Field

The allowable host data types in HCD items.

VB

```
Public Shared HostTypes() As HCDDataType
[C#]
public static HCDDataType[] HostTypes;
[C++]
public: static HCDDataType HostTypes[];
[JScript]
public static var HostTypes : HCDDataType[];
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataTypes Class | HCDDataTypes Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataTypes.LocalTypes Field

The allowable PC data types in HCD items.

VB

```
Public Shared LocalTypes() As HCDDataType
[C#]
public static HCDDataType[] LocalTypes;
[C++]
public: static HCDDataType LocalTypes[];
[JScript]
public static var LocalTypes : HCDDataType[];
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDDataTypes Class | HCDDataTypes Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataTypes Methods

The methods of the **HCDDataTypes** class are listed here. For a complete list of **HCDDataTypes** class members, see the HCDDataTypes Members topic.

Public Methods

Equals (inherited from **System.Object**)	Determines whether two instances are equal.
S FriendlyNameToName	Converts a friendly name to a simple name.
S FriendlyNameToType	Converts a friendly name to an HCD data type.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Returns the type of the current instance.
S NameToFriendlyName	Converts a friendly name to a simple name.
ToString (inherited from **System.Object**)	Returns a string that represents the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

HCDDataTypes Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataTypes.FriendlyNameToName Method

Converts a friendly name to a simple name.

VB

```
Public Shared Function FriendlyNameToName( _
   ByVal list() As HCDDataType, _
   ByVal friendlyName As String _
) As String
[C#]
public static string FriendlyNameToName(
   HCDDataType[] list,
   string friendlyName
);
[C++]
public: static String* FriendlyNameToName(
   HCDDataType list[],
   String* friendlyName
);
[JScript]
public static function FriendlyNameToName(
   list : HCDDataType[],
   friendlyName : String
) : String;
```

Parameters

list
A set of HCD data types to search.
friendlyName
The specified friendly name to search on.

Return value

The simple name of the type if found; otherwise, returns **String.empty**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDDataTypes Class | HCDDataTypes Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataTypes.FriendlyNameToType Method

Converts a friendly name to an HCD data type.

VB

```
Public Shared Function FriendlyNameToType( _
   ByVal list() As HCDDataType, _
   ByVal friendlyName As String _
) As HCDDataType
[C#]
public static HCDDataType FriendlyNameToType(
   HCDDataType[] list,
   string friendlyName
);
[C++]
public: static HCDDataType FriendlyNameToType(
   HCDDataType list[],
   String* friendlyName
);
[JScript]
public static function FriendlyNameToType(
   list : HCDDataType[],
   friendlyName : String
) : HCDDataType;
```

Parameters

list
  A set of HCD data types to search.
friendlyName
  The friendly name to search on.

Return value

If successful, returns the HCD item; otherwise, returns the first item in the list.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDDataTypes Class | HCDDataTypes Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDDataTypes.NameToFriendlyName Method

Converts a friendly name to a simple name.

VB

```
Public Shared Function NameToFriendlyName( _
   ByVal list() As HCDDataType, _
   ByVal name As String _
) As String
[C#]
public static string NameToFriendlyName(
   HCDDataType[] list,
   string name
);
[C++]
public: static String* NameToFriendlyName(
   HCDDataType list[],
   String* name
);
[JScript]
public static function NameToFriendlyName(
   list : HCDDataType[],
   name : String
) : String;
```

Parameters

list
A list of HCD data types to search.
name
The friendly name to search on.

Return value

If successful, the simple name of the type; otherwise, **String.empty**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDDataTypes Class | HCDDataTypes Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile Class

Describes a host column description (HCD) file that can be used to connect to host file systems.

For a list of all members of this type, see HCDFile Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IHCDItem
    Microsoft.HostIntegration.DataAccessLibrary.HCDFile

VB

```
<Serializable>
NotInheritable Public Class HCDFile
   Inherits IHCDItem
[C#]
[Serializable]
public sealed class HCDFile : IHCDItem
[C++]
[Serializable]
public __gc __sealed class HCDFile : public IHCDItem
[JScript]
public
   Serializable
class HCDFile extends IHCDItem
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDFile Members

HCDFile overview

Public Fields

S Format	A format identifier that can be used to copy and paste the current instance in a user interface.

Public Properties

CreationDate	Gets and sets the creation date of the host column description (HCD) file.
FilePath	Gets the full file path of the HCD file.
S HCDExtension	Gets the extension used for HCD files.
Name	Overridden. Gets and sets the name of the HCD file.
TableCount	Gets the number of tables in the file.

Public Methods

AddTable	Overloaded. Adds a table to the file.
S CreateFile	Creates a new HCD file.
Delete (inherited from **IHCDItem**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two instances are equal.
S Exists	Determines if a given file name exists at the specified path.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for the current instance.
GetTableAt	Returns a table using the specified index.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load (inherited from **IHCDItem**)	Loads the HCD item from persistent storage.
S OpenFile	Opens an existing HCD file.
RemoveTable	Removes a table from the table.
Rename	Overridden. Renames the file.
Save (inherited from **IHCDItem**)	Saves the HCD item to persistent storage.
TableExists	Determines if the specified table is present in a file.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Properties

ChildCount (inherited from **IHCDItem**)	Gets the number of HCD item children for the item.

Protected Methods

ChildExists (inherited from **IHCDItem**)	Returns a value that describes whether a child with the specified name exists inside the current instance.
Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetChild (inherited from **IHCDItem**)	Retrieves an HCD item child at the specified index.
InternalDelete	Overridden. Deletes a file.
InternalLoad	Overridden. Loads a file.
InternalSave	Overridden. Saves a file.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

HCDFile Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDFile Fields

The fields of the **HCDFile** class are listed here. For a complete list of **HCDFile** class members, see the HCDFile Members topic.

Public Fields

Format	A format identifier that can be used to copy and paste the current instance in a user interface.

See Also

HCDFile Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDFile.Format Field

A format identifier that can be used to copy and paste the current instance in a user interface.

VB

```
Public Shared Format As DataFormats.Format
[C#]
public static DataFormats.Format Format;
[C++]
public: static DataFormats.Format* Format;
[JScript]
public static var Format : DataFormats.Format;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile Properties

The properties of the **HCDFile** class are listed here. For a complete list of **HCDFile** class members, see the HCDFile Members topic.

Public Properties

CreationDate	Gets and sets the creation date of the host column description (HCD) file.
FilePath	Gets the full file path of the HCD file.
S HCDExtension	Gets the extension used for HCD files.
Name	Overridden. Gets and sets the name of the HCD file.
TableCount	Gets the number of tables in the file.

Protected Properties

ChildCount (inherited from **IHCDItem**)	Gets the number of HCD item children for the item.

See Also

HCDFile Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDFile.CreationDate Property

Gets and sets the creation date of the host column description (HCD) file.

VB

```
Public Property CreationDate As DateTime
[C#]
public DateTime CreationDate {get; set;}
[C++]
public: __property DateTime get_CreationDate();
public: __property void set_CreationDate(DateTime);
[JScript]
public function get CreationDate() : DateTime;
public function set CreationDate(DateTime);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.FilePath Property

Gets the full file path of the host column description (HCD) file.

VB

```
Public ReadOnly Property FilePath As String
[C#]
public string FilePath {get;}
[C++]
public: __property String* get_FilePath();
[JScript]
public function get FilePath() : String;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.HCDExtension Property

Gets the extension used for host column description (HCD) files.

VB

```
Public Shared ReadOnly Property HCDExtension As String
[C#]
public static string HCDExtension {get;}
[C++]
public: __property static String* get_HCDExtension();
[JScript]
public static function get HCDExtension() : String;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.Name Property

Gets and sets the name of the host column description (HCD) file.

VB

```
Overrides Public Property Name As String
[C#]
public override string Name {get; set;}
[C++]
public: __property String* get_Name();
public: __property void set_Name(String*);
[JScript]
public override function get Name() : String;
public override function set Name(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.TableCount Property

Gets the number of tables in the file.

VB

```
Public ReadOnly Property TableCount As Integer
[C#]
public int TableCount {get;}
[C++]
public: __property int get_TableCount();
[JScript]
public function get TableCount() : int;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile Methods

The methods of the **HCDFile** class are listed here. For a complete list of **HCDFile** class members, see the HCDFile Members topic.

Public Methods

AddTable	Overloaded. Adds a table to the file.
CreateFile	Creates a new host column description (HCD) file.
Delete (inherited from **IHCDItem**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two instances are equal.
Exists	Determines if a given file name exists at the specified path.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for the current instance.
GetTableAt	Returns a table using the specified index.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load (inherited from **IHCDItem**)	Loads the HCD item from persistent storage.
OpenFile	Opens an existing HCD file.
RemoveTable	Removes a table from the table.
Rename	Overridden. Renames the file.
Save (inherited from **IHCDItem**)	Saves the HCD item to persistent storage.
TableExists	Determines if the specified table is present in a file.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Properties

ChildCount (inherited from **IHCDItem**)	Gets the number of HCD item children for the item.

Protected Methods

ChildExists (inherited from **IHCDItem**)	Returns a value that describes whether a child with the specified name exists inside the current instance.
Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetChild (inherited from **IHCDItem**)	Retrieves an HCD item child at the specified index.
InternalDelete	Overridden. Deletes a file.
InternalLoad	Overridden. Loads a file.
InternalSave	Overridden. Saves a file.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

HCDFile Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.AddTable Method

Adds a table to the file.

Overload List

Adds a table to the file

[Visual Basic] Overloads Public Function AddTable() As HCDTable

[C#] public HCDTable AddTable();

[C++] public: HCDTable* AddTable();

[JScript] public function AddTable() : HCDTable;

Adds a table to the file.

[Visual Basic] Overloads Public Function AddTable(HCDTable) As HCDTable

[C#] public HCDTable AddTable(HCDTable);

[C++] public: HCDTable* AddTable(HCDTable*);

[JScript] public function AddTable(HCDTable) : HCDTable;

Adds a table to the file.

[Visual Basic] Overloads Public Function AddTable(System.String) As HCDTable

[C#] public HCDTable AddTable(System.String);

[C++] public: HCDTable* AddTable(System.String);

[JScript] public function AddTable(System.String) : HCDTable;

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

HCDFile.AddTable Method ()

Adds a new table to the file.

VB

```
Overloads Public Function AddTable() As HCDTable
[C#]
public HCDTable AddTable();
[C++]
public: HCDTable* AddTable();
[JScript]
public function AddTable() : HCDTable;
```

Return value

An HCDTable containing the table that is added.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide | HCDFile.AddTable Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.AddTable Method (HCDTable)

Adds a table to the file.

VB

```
Overloads Public Function AddTable( _
   ByVal table As HCDTable _
) As HCDTable
[C#]
public HCDTable AddTable(
   HCDTable table
);
[C++]
public: HCDTable* AddTable(
   HCDTable* table
);
[JScript]
public function AddTable(
   table : HCDTable
) : HCDTable;
```

Parameters

table
The name of the table.

Return value

An HCDTable containing the table that is added.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide | HCDFile.AddTable Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.AddTable Method (System.String)

Adds a table to the file.

VB

```
Overloads Public Function AddTable( _
   ByVal name As String _
) As HCDTable
[C#]
public HCDTable AddTable(
   string name
);
[C++]
public: HCDTable* AddTable(
   String* name
);
[JScript]
public function AddTable(
   name : String
) : HCDTable;
```

Parameters

name
The name of the table.

Return value

An HCDTable containing the table that is added.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide | HCDFile.AddTable Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.CreateFile Method

Creates a new host column description (HCD) file.

Overload List

Creates a new HCD file.

[Visual Basic] Overloads Public Shared Function CreateFile() As HCDFile

[C#] public static HCDFile CreateFile();

[C++] public: static HCDFile* CreateFile();

[JScript] public static function CreateFile() : HCDFile;

Creates a new HCD file using the specified file path.

[Visual Basic] Overloads Public Shared Function CreateFile(System.String) As HCDFile

[C#] public static HCDFile CreateFile(System.String);

[C++] public: static HCDFile* CreateFile(System.String);

[JScript] public static function CreateFile(System.String) : HCDFile;

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.CreateFile Method ()

Creates a new host column description (HCD) file.

VB

```
Overloads Public Shared Function CreateFile() As HCDFile
[C#]
public static HCDFile CreateFile();
[C++]
public: static HCDFile* CreateFile();
[JScript]
public static function CreateFile() : HCDFile;
```

Return value

The opened and loaded HCD file.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide | HCDFile.CreateFile Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.CreateFile Method (System.String)

Creates a new host column description (HCD) file using the specified file path.

VB

```
Overloads Public Shared Function CreateFile( _
   ByVal filePath As String _
) As HCDFile
[C#]
public static HCDFile CreateFile(
   string filePath
);
[C++]
public: static HCDFile* CreateFile(
   String* filePath
);
[JScript]
public static function CreateFile(
   filePath : String
) : HCDFile;
```

Parameters

filePath
The full file path of the new HCD file.

Return value

The opened and loaded HCD file

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide | HCDFile.CreateFile Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.Exists Method

Determines if a given file name exists at the specified path.

VB

```
Public Shared Function Exists( _
   ByVal path As String, _
   ByVal name As String _
) As Boolean
[C#]
public static bool Exists(
   string path,
   string name
);
[C++]
public: static bool Exists(
   String* path,
   String* name
);
[JScript]
public static function Exists(
   path : String,
   name : String
) : Boolean;
```

Parameters

path
The path to search.
name
The name of the file to look for.

Return value

true if the file exists; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.GetTableAt Method

Returns a table using the specified index.

VB

```
Public Function GetTableAt( _
   ByVal i As Integer _
) As HCDTable
[C#]
public HCDTable GetTableAt(
   int i
);
[C++]
public: HCDTable* GetTableAt(
   int i
);
[JScript]
public function GetTableAt(
   i : int
) : HCDTable;
```

Parameters

i
  The index of the table.

Return value

An HCDTable containing the specified table.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.InternalDelete Method

Deletes a file.

VB

```
Overrides Protected Function InternalDelete() As Boolean
[C#]
protected override bool InternalDelete();
[C++]
protected: bool InternalDelete();
[JScript]
protected override function InternalDelete() : Boolean;
```

Return value

true if the delete was successful; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

HCDFile.InternalLoad Method

Loads a file.

VB

```
Overrides Protected Sub InternalLoad()
[C#]
protected override void InternalLoad();
[C++]
protected: void InternalLoad();
[JScript]
protected override function InternalLoad();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

HCDFile.InternalSave Method

Saves a file.

VB

```
Overrides Protected Sub InternalSave()
[C#]
protected override void InternalSave();
[C++]
protected: void InternalSave();
[JScript]
protected override function InternalSave();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.OpenFile Method

Opens an existing host column description (HCD) file.

VB

```
Public Shared Function OpenFile( _
   ByVal filePath As String _
) As HCDFile
[C#]
public static HCDFile OpenFile(
   string filePath
);
[C++]
public: static HCDFile* OpenFile(
   String* filePath
);
[JScript]
public static function OpenFile(
   filePath : String
) : HCDFile;
```

Parameters

filePath
The full path to the HCD file.

Return value

An HCDFile containing the HCD file.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.RemoveTable Method

Removes a table from the table.

VB

```
Public Sub RemoveTable( _
   ByVal table As HCDTable _
)
[C#]
public void RemoveTable(
   HCDTable table
);
[C++]
public: void RemoveTable(
   HCDTable* table
);
[JScript]
public function RemoveTable(
   table : HCDTable
);
```

Parameters

table
An HCDTable containing the table to be removed.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

HCDFile.Rename Method

Renames the file.

VB

```
Overrides Public Sub Rename( _
   ByVal newLabel As String _
)
[C#]
public override void Rename(
   string newLabel
);
[C++]
public: void Rename(
   String* newLabel
);
[JScript]
public override function Rename(
   newLabel : String
);
```

Parameters

newLabel
The new label name.

Remarks

Rename automatically saves any changes made to the HCD file name.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDFile.TableExists Method

Determines if the specified table is present in a file.

VB

```
Public Function TableExists( _
   ByVal name As String _
) As Boolean
[C#]
public bool TableExists(
   string name
);
[C++]
public: bool TableExists(
   String* name
);
[JScript]
public function TableExists(
   name : String
) : Boolean;
```

Parameters

name
The name of the table to search for.

Return value

true if the table exists in the file; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDFile Class | HCDFile Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable Class

Describes a table within a host column description (HCD) file.

For a list of all members of this type, see HCDTable Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IHCDItem
    Microsoft.HostIntegration.DataAccessLibrary.HCDTable

VB

```
<Serializable>
NotInheritable Public Class HCDTable
   Inherits IHCDItem
[C#]
[Serializable]
public sealed class HCDTable : IHCDItem
[C++]
[Serializable]
public __gc __sealed class HCDTable : public IHCDItem
[JScript]
public
   Serializable
class HCDTable extends IHCDItem
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable Members

HCDTable overview

Public Fields

Format	A format identifier.

Public Properties

ColumnCount	Gets the number of columns in the table.
CreationType	Gets or sets the table's creation type.
DelimiterField	Gets or sets the delimiter field of the table.
DelimiterRecord	Gets or sets the delimiter record of the table.
KeyLength	Gets or sets the key length of the table.
KeyPosition	Gets or sets the key position of the table.
KeySort	Gets or sets the key sort of the table.
Name	Gets or sets the name of the table.
TextQualifier	Gets or sets the text qualifier of the table.
UseForFileTransfer	Gets or sets a value indicating whether the current instance is used for file transfer.

Public Methods

AddColumn	Adds a column to the current table.
AddNewColumn	Adds a new column to the table.
ColumnExists	Returns a value indicating whether the specified column exists in the current table.
Delete (inherited from **IHCDItem**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two instances are equal.
GetColumnAt	Returns a column from the specified index.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load (inherited from **IHCDItem**)	Loads the table from persistent storage.
RemoveColumn	Removes the specified column from the current instance.
Rename	Renames the table in persistent storage.
Save (inherited from **IHCDItem**)	Saves the host column description (HCD) item to persistent storage.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Properties

ChildCount (inherited from **IHCDItem**)	Gets the number of HCD item children for the item.

Protected Methods

ChildExists (inherited from **IHCDItem**)	Returns a value that describes whether a child with the specified name exists inside the current instance.
Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetChild (inherited from **IHCDItem**)	Retrieves an HCD item child at the specified index.
InternalDelete	Deletes the current instance.
InternalLoad	Loads the table from persistent storage.
InternalSave	Saves the table to permanent storage.

MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

HCDTable Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable Fields

The fields of the **HCDTable** class are listed here. For a complete list of **HCDTable** class members, see the HCDTable Members topic.

Fields

◆ S Format	A format identifier.

See Also

HCDTable Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.Format Field

A format identifier.

VB

```
Public Shared Format As DataFormats.Format
[C#]
public static DataFormats.Format Format;
[C++]
public: static DataFormats.Format* Format;
[JScript]
public static var Format : DataFormats.Format;
```

Remarks

Format is designed to be used for copying and pasting in a user interface.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable Properties

The properties of the **HCDTable** class are listed here. For a complete list of **HCDTable** class members, see the HCDTable Members topic.

Public Properties

ColumnCount	Gets the number of columns in the table.
CreationType	Gets or sets the table's creation type.
DelimiterField	Gets or sets the delimiter field of the table.
DelimiterRecord	Gets or sets the delimiter record of the table.
KeyLength	Gets or sets the key length of the table.
KeyPosition	Gets or sets the key position of the table.
KeySort	Gets or sets the key sort of the table.
Name	Gets or sets the name of the table.
TextQualifier	Gets or sets the text qualifier of the table.
UseForFileTransfer	Gets or sets a value indicating whether the current instance is used for file transfer.

Protected Properties

ChildCount (inherited from **IHCDItem**)	Gets the number of HCD item children for the item.

See Also

HCDTable Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDTable.ColumnCount Property

Gets the number of columns in the table.

VB

```
Public ReadOnly Property ColumnCount As Integer
[C#]
public int ColumnCount {get;}
[C++]
public: __property int get_ColumnCount();
[JScript]
public function get ColumnCount() : int;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.CreationType Property

Gets or sets the creation type of the table.

VB

```
Public Property CreationType As Integer
[C#]
public int CreationType {get; set;}
[C++]
public: __property int get_CreationType();
public: __property void set_CreationType(int);
[JScript]
public function get CreationType() : int;
public function set CreationType(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.DelimiterField Property

Gets or sets the delimiter field of the table.

VB

```
Public Property DelimiterField As String
[C#]
public string DelimiterField {get; set;}
[C++]
public: __property String* get_DelimiterField();
public: __property void set_DelimiterField(String*);
[JScript]
public function get DelimiterField() : String;
public function set DelimiterField(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.DelimiterRecord Property

Gets or sets the delimiter record of the table.

VB

```
Public Property DelimiterRecord As String
[C#]
public string DelimiterRecord {get; set;}
[C++]
public: __property String* get_DelimiterRecord();
public: __property void set_DelimiterRecord(String*);
[JScript]
public function get DelimiterRecord() : String;
public function set DelimiterRecord(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.KeyLength Property

Gets or sets the key length of the table.

VB

```
Public Property KeyLength As Integer
[C#]
public int KeyLength {get; set;}
[C++]
public: __property int get_KeyLength();
public: __property void set_KeyLength(int);
[JScript]
public function get KeyLength() : int;
public function set KeyLength(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.KeyPosition Property

Gets or sets the key position of the table.

VB

```
Public Property KeyPosition As Integer
[C#]
public int KeyPosition {get; set;}
[C++]
public: __property int get_KeyPosition();
public: __property void set_KeyPosition(int);
[JScript]
public function get KeyPosition() : int;
public function set KeyPosition(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.KeySort Property

Gets or sets the key sort of the table.

VB

```
Public Property KeySort As Integer
[C#]
public int KeySort {get; set;}
[C++]
public: __property int get_KeySort();
public: __property void set_KeySort(int);
[JScript]
public function get KeySort() : int;
public function set KeySort(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.Name Property

Gets or sets the name of the table.

VB

```
Overrides Public Property Name As String
[C#]
public override string Name {get; set;}
[C++]
public: __property String* get_Name();
public: __property void set_Name(String*);
[JScript]
public override function get Name() : String;
public override function set Name(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.TextQualifier Property

Gets or sets the text qualifier of the table.

VB

```
Public Property TextQualifier As String
[C#]
public string TextQualifier {get; set;}
[C++]
public: __property String* get_TextQualifier();
public: __property void set_TextQualifier(String*);
[JScript]
public function get TextQualifier() : String;
public function set TextQualifier(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.UseForFileTransfer Property

Gets or sets a value indicating whether the current instance is used for file transfer.

VB

```
Public Property UseForFileTransfer As Boolean
[C#]
public bool UseForFileTransfer {get; set;}
[C++]
public: __property bool get_UseForFileTransfer();
public: __property void set_UseForFileTransfer(bool);
[JScript]
public function get UseForFileTransfer() : Boolean;
public function set UseForFileTransfer(Boolean);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable Methods

The methods of the **HCDTable** class are listed here. For a complete list of **HCDTable** class members, see the HCDTable Members topic.

Public Methods

AddColumn	Adds a column to the current table.
AddNewColumn	Adds a new column to the table.
ColumnExists	Returns a value indicating whether the specified column exists in the current table.
Delete (inherited from **IHCDItem**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two instances are equal.
GetColumnAt	Returns a column from the specified index.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load (inherited from **IHCDItem**)	Loads the table from persistent storage.
RemoveColumn	Removes the specified column from the current instance.
Rename	Renames the table in persistent storage.
Save (inherited from **IHCDItem**)	Saves the host column description (HCD) item to persistent storage.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Methods

ChildExists (inherited from **IHCDItem**)	Returns a value that describes whether a child with the specified name exists inside the current instance.
Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetChild (inherited from **IHCDItem**)	Retrieves an HCD item child at the specified index.
InternalDelete	Deletes the current instance.
InternalLoad	Loads the table from persistent storage.
InternalSave	Saves the table to permanent storage.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

HCDTable Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDTable.AddColumn Method

Adds a column to the current table.

VB

```
Public Function AddColumn( _
   ByVal column As HCDColumn _
) As HCDColumn
[C#]
public HCDColumn AddColumn(
   HCDColumn column
);
[C++]
public: HCDColumn* AddColumn(
   HCDColumn* column
);
[JScript]
public function AddColumn(
   column : HCDColumn
) : HCDColumn;
```

Parameters

column
The column to add.

Return value

The column that was added.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.AddNewColumn Method

Adds a new column to the table.

Overload List

Adds a new column to the table.

[Visual Basic] Overloads Public Function AddNewColumn() As HCDColumn

[C#] public HCDColumn AddNewColumn();

[C++] public: HCDColumn* AddNewColumn();

[JScript] public function AddNewColumn() : HCDColumn;

Adds a new column to the table with the specified column name.

[Visual Basic] Overloads Public Function AddNewColumn(System.String) As HCDColumn

[C#] public HCDColumn AddNewColumn(System.String);

[C++] public: HCDColumn* AddNewColumn(System.String);

[JScript] public function AddNewColumn(System.String) : HCDColumn;

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

HCDTable.AddNewColumn Method ()

Adds a new column to the table.

VB

```
Overloads Public Function AddNewColumn() As HCDColumn
[C#]
public HCDColumn AddNewColumn();
[C++]
public: HCDColumn* AddNewColumn();
[JScript]
public function AddNewColumn() : HCDColumn;
```

Return value

An HCDColumn containing the new column added.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide | HCDTable.AddNewColumn Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.AddNewColumn Method (System.String)

Adds the specified column to the table using the specified name.

VB

```
Overloads Public Function AddNewColumn( _
   ByVal name As String _
) As HCDColumn
[C#]
public HCDColumn AddNewColumn(
   string name
);
[C++]
public: HCDColumn* AddNewColumn(
   String* name
);
[JScript]
public function AddNewColumn(
   name : String
) : HCDColumn;
```

Parameters

name
The name of the column to add.

Return value

An HCDColumn containing the new column added.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide | HCDTable.AddNewColumn Overload List

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.ColumnExists Method

Returns a value indicating whether the specified column exists in the current table.

VB

```
Public Function ColumnExists( _
   ByVal name As String _
) As Boolean
[C#]
public bool ColumnExists(
   string name
);
[C++]
public: bool ColumnExists(
   String* name
);
[JScript]
public function ColumnExists(
   name : String
) : Boolean;
```

Parameters

name
The name of the column to search for.

Return value

true if the column exists in the current instance; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.GetColumnAt Method

Returns a column from the specified index.

VB

```
Public Function GetColumnAt( _
   ByVal i As Integer _
) As HCDColumn
[C#]
public HCDColumn GetColumnAt(
   int i
);
[C++]
public: HCDColumn* GetColumnAt(
   int i
);
[JScript]
public function GetColumnAt(
   i : int
) : HCDColumn;
```

Parameters

i
  Index of the column to return.

Return value

An HCDColumn containing the column with the specified index.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

HCDTable.InternalDelete Method

Deletes the current instance.

VB

```
Overrides Protected Function InternalDelete() As Boolean
[C#]
protected override bool InternalDelete();
[C++]
protected: bool InternalDelete();
[JScript]
protected override function InternalDelete() : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

HCDTable.InternalLoad Method

Loads the table from persistent memory.

VB

```
Overrides Protected Sub InternalLoad()
[C#]
protected override void InternalLoad();
[C++]
protected: void InternalLoad();
[JScript]
protected override function InternalLoad();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.InternalSave Method

Saves the current instance to persistent memory.

VB

```
Overrides Protected Sub InternalSave()
[C#]
protected override void InternalSave();
[C++]
protected: void InternalSave();
[JScript]
protected override function InternalSave();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

HCDTable.RemoveColumn Method

Removes the specified column from the current instance.

VB

```
Public Sub RemoveColumn( _
   ByVal column As HCDColumn _
)
[C#]
public void RemoveColumn(
   HCDColumn column
);
[C++]
public: void RemoveColumn(
   HCDColumn* column
);
[JScript]
public function RemoveColumn(
   column : HCDColumn
);
```

Parameters

column
An HCDColumn containing the column to remove.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

HCDTable.Rename Method

Renames a table within a host column description (HCD) file.

VB

```
Overrides Public Sub Rename( _
   ByVal newName As String _
)
[C#]
public override void Rename(
   string newName
);
[C++]
public: void Rename(
   String* newName
);
[JScript]
public override function Rename(
   newName : String
);
```

Parameters

newName
The new name of the table.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

HCDTable Class | HCDTable Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString Class

Represents a generic connection string.

For a list of all members of this type, see IConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.BasicConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.DB2OdbcConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.OleDbConnectionString

VB

```
<Serializable>
MustInherit Public Class IConnectionString
[C#]
[Serializable]
public abstract class IConnectionString
[C++]
[Serializable]
public __gc __abstract class IConnectionString
[JScript]
public
   Serializable
abstract class IConnectionString
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString Members

IConnectionString overview

Public Properties

AffiliatedApplication	Gets or sets the name of the affiliated application.
AllowSavingPassword	Gets or sets a value that determines if the system saves the password of the user.
APPCMode	Gets or sets the APPC Mode.
BinaryAsChar	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment	Gets or sets additional information about the connection string.
DataSourceName	Gets or sets the name of the data source.
DateModified	Get or sets the date and time the connection string was modified.
DBMSPlatform	Gets or sets the type of database to which the connection string connects.
DefaultLibrary	Gets or sets the default library for the connection string.
DefaultQualifier	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema	Gets or sets the name of the collection where the system looks for catalog information.
S Format	Gets the format for the string.
HCDFileName	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID	Gets or sets the character code set identifier (CCSID) for the host.
HostName	Gets the name of the host.
InitialCatalog	Gets or sets the initial catalog name.
LocalLU	Gets or sets the local logical unit (LU) name.
Location	Gets or sets the location.
Name	Gets or sets the name of the connection string.
NetworkAddress	Gets or sets the IP network address.
NetworkLibrary	Gets or sets the type of network over which the connection transmits.
NetworkPort	Gets or sets the network port ID.
PackageCollection	Gets or sets the name of the target collection.
Password	Gets or sets the user password.
PCCodepage	Gets or sets the client PC code page.
RemoteLU	Gets or sets the remote logical unit (LU).
UnitsOfWork	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName	Gets or sets the name of the user.
UseSingleSignOn	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone	Creates a deep copy of the current instance.
CopyFrom	Copies the connection string from the specified object.
Delete	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Retrieves the current instance.
Rename	Renames the connection string.
Save	Saves the connection string.
SetString	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
InternalDelete	Deletes the connection string.
InternalRename	Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

IConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString Properties

The properties of the **IConnectionString** class are listed here. For a complete list of **IConnectionString** class members, see the IConnectionString Members topic.

Public Properties

AffiliatedApplication	Gets or sets the name of the affiliated application.
AllowSavingPassword	Gets or sets a value that determines if the system saves the password of the user.
APPCMode	Gets or sets the APPC Mode.
BinaryAsChar	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment	Gets or sets additional information about the connection string.
DataSourceName	Gets or sets the name of the data source.
DateModified	Get or sets the date and time the connection string was modified.
DBMSPlatform	Gets or sets the type of database to which the connection string connects.
DefaultLibrary	Gets or sets the default library for the connection string.
DefaultQualifier	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema	Gets or sets the name of the collection where the system looks for catalog information.
S Format	Gets the format for the string.
HCDFileName	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID	Gets or sets the character code set identifier (CCSID) for the host.
HostName	Gets the name of the host.
InitialCatalog	Gets or sets the initial catalog name.
LocalLU	Gets or sets the local LU name.
Location	Gets or sets the location.
Name	Gets or sets the name of the connection string.
NetworkAddress	Gets or sets the IP network address.
NetworkLibrary	Gets or sets the type of network over which the connection transmits.
NetworkPort	Gets or sets the network port ID.
PackageCollection	Gets or sets the name of the target collection.
Password	Gets or sets the user password.
PCCodepage	Gets or sets the client PC code page.
RemoteLU	Gets or sets the remote logical unit (LU).
UnitsOfWork	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName	Gets or sets the name of the user.
UseSingleSignOn	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

See Also

IConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

IConnectionString.AffiliatedApplication Property

Gets or sets the name of the affiliated application.

VB

```
Public Property AffiliatedApplication As String
[C#]
public string AffiliatedApplication {get; set;}
[C++]
public: __property String* get_AffiliatedApplication();
public: __property void set_AffiliatedApplication(String*);
[JScript]
public function get AffiliatedApplication() : String;
public function set AffiliatedApplication(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.AllowSavingPassword Property

Gets or sets a value that determines if the system saves the password of the user.

VB

```
Public Property AllowSavingPassword As Boolean
[C#]
public bool AllowSavingPassword {get; set;}
[C++]
public: __property bool get_AllowSavingPassword();
public: __property void set_AllowSavingPassword(bool);
[JScript]
public function get AllowSavingPassword() : Boolean;
public function set AllowSavingPassword(Boolean);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.APPCMode Property

Gets or sets the APPC Mode.

VB

```
Public Property APPCMode As String
[C#]
public string APPCMode {get; set;}
[C++]
public: __property String* get_APPCMode();
public: __property void set_APPCMode(String*);
[JScript]
public function get APPCMode() : String;
public function set APPCMode(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.BinaryAsChar Property

Gets or sets a value that determines if the system should interpret the information received as a character string.

VB

```
Public Property BinaryAsChar As Boolean
[C#]
public bool BinaryAsChar {get; set;}
[C++]
public: __property bool get_BinaryAsChar();
public: __property void set_BinaryAsChar(bool);
[JScript]
public function get BinaryAsChar() : Boolean;
public function set BinaryAsChar(Boolean);
```

Value

true to interpret the information as a character string; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Comment Property

Gets or sets additional information about the connection string.

VB

```
Public Property Comment As String
[C#]
public string Comment {get; set;}
[C++]
public: __property String* get_Comment();
public: __property void set_Comment(String*);
[JScript]
public function get Comment() : String;
public function set Comment(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

IConnectionString.DataSourceName Property

Gets or sets the name of the data source.

```
Public Property DataSourceName As String
[C#]
public string DataSourceName {get; set;}
[C++]
public: __property String* get_DataSourceName();
public: __property void set_DataSourceName(String*);
[JScript]
public function get DataSourceName() : String;
public function set DataSourceName(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.DateModified Property

Get or sets the date and time the connection string was modified.

VB

```
Public Property DateModified As DateTime
[C#]
public DateTime DateModified {get; set;}
[C++]
public: __property DateTime get_DateModified();
public: __property void set_DateModified(DateTime);
[JScript]
public function get DateModified() : DateTime;
public function set DateModified(DateTime);
```

Remarks

DateModified applies only to connection strings that connect to a file.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.DBMSPlatform Property

Gets or sets the type of database to which the connection string connects.

VB

```
Public Property DBMSPlatform As String
[C#]
public string DBMSPlatform {get; set;}
[C++]
public: __property String* get_DBMSPlatform();
public: __property void set_DBMSPlatform(String*);
[JScript]
public function get DBMSPlatform() : String;
public function set DBMSPlatform(String);
```

Value

The following list describes the possible values for **DBMSPlatform**.

- DB2/MVS
- DB2/AS400
- DB2/NT
- DB2/6000

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.DefaultLibrary Property

Gets or sets the default library for the connection string.

VB

```
Public Property DefaultLibrary As String
[C#]
public string DefaultLibrary {get; set;}
[C++]
public: __property String* get_DefaultLibrary();
public: __property void set_DefaultLibrary(String*);
[JScript]
public function get DefaultLibrary() : String;
public function set DefaultLibrary(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.DefaultQualifier Property

Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.

VB

```
Public Property DefaultQualifier As String
[C#]
public string DefaultQualifier {get; set;}
[C++]
public: __property String* get_DefaultQualifier();
public: __property void set_DefaultQualifier(String*);
[JScript]
public function get DefaultQualifier() : String;
public function set DefaultQualifier(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.DefaultSchema Property

Gets or sets the name of the collection where the system looks for catalog information.

VB

```
Public Property DefaultSchema As String
[C#]
public string DefaultSchema {get; set;}
[C++]
public: __property String* get_DefaultSchema();
public: __property void set_DefaultSchema(String*);
[JScript]
public function get DefaultSchema() : String;
public function set DefaultSchema(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Format Property

Gets the format for the string.

VB

```
Public Shared ReadOnly Property Format As DataFormats.Format
[C#]
public static DataFormats.Format Format {get;}
[C++]
public: __property static DataFormats.Format* get_Format();
[JScript]
public static function get Format() : DataFormats.Format;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.HCDFileName Property

Gets or sets the name of the host column description (HCD) file associated with the connection string.

VB

```
Public Property HCDFileName As String
[C#]
public string HCDFileName {get; set;}
[C++]
public: __property String* get_HCDFileName();
public: __property void set_HCDFileName(String*);
[JScript]
public function get HCDFileName() : String;
public function set HCDFileName(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.HostCCSID Property

Gets or sets the character code set identifier (CCSID) for the host.

VB

```
Public Property HostCCSID As Integer
[C#]
public int HostCCSID {get; set;}
[C++]
public: __property int get_HostCCSID();
public: __property void set_HostCCSID(int);
[JScript]
public function get HostCCSID() : int;
public function set HostCCSID(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.HostName Property

Gets the name of the host.

VB

```
Public ReadOnly Property HostName As String
[C#]
public string HostName {get;}
[C++]
public: __property String* get_HostName();
[JScript]
public function get HostName() : String;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

IConnectionString.InitialCatalog Property

Gets or sets the initial catalog name.

VB

```
Public Property InitialCatalog As String
[C#]
public string InitialCatalog {get; set;}
[C++]
public: __property String* get_InitialCatalog();
public: __property void set_InitialCatalog(String*);
[JScript]
public function get InitialCatalog() : String;
public function set InitialCatalog(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.LocalLU Property

Gets or sets the local logical unit (LU) name.

VB

```
Public Property LocalLU As String
[C#]
public string LocalLU {get; set;}
[C++]
public: __property String* get_LocalLU();
public: __property void set_LocalLU(String*);
[JScript]
public function get LocalLU() : String;
public function set LocalLU(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Location Property

Gets or sets the location.

VB

```
Public Property Location As String
[C#]
public string Location {get; set;}
[C++]
public: __property String* get_Location();
public: __property void set_Location(String*);
[JScript]
public function get Location() : String;
public function set Location(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Name Property

Gets or sets the name of the connection string.

VB

```
Public Overridable Property Name As String
[C#]
public virtual string Name {get; set;}
[C++]
public: __property virtual String* get_Name();
public: __property virtual void set_Name(String*);
[JScript]
public function get Name() : String;
public function set Name(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.NetworkAddress Property

Gets or sets the IP network address.

VB

```
Public Property NetworkAddress As String
[C#]
public string NetworkAddress {get; set;}
[C++]
public: __property String* get_NetworkAddress();
public: __property void set_NetworkAddress(String*);
[JScript]
public function get NetworkAddress() : String;
public function set NetworkAddress(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.NetworkLibrary Property

Gets or sets the type of network over which the connection transmits.

VB

```
Public Property NetworkLibrary As String
[C#]
public string NetworkLibrary {get; set;}
[C++]
public: __property String* get_NetworkLibrary();
public: __property void set_NetworkLibrary(String*);
[JScript]
public function get NetworkLibrary() : String;
public function set NetworkLibrary(String);
```

Value

The following table describes the possible values for **NetworkLibrary**.

Value	Description
TCP/IP, TCP, or IP	TCP/IP
SNA	SNA

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.NetworkPort Property

Gets or sets the network port ID.

VB

```
Public Property NetworkPort As Integer
[C#]
public int NetworkPort {get; set;}
[C++]
public: __property int get_NetworkPort();
public: __property void set_NetworkPort(int);
[JScript]
public function get NetworkPort() : int;
public function set NetworkPort(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.PackageCollection Property

Gets or sets the name of the target collection.

VB

```
Public Property PackageCollection As String
[C#]
public string PackageCollection {get; set;}
[C++]
public: __property String* get_PackageCollection();
public: __property void set_PackageCollection(String*);
[JScript]
public function get PackageCollection() : String;
public function set PackageCollection(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Password Property

Gets or sets the user password.

VB

```
Public Property Password As String
[C#]
public string Password {get; set;}
[C++]
public: __property String* get_Password();
public: __property void set_Password(String*);
[JScript]
public function get Password() : String;
public function set Password(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.PCCodepage Property

Gets or sets the client PC code page.

VB

```
Public Property PCCodepage As Integer
[C#]
public int PCCodepage {get; set;}
[C++]
public: __property int get_PCCodepage();
public: __property void set_PCCodepage(int);
[JScript]
public function get PCCodepage() : int;
public function set PCCodepage(int);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

IConnectionString.RemoteLU Property

Gets or sets the remote logical unit (LU).

VB

```
Public Property RemoteLU As String
[C#]
public string RemoteLU {get; set;}
[C++]
public: __property String* get_RemoteLU();
public: __property void set_RemoteLU(String*);
[JScript]
public function get RemoteLU() : String;
public function set RemoteLU(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

IConnectionString.UnitsOfWork Property

Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.

VB

```
Public Property UnitsOfWork As String
[C#]
public string UnitsOfWork {get; set;}
[C++]
public: __property String* get_UnitsOfWork();
public: __property void set_UnitsOfWork(String*);
[JScript]
public function get UnitsOfWork() : String;
public function set UnitsOfWork(String);
```

Value

The following table describes the possible values for **RemoteLU**.

Value	Description
RUW	Remote unit of work
DUW	Distributed unit of work.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.UserName Property

Gets or sets the name of the user.

VB

```
Public Property UserName As String
[C#]
public string UserName {get; set;}
[C++]
public: __property String* get_UserName();
public: __property void set_UserName(String*);
[JScript]
public function get UserName() : String;
public function set UserName(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

IConnectionString.UseSingleSignOn Property

Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

VB

```
Public Property UseSingleSignOn As Boolean
[C#]
public bool UseSingleSignOn {get; set;}
[C++]
public: __property bool get_UseSingleSignOn();
public: __property void set_UseSingleSignOn(bool);
[JScript]
public function get UseSingleSignOn() : Boolean;
public function set UseSingleSignOn(Boolean);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString Methods

The methods of the **IConnectionString** class are listed here. For a complete list of **IConnectionString** class members, see the IConnectionString Members topic.

Public Methods

Clone	Creates a deep copy of the current instance.
CopyFrom	Copies the connection string from the specified object.
Delete	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists	Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Retrieves the current instance.
Rename	Renames the connection string.
Save	Saves the connection string.
SetString	Sets the connection string.
ToString (inherited from **System.Object**)	Returns a string representation of the current object.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
InternalDelete	Deletes the connection string.
InternalRename	Renames the connection string.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

IConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Clone Method

Creates a deep copy of the current instance.

VB

```
Public MustOverride Function Clone() As IConnectionString
[C#]
public abstract IConnectionString Clone();
[C++]
public: virtual IConnectionString* Clone() = 0;
[JScript]
public abstract function Clone() : IConnectionString;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.CopyFrom Method

Copies the connection string from the specified object.

VB

```
Public Sub CopyFrom( _
   ByVal rhs As IConnectionString _
)
[C#]
public void CopyFrom(
   IConnectionString rhs
);
[C++]
public: void CopyFrom(
   IConnectionString* rhs
);
[JScript]
public function CopyFrom(
   rhs : IConnectionString
);
```

Parameters

rhs
The object to copy the connection string from.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

IConnectionString.Delete Method

Deletes the current instance.

VB

```
Public Function Delete( _
   ByVal force As Boolean _
) As Boolean
[C#]
public bool Delete(
   bool force
);
[C++]
public: bool Delete(
   bool force
);
[JScript]
public function Delete(
   force : Boolean
) : Boolean;
```

Parameters

force
  true to force the deletion; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Exists Method

Determines if the current instance is abstract or actually represents a connection string.

VB

```
Public MustOverride Function Exists() As Boolean
[C#]
public abstract bool Exists();
[C++]
public: virtual bool Exists() = 0;
[JScript]
public abstract function Exists() : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

IConnectionString.GetString Method

Retrieves the connection string.

VB

```
Public MustOverride Function GetString() As String
[C#]
public abstract string GetString();
[C++]
public: virtual String* GetString() = 0;
[JScript]
public abstract function GetString() : String;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.InternalDelete Method

Deletes the connection string.

VB

```
Protected MustOverride Function InternalDelete() As Boolean
[C#]
protected abstract bool InternalDelete();
[C++]
protected: virtual bool InternalDelete() = 0;
[JScript]
protected abstract function InternalDelete() : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.InternalRename Method

Renames the connection string.

VB

```
Protected MustOverride Sub InternalRename( _
   ByVal destIdentifier As String _
)
[C#]
protected abstract void InternalRename(
   string destIdentifier
);
[C++]
protected: virtual void InternalRename(
   String* destIdentifier
) = 0;
[JScript]
protected abstract function InternalRename(
   destIdentifier : String
);
```

Parameters

destIdentifier
The new connection string.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Load Method

Retrieves the current instance.

VB

```
Public MustOverride Sub Load()
[C#]
public abstract void Load();
[C++]
public: virtual void Load() = 0;
[JScript]
public abstract function Load();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Rename Method

Renames the connection string.

VB

```
Public Sub Rename( _
   ByVal destIdentifier As String _
)
[C#]
public void Rename(
   string destIdentifier
);
[C++]
public: void Rename(
   String* destIdentifier
);
[JScript]
public function Rename(
   destIdentifier : String
);
```

Parameters

destIdentifier
Value to rename the connection string.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IConnectionString.Save Method

Saves the connection string.

VB

```
Public MustOverride Sub Save()
[C#]
public abstract void Save();
[C++]
public: virtual void Save() = 0;
[JScript]
public abstract function Save();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

IConnectionString.SetString Method

Sets the connection string.

VB

```
Public MustOverride Sub SetString( _
   ByVal val As String _
)
[C#]
public abstract void SetString(
   string val
);
[C++]
public: virtual void SetString(
   String* val
) = 0;
[JScript]
public abstract function SetString(
   val : String
);
```

Parameters

val
The connection string to set.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IConnectionString Class | IConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem Class

Provides the interface for loading, saving, deleting, and renaming an HCD item.

For a list of all members of this type, see IHCDItem Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IHCDItem
    Microsoft.HostIntegration.DataAccessLibrary.HCDColumn
    Microsoft.HostIntegration.DataAccessLibrary.HCDFile
    Microsoft.HostIntegration.DataAccessLibrary.HCDTable

VB

```
<Serializable>
MustInherit Public Class IHCDItem
[C#]
[Serializable]
public abstract class IHCDItem
[C++]
[Serializable]
public __gc __abstract class IHCDItem
[JScript]
public
   Serializable
abstract class IHCDItem
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem Members

IHCDItem overview

Public Properties

Name	Gets and sets the simple name of the HCD item.

Public Methods

Delete	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Loads the HCD item from persistent storage.
Rename	Renames the item in its persistent storage.
Save	Saves the HCD item to persistent storage.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Properties

ChildCount	Gets the number of HCD item children for the item.

Protected Methods

ChildExists	Returns a value that describes whether a child with the specified name exists inside the current instance.
Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetChild	Retrieves an HCD item child at the specified index.
InternalDelete	Deletes the current instance.
InternalLoad	Loads the HCD item from persistent storage.
InternalSave	Saves the HCD item to permanent storage.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

IHCDItem Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

IHCDItem Properties

The properties of the **IHCDItem** class are listed here. For a complete list of **IHCDItem** class members, see the IHCDItem Members topic.

Public Properties

Name	Gets and sets the simple name of the HCD item.

Protected Properties

ChildCount	Gets the number of HCD item children for the item.

See Also

IHCDItem Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

IHCDItem.ChildCount Property

Gets the number of HCD item children for the item.

VB

```
Protected ReadOnly Property ChildCount As Integer
[C#]
protected int ChildCount {get;}
[C++]
protected: __property int get_ChildCount();
[JScript]
protected function get ChildCount() : int;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem.Name Property

Gets and sets the simple name of the HCD item.

VB

```
Public MustOverride Property Name As String
[C#]
public abstract string Name {get; set;}
[C++]
public: __property virtual String* get_Name() = 0;
public: __property virtual void set_Name(String*) = 0;
[JScript]
public abstract function get Name() : String;
public abstract function set Name(String);
```

Remarks

Name represents is the file name (without a path or extension) for an **HCDFile**, the table name for an **HCDTable**, and the column name for an **HCDColumn**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem Methods

The methods of the **IHCDItem** class are listed here. For a complete list of **IHCDItem** class members, see the IHCDItem Members topic.

Public Methods

Delete	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two instances are equal.
GetHashCode (inherited from **System.Object**)	Serves as a hash function.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Loads the HCD item from persistent storage.
Rename	Renames the item in its persistent storage.
Save	Saves the HCD item to persistent storage.
ToString (inherited from **System.Object**)	Returns a string that represents the current instance.

Protected Methods

ChildExists	Returns a value that describes whether a child with the specified name exists inside the current instance.
Finalize (inherited from **System.Object**)	Enables an instance to attempt to free resources and perform other cleanup operations before the instance is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetChild	Retrieves an HCD item child at the specified index.
InternalDelete	Deletes the current instance.
InternalLoad	Loads the HCD item from persistent storage.
InternalSave	Saves the HCD item to permanent storage.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the current instance.

See Also

IHCDItem Class | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem.ChildExists Method

Returns a value that describes whether a child with the specified name exists inside the current instance.

VB

```
Protected Function ChildExists( _
   ByVal name As String _
) As Boolean
[C#]
protected bool ChildExists(
   string name
);
[C++]
protected: bool ChildExists(
   String* name
);
[JScript]
protected function ChildExists(
   name : String
) : Boolean;
```

Parameters

name
The name of the child HCD item to search for.

Return value

true if the child exists; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem.Delete Method

Deletes the current instance.

VB

```
Public Function Delete( _
   ByVal force As Boolean _
) As Boolean
[C#]
public bool Delete(
   bool force
);
[C++]
public: bool Delete(
   bool force
);
[JScript]
public function Delete(
   force : Boolean
) : Boolean;
```

Parameters

force
  true to delete the item permanently; **false** to receive a warning message before the item is deleted.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem.GetChild Method

Retrieves an HCD item child at the specified index.

VB

```
Protected Function GetChild( _
   ByVal i As Integer _
) As IHCDItem
[C#]
protected IHCDItem GetChild(
   int i
);
[C++]
protected: IHCDItem* GetChild(
   int i
);
[JScript]
protected function GetChild(
   i : int
) : IHCDItem;
```

Parameters

i
The index of the child.

Return value

The HCD child item.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem.InternalDelete Method

Deletes the current instance.

VB

```
Protected MustOverride Function InternalDelete() As Boolean
[C#]
protected abstract bool InternalDelete();
[C++]
protected: virtual bool InternalDelete() = 0;
[JScript]
protected abstract function InternalDelete() : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem.InternalLoad Method

Loads the HCD item from persistent storage.

VB

```
Protected MustOverride Sub InternalLoad()
[C#]
protected abstract void InternalLoad();
[C++]
protected: virtual void InternalLoad() = 0;
[JScript]
protected abstract function InternalLoad();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

IHCDItem.InternalSave Method

Saves the HCD item to permanent storage.

VB

```
Protected MustOverride Sub InternalSave()
[C#]
protected abstract void InternalSave();
[C++]
protected: virtual void InternalSave() = 0;
[JScript]
protected abstract function InternalSave();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem.Load Method

Loads the HCD item from persistent storage.

VB

```
Public Sub Load()
[C#]
public void Load();
[C++]
public: void Load();
[JScript]
public function Load();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem.Rename Method

Renames the item in its persistent storage.

VB

```
Public MustOverride Sub Rename( _
   ByVal newName As String _
)
[C#]
public abstract void Rename(
   string newName
);
[C++]
public: virtual void Rename(
   String* newName
) = 0;
[JScript]
public abstract function Rename(
   newName : String
);
```

Parameters

newName
The new name of the item.

Remarks

For a file, **Rename** renames the full file path.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IHCDItem.Save Method

Saves the HCD item to persistent storage.

VB

```
Public Sub Save()
[C#]
public void Save();
[C++]
public: void Save();
[JScript]
public function Save();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

IHCDItem Class | IHCDItem Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

OleDbConnectionString Class

Describes an OLE DB connection string.

For a list of all members of this type, see OleDbConnectionString Members.

System.Object
  Microsoft.HostIntegration.DataAccessLibrary.IConnectionString
    Microsoft.HostIntegration.DataAccessLibrary.OleDbConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.DB2OleDbConnectionString
      Microsoft.HostIntegration.DataAccessLibrary.FileSysOleDbConnectionString

VB

```
<Serializable>
MustInherit Public Class OleDbConnectionString
   Inherits IConnectionString
[C#]
[Serializable]
public abstract class OleDbConnectionString : IConnectionString
[C++]
[Serializable]
public __gc __abstract class OleDbConnectionString : public
   IConnectionString
[JScript]
public
   Serializable
abstract class OleDbConnectionString extends
   IConnectionString
```

Thread Safety

Any public static (**Shared** in Microsoft® Visual Basic®) members of this type are safe for multithreaded operations. Any instance members are not guaranteed to be thread safe.

Requirements

Namespace: Microsoft.HostIntegration.DataAccessLibrary

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server Server

Assembly: Microsoft.Hostintegration.Dataaccesslibrary (in Microsoft.Hostintegration.Dataaccesslibrary.dll)

See Also

OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString Members

OleDbConnectionString overview

Public Fields

OLEDBExtension	Represents the type of file extension. This field is constant.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of database to which the connection string connects.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
FilePath	Gets the file path of the current instance.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local logical unit (LU) name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.

PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).
UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

Public Methods

Clone (inherited from **IConnectionString**)	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Overridden. Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Overridden. Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save	Overridden. Saves the connection string.
SaveAsText	Saves the current instance as a text file.
SetString	Overridden. Sets current string.
ToString (inherited from **System.Object**)	Returns a string that represents the current connection string.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetKey	Retrieves the key from the current instance.
InternalDelete	Overridden. Deletes the connection string.
InternalRename	Overridden. Renames the connection string.
MakePathFromIdentifier	Makes a path from the specified identifier.
MakeTextPathFromIdentifier	Makes a text path from the specified identifier.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

OleDbConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString Fields

The fields of the **OleDbConnectionString** class are listed here. For a complete list of **OleDbConnectionString** class members, see the OleDbConnectionString Members topic.

Public Fields

◆ S OLEDBExtension	Represents the type of file extension. This field is constant.

See Also

OleDbConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

OleDbConnectionString.OLEDBExtension Field

Represents the type of file extension. This field is constant.

VB

```
Public Const OLEDBExtension As String
[C#]
public const string OLEDBExtension;
[C++]
public: const String* OLEDBExtension;
[JScript]
public var OLEDBExtension : String;
```

Remarks

The value of this filed is "UDL".

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString Properties

The properties of the **OleDbConnectionString** class are listed here. For a complete list of **OleDbConnectionString** class members, see the OleDbConnectionString Members topic.

Public Properties

AffiliatedApplication (inherited from **IConnectionString**)	Gets or sets the name of the affiliated application.
AllowSavingPassword (inherited from **IConnectionString**)	Gets or sets a value that determines if the system saves the password of the user.
APPCMode (inherited from **IConnectionString**)	Gets or sets the APPC Mode.
BinaryAsChar (inherited from **IConnectionString**)	Gets or sets a value that determines if the system should interpret the information received as a character string.
Comment (inherited from **IConnectionString**)	Gets or sets additional information about the connection string.
DataSourceName (inherited from **IConnectionString**)	Gets or sets the name of the data source.
DateModified (inherited from **IConnectionString**)	Get or sets the date and time the connection string was modified.
DBMSPlatform (inherited from **IConnectionString**)	Gets or sets the type of database to which the connection string connects.
DefaultLibrary (inherited from **IConnectionString**)	Gets or sets the default library for the connection string.
DefaultQualifier (inherited from **IConnectionString**)	Gets or sets name of the schema (collection/owner) with which to fully qualify unqualified object names.
DefaultSchema (inherited from **IConnectionString**)	Gets or sets the name of the collection where the system looks for catalog information.
FilePath	Gets the file path of the current instance.
HCDFileName (inherited from **IConnectionString**)	Gets or sets the name of the host column description (HCD) file associated with the connection string.
HostCCSID (inherited from **IConnectionString**)	Gets or sets the character code set identifier (CCSID) for the host.
HostName (inherited from **IConnectionString**)	Gets the name of the host.
InitialCatalog (inherited from **IConnectionString**)	Gets or sets the initial catalog name.
LocalLU (inherited from **IConnectionString**)	Gets or sets the local logical unit (LU) name.
Location (inherited from **IConnectionString**)	Gets or sets the location.
Name	Gets or sets the name of the connection string.
NetworkAddress (inherited from **IConnectionString**)	Gets or sets the IP network address.
NetworkLibrary (inherited from **IConnectionString**)	Gets or sets the type of network over which the connection transmits.
NetworkPort (inherited from **IConnectionString**)	Gets or sets the network port ID.
PackageCollection (inherited from **IConnectionString**)	Gets or sets the name of the target collection.
Password (inherited from **IConnectionString**)	Gets or sets the user password.
PCCodepage (inherited from **IConnectionString**)	Gets or sets the client PC code page.
RemoteLU (inherited from **IConnectionString**)	Gets or sets the remote logical unit (LU).

UnitsOfWork (inherited from **IConnectionString**)	Gets or sets a value that describes whether two-phase commit (distributed unit of work) used for transactions is supported for this data source.
UserName (inherited from **IConnectionString**)	Gets or sets the name of the user.
UseSingleSignOn (inherited from **IConnectionString**)	Gets or sets a value that determines if the connection string uses Single Sign-On (SSO).

See Also

OleDbConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString.FilePath Property

Gets the file path of the current instance.

VB

```
Public ReadOnly Property FilePath As String
[C#]
public string FilePath {get;}
[C++]
public: __property String* get_FilePath();
[JScript]
public function get FilePath() : String;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString.Name Property

Gets or sets the name of the current instance.

VB

```
Overrides Public Property Name As String
[C#]
public override string Name {get; set;}
[C++]
public: __property String* get_Name();
public: __property void set_Name(String*);
[JScript]
public override function get Name() : String;
public override function set Name(String);
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString Methods

The methods of the **OleDbConnectionString** class are listed here. For a complete list of **OleDbConnectionString** class members, see the OleDbConnectionString Members topic.

Public Methods

Clone (inherited from **IConnectionString**)	Overridden. Creates a deep copy of the current instance.
CopyFrom (inherited from **IConnectionString**)	Copies the connection string from the specified object.
Delete (inherited from **IConnectionString**)	Deletes the current instance.
Equals (inherited from **System.Object**)	Determines whether two connection strings are equal.
Exists	Overridden. Determines if the current instance is abstract or actually represents a connection string.
GetHashCode (inherited from **System.Object**)	Serves as a hash function for this type.
GetString	Overridden. Retrieves the connection string.
GetType (inherited from **System.Object**)	Gets the type of the current instance.
Load	Overridden. Retrieves the current instance.
Rename (inherited from **IConnectionString**)	Renames the connection string.
Save	Overridden. Saves the connection string.
SaveAsText	Saves the current instance as a text file.
SetString	Overridden. Sets the current connection string.
ToString (inherited from **System.Object**)	Returns a string that represents the current connection string.

Protected Methods

Finalize (inherited from **System.Object**)	Attempts to free resources and perform other cleanup operations before the connection string is reclaimed by the garbage collection. In Microsoft® Visual C#® and Visual C++®, finalizers are expressed using destructor syntax.
GetKey	Retrieves the key from the current instance.
InternalDelete	Overridden. Deletes the connection string.
InternalRename	Overridden. Renames the connection string.
MakePathFromIdentifier	Makes a path from the specified identifier.
MakeTextPathFromIdentifier	Makes a text path from the specified identifier.
MemberwiseClone (inherited from **System.Object**)	Creates a shallow copy of the connection string.

See Also

OleDbConnectionString Class | Microsoft.HostIntegration.DataAccessLibrary Namespace|
Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString.Exists Method

Determines if the current instance is abstract or actually represents a connection string.

VB

```
Overrides Public Function Exists() As Boolean
[C#]
public override bool Exists();
[C++]
public: bool Exists();
[JScript]
public override function Exists() : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

OleDbConnectionString.GetKey Method

Retrieves the key from the current instance.

VB

```
Protected Function GetKey( _
   ByVal i As Integer _
) As String
[C#]
protected string GetKey(
   int i
);
[C++]
protected: String* GetKey(
   int i
);
[JScript]
protected function GetKey(
   i : int
) : String;
```

Parameters

i

The key of the current instance.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString.GetString Method

Retrieves the connection string.

VB

```
Overrides Public Function GetString() As String
[C#]
public override string GetString();
[C++]
public: String* GetString();
[JScript]
public override function GetString() : String;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

OleDbConnectionString.InternalDelete Method

Deletes the current instance.

VB

```
Overrides Protected Function InternalDelete() As Boolean
[C#]
protected override bool InternalDelete();
[C++]
protected: bool InternalDelete();
[JScript]
protected override function InternalDelete() : Boolean;
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString.InternalRename Method

Renames the current instance.

VB

```
Overrides Protected Sub InternalRename( _
   ByVal destIdentifier As String _
)
[C#]
protected override void InternalRename(
   string destIdentifier
);
[C++]
protected: void InternalRename(
   String* destIdentifier
);
[JScript]
protected override function InternalRename(
   destIdentifier : String
);
```

Parameters

destIdentifier
The new name of the current instance.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString.Load Method

Retrieves the current instance.

VB

```
Overrides Public Sub Load()
[C#]
public override void Load();
[C++]
public: void Load();
[JScript]
public override function Load();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

OleDbConnectionString.MakePathFromIdentifier Method

Makes a path from the specified identifier.

VB

```
Protected Function MakePathFromIdentifier( _
   ByVal identifier As String _
) As String
[C#]
protected string MakePathFromIdentifier(
   string identifier
);
[C++]
protected: String* MakePathFromIdentifier(
   String* identifier
);
[JScript]
protected function MakePathFromIdentifier(
   identifier : String
) : String;
```

Parameters

identifier
The identifier out of which to make a path.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

OleDbConnectionString.MakeTextPathFromIdentifier Method

Creates a text path using the specified identifier.

VB

```
Protected Function MakeTextPathFromIdentifier( _
   ByVal identifier As String _
) As String
[C#]
protected string MakeTextPathFromIdentifier(
   string identifier
);
[C++]
protected: String* MakeTextPathFromIdentifier(
   String* identifier
);
[JScript]
protected function MakeTextPathFromIdentifier(
   identifier : String
) : String;
```

Parameters

identifier
The identifier on which to base a text path.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString.Save Method

Saves the current instance.

VB

```
Overrides Public Sub Save()
[C#]
public override void Save();
[C++]
public: void Save();
[JScript]
public override function Save();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

OleDbConnectionString.SaveAsText Method

Saves the current instance as a text file.

VB

```
Public Sub SaveAsText()
[C#]
public void SaveAsText();
[C++]
public: void SaveAsText();
[JScript]
public function SaveAsText();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OleDbConnectionString.SetString Method

Sets the current string.

VB

```
Overrides Public Sub SetString( _
   ByVal val As String _
)
[C#]
public override void SetString(
   string val
);
[C++]
public: void SetString(
   String* val
);
[JScript]
public override function SetString(
   val : String
);
```

Parameters

val
Value to set the string to.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

OleDbConnectionString Class | OleDbConnectionString Members | Microsoft.HostIntegration.DataAccessLibrary Namespace| Data Access Library Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ActiveX Controls Programmer's Reference

Microsoft® Host Integration Server 2004 provides ActiveX® controls that enable many Host Integration Server features to be easily accessed from a large number of client development environments. The APIs of these controls are listed in the sections below.

For general information about programming for ActiveX controls, see the ActiveX Controls Programmer's Guides section of the SDK.

For sample code using ActiveX controls, see the ActiveX Controls Samples section in the SDK.

This section contains:

- Data Queue ActiveX Control Programmer's Reference
- Host File Transfer ActiveX Control Programmer's Reference

Data Queue ActiveX Control Programmer's Reference

This section provides reference information about specific ActiveX® methods, properties, and event notifications supported by the Microsoft® Data Queue ActiveX control. The function syntax and code examples are based on Microsoft Visual Basic®.

This section contains:

- AddQueueItem Method
- Cancel Method
- CancelQueue Method
- CCSID Property
- ClearAll Method
- Connect Method
- ConnectionState Property
- ConnectionType Property
- CreateQueue Method
- CreateQueueContainer Method
- DeleteQueue Method
- Disconnect Method
- GetQueueItem Method
- LocalLU Property
- ModeName Property
- Password Property
- PCCodePage Property
- QueryAttribute Method
- QueueName Property
- RemoteLU Property
- SetAttribute Method
- StopQueue Method
- UserID Property

AddQueueItem Method

The **AddQueueItem** method on an **IEGDataQueue** object adds a record to a specified data queue using the Microsoft® Data Queue ActiveX® control.

```
object.AddQueueItem QueueItem, fBlock
```

Parameters

QueueItem
This required parameter representing an **IEIGDataQueueItem** object instance specifying the queue item to add to the queue.
fBlock
This optional parameter specifies whether the operation should block until the completion status is known. This parameter can be set to one of the **eigAnswerYesNoEnum** constants shown in the table following the Parameters section.

Values for the eigAnswerYesNoEnum constants

Enumeration	Value	Description
eigAnswerYes	0	This value indicates that the operation should block until the completion status is known.
eigAnswerNo	1	This value indicates that the operation should not block. This is the default value for this parameter if it is omitted from the method call.

Remarks

The queue the item is sent to is represented by **QItemType** property on the **IEIGDataQueueItem**. The *QueueItem* is an object of type **IEIGDataQueueItem** that may have been initialized by the user or returned by a call to **GetQueueItem**.

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Cancel Method

The **Cancel** method on an **IEGDataQueue** object terminates a transfer operation that is already in progress. This method cancels an item transfer using the Microsoft® Data Queue ActiveX® control.

```
object.Cancel
```

Parameters

None.

Remarks

The **Cancel** method is used to cancel a transfer operation that is already in progress.

CancelQueue Method

The **CancelQueue** method on an **IEGDataQueue** object indicates that an application using the Microsoft® Data Queue ActiveX® control no longer wants to be notified of an incoming queue data item. This can be used to stop pending notifications that were queued as a result of calling **GetQueueItem**.

```
object.CancelQueue CancelReqCount, CancelReqType, KeyValue
```

Parameters

CancelReqCount
This optional parameter is a count (a short value) of the number of outstanding queue receive requests to cancel. This parameter defaults to a value of 1.

CancelReqType
This optional parameter specifies the type of queue request to cancel. This parameter can be set to one of the **eigQItemTypeEnum** constants shown in the table following the Parameters section.

KeyValue
This optional parameter is a VARIANT representing the key value and has no default value. If the *CancelReqType* is eigKQItem, then this value specifies the key value to stop waiting for.

Values for the eigQItemTypeEnum constants

Enumeration	Value	Description
eigKQItem	0	A keyed item.
eigQItem	1	A non-keyed item. This is the default value for this parameter if it is not specified.

This parameter defaults to **eigQItem**.

Remarks

An application can call the **CancelQueue** method passing a *CancelReqCount* value of 0, in order to retrieve the number of queued receive requests.

It is possible that a notification event is in process during this method call. If this occurs, the application may receive a notification following the successful completion of this function. Entering a *CancelReqCount* value that is larger than the queued requests will result in all requests being cancelled. No error will be returned under this condition. Calling this method while no queued requests are outstanding will result in a noncritical error return code indicating this condition.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CCSID Property

The **CCSID** property on an **IEGDataQueueCtrl** object indicates the character code set identifier (CCSID) that must match the data in the queue as represented on the remote host computer. This property affects how data conversion is handled using the Microsoft® Data Queue ActiveX® control. This property sets or returns a short value representing a host CCSID for the data file. The default value for this property is 37 representing a CCSID for U.S./Canada.

```
current CCSID = object.CCSID
object.CCSID = 37
```

Remarks

The **CCSID** property is used to set or return the character code set identifier (CCSID) matching the data in the data queue as represented on the remote host computer. This value is used for data conversion of any character data in the host data queue to the **PCCodePage** property specified representing ANSI or Unicode character data on the computer running Microsoft® Windows®.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ClearAll Method

The **ClearAll** method on the **EIGDataQueue** object removes all items from the queue.

```
object.ClearAll OverWrite
```

Parameters

OverWrite
This optional parameter specifies whether to overwrite data in the queue. This parameter can be set to one of the **eigAnswerYesNoEnum** constants shown in the table following the Parameters section.

Values for the eigAnswerYesNoEnum constants

Enumeration	Value	Description
eigAnswerYes	0	This value indicates that the operation should overwrite data in the queue. This is the default value for this parameter if it is omitted from the method call.
eigAnswerNo	1	This value indicates that the operation should not overwrite data in the queue.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Connect Method

The **Connect** method on an **IEGDataQueueCtrl** object establishes a connection to the configured host using the Microsoft® Data Queue ActiveX® control and reports to the user an indication of the success or failure of the action.

```
object.Connect
```

Parameters

None.

Remarks

The **Connect** method is used to establish a connection to the host.

If the Data Queue ActiveX control support DLL cannot be loaded, the Win32® **SetErrorMode** function is called with an error value of SEM_NOOPENFILEERRORBOX | SEM_FAILCRITICALERRORS. Other types of errors are returned using the **ISupportErrorInfo** object.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ConnectionState Property

The **ConnectionState** property on an **IEGDataQueueCtrl** object indicates the current state of the connection to the host using the Microsoft® Data Queue ActiveX® control. The state of a connection can be unspecified, idle, connecting, connected, or disconnecting. This property returns a Long value representing a **eigConnectionStateEnum**. The default value for this property is **eigConnStateIdle**.

```
currentConnectionState = object.ConnectionState
```

Remarks

The **ConnectionState** property is used to return the current state of the connection to the host. This property is read-only and can be one of the following **eigConnectionStateEnum** constants:

Enumeration	Value	Description
eigConnStateUnspecified	-1	This value indicates that the connection state is unspecified.
eigConnStateIdle	0	This value indicates that the connection state is idle and no connection to the host exists.
eigConnStateConnecting	1	This value indicates that the connection state is in the process of connecting to the host.
eigConnStateConnected	2	This value indicates that the connection state is connected indicating a connection to the host.
eigConnStateDisconnecting	3	This value indicates that the connection state is in the process of disconnecting from the host.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ConnectionType Property

The **ConnectionType** property on an **IEGDataQueueCtrl** object indicates the network transport used for this connection. This property sets or returns a Long value representing an **eigConnectionTypeEnum**. The default value for this property is **eigConnTypeAPPC** indicating an APPC connection using SNA.

```
currentConnectionType = object.ConnectionType
```

Remarks

The **ConnectionType** property is used to set or return the connection type used to connect to the host. This property can be one of the following **eigConnectionTypeEnum** constants:

Enumeration	Value	Description
eigConnTypeUnspecified	-1	This value indicates that the connection type is unspecified.
eigConnTypeAPPC	0	This value indicates an APPC connection to the host using SNA LU 6.2.

If APPC (SNA LU 6.2) is selected for **ConnectionType**, then values for the **LocalLU**, **ModeName**, and **RemoteLU** properties are required.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CreateQueue Method

The **CreateQueue** method on an **IEGDataQueue** object creates a data queue using the Microsoft® Data Queue ActiveX® control. Following the successful creation of the queue, the object has a virtual connection to the data queue, such that a single instance of this object represents a single queue connection. In order to break this connection, the application can modify the **QueueName** property thus altering the queue association to a new value.

```
object.CreateQueue MaxMsgLength, QAuthority, QueueClass,
    AddSenderInfo, HostCCSID, InitialSize, queueLoc, recordLenCls,
    Title, AllowDupKeys, MakeKeyLen
```

Parameters

MaxMsgLength
This required parameter indicates the maximum length of a record in the queue represented as a short integer with possible values ranging from 1 to 31,744. This parameter defaults to a value of 256.

QAuthority
This required parameter specifies the authority to grant users of this queue. This parameter can be set to one of the **eigQAuthorityEnum** constants shown in the table following the Parameters section.

QueueClass
This required parameter indicates how the data will be received from the data queue. This parameter can be set to one of the **eigQClassEnum** constants shown in the table following the Parameters section.

AddSenderInfo
This required parameter indicates whether the queue sender's ID should be kept. This parameter can be set to one of the **eigAnswerYesNoEnum** constants shown in the table following the Parameters section.

HostCCSID
This optional parameter indicates the character code set identifier (CCSID) represented as a short to be used on the host and affects how data conversion is handled. This value must match the data in the queue as represented on the remote host computer. This parameter has no default value, but if this parameter is not specified the *HostCCSID* defaults to the value of the **CCSID** property set on the **IEGDataQueueCtl** object.

InitialSize
This optional parameter indicates the initial data queue size represented as a short integer.

queueLoc
This optional parameter indicates the queue location represented as VARIANT_BOOL.

recordLenCls
This optional parameter indicates the record length class. This parameter can be set to one of the **eigRecordLenClsEnum** constants shown in the table following the Parameters section.

Title
This optional parameter indicates a text description of the queue represented as a BSTR with a maximum length of 50 characters. The default value for this parameter is an empty string.

AllowDupKeys
This optional parameter indicates whether duplicate keys are allowed. This parameter can be set to one of the **eigAnswerYesNoEnum** constants shown in the table following the Parameters section.

Note that this parameter is only valid if the *QueueClass* is specified as **eigQClassKeyed**.

MakeKeyLen
This optional parameter indicates the maximum length of a key for this data queue represented as a short integer ranging from 1 to 256. Note that this parameter is only valid if the *QueueClass* is specified as **eigQClassKeyed**. This parameter has no default value.

The eigQAuthorityEnum constants

Enumeration	**Value**	**Description**
eigQAuthUnspecified	-1	This value indicates that the authority is unspecified.
eigQAuthDefault	0	This value indicates directory default authorization. This is the default value for this parameter if it is not specified.
eigQAuthAll	1	This value indicates all authorization.
eigQAuthExclude	2	This value indicates exclude authorization.
eigQAuthChange	3	This value indicates change authorization.

eigQAuthUse	4	This value indicates use authorization.
eigQAuthLibCreate	5	This value indicates library create authorization.

The eigQClassEnum constants

Enumeration	**Value**	**Description**
eigQClassUnspecified	-1	No value
eigQClassFIFO	0	A first in, first out queue. This is the default value for this parameter if it is not specified.
eigQClassLIFO	1	A last in, first out queue.
eigQClassKeyed	2	A keyed ordered queue.

The eigAnswerYesNoEnum constants

Enumeration	**Value**	**Description**
eigAnswerYes	0	This value indicates that the sender ID should be kept.
eigAnswerNo	1	This value indicates that the sender ID should not be kept. This is the default value for this parameter if it is not specified in the method call.

The eigRecordLenClsEnum constants

Enumeration	**Value**	**Description**
eigRecordLenUnspecified	-1	This value indicates that the record length class is unspecified.
eigRecordLenFixed	0	This value indicates fixed length records. This is the default value for this parameter if it is not specified.
eigRecordLenInitVarLen	1	This value indicates initial variable record length.
eigRecordLenVarLen	2	This value indicates variable record length.

Remarks

The type of data queue created is dependent on the value of the *QueueClass* parameter. If a *QueueClass* of **eigQClassKeyed** is specified, then a keyed data queue is created. A *QueueClass* of **eigQClassFIFO** and **eigQClassLIFO** will result in a non-keyed data queue being created.

CreateQueueContainer Method

The **CreateQueue** method on an **IEGDataQueueCtl** object creates an instance of an **IEIGDataQueue** container object using the Microsoft® Data Queue ActiveX® control and optionally initializes the **QueueName** property. The default value for this property is VT_EMPTY.

```
object.CreateQueueContainer QueueName
```

Parameters

QueueName

This optional parameter is a BSTR string representing the name of the data queue that this object instance is connected to. This parameter corresponds with the value for the QueueName property.

Remarks

The created queue object is assumed to be associated with the connection object that created it for the life of the connection or the life of the queue object.

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DeleteQueue Method

The **DeleteQueue** method on an **IEGDataQueue** object clears all messages from the queue and then deletes the queue using the Data Queue ActiveX® control.

```
object.DeleteQueue OverWriteData
```

Parameters

OverWriteData
This required parameter indicates whether data should be overwritten in the data queue. This parameter can be set to one of the **eigAnswerYesNoEnum** constants listed in the table following the Parameters section.

The eigAnswerYesNoEnum constants

Enumeration	Value	Description
eigAnswerYes	0	This value indicates that the operation should overwrite data in the queue. This is the default value for this parameter if it is omitted from the method call.
eigAnswerNo	1	This value indicates that the operation should not overwrite data in the queue.

This parameter had a default value of **eigAnswerYes.**

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Disconnect Method

The **Disconnect** method on an **IEGDataQueueCtrl** object terminates an existing connection to a host computer using the Microsoft® Data Queue ActiveX® control.

```
object.Disconnect
```

Parameters

None.

Remarks

The **Disconnect** method is used to terminate a connection to the host. Errors are returned using the **ISupportErrorInfo** object.

GetQueueItem Method

The **GetQueueItem** method on an **IEGDataQueue** object receives an item from a keyed queue using the Microsoft® Data Queue ActiveX® control.

```
object.GetQueueItem QueueType, BlockComplete, PeekQItem,
    ProvideExtInfo, TimeOut, UserProfile, SenderInfo, SearchKey,
    SearchOrder, QueueItem
```

Parameters

QueueType
This required parameter specifies the type of the queue request. This parameter can be set to one of the **eigQItemTypeEnum** constants listed in the table following the Parameters section.

BlockComplete
This required parameter specifies whether the operation should block until the completion status is known. This parameter can be set to one of the **eigAnswerYesNoEnum** constants listed in the table following the Parameters section.

PeekQItem
This required parameter indicates whether to keep the record in the data queue. This parameter can be set to one of the **eigAnswerYesNoEnum** constants listed in the table following the Parameters section.

ProvideExtInfo
This required parameter indicates whether to provide information in the External Job, name, and user properties. This parameter can be set to one of the **eigAnswerYesNoEnum** constants listed in the table following the Parameters section.

TimeOut
This required parameter indicates the amount of time in seconds represented as a short value to block before indicating a failure. This parameter has a default value of 0.

UserProfile
This required parameter indicates whether to provide user profile feedback. This parameter can be set to one of the **eigAnswerYesNoEnum** constants listed in the table following the Parameters section.

SenderInfo
This required parameter indicates whether the sender's ID should be returned. This parameter can be set to one of the **eigAnswerYesNoEnum** constants listed in the table following the Parameters section.

SearchKey
This optional parameter indicates the key used in conjunction with the *SearchOrder* parameter used to identify the queue data item being requested. This must be the same length as specified in the **CreateDataQueue** method call. This parameter is represented as a VARIANT and has no default value.

Note that this parameter is only valid when the *QueueClass* for the data queue is **eigQClassKeyed**.

SearchOrder
This optional parameter indicates the relational order used in receiving keyed data queue items. This parameter can be set to one of the **eigSearchKeyEnum** constants listed in the table following the Parameters section.

Note that this parameter is only valid when the *QueueClass* for the data queue is **eigQClassKeyed**.

QueueItem
This returned parameter is the requested **IEGDataQueueItem**.

The eigQItemTypeEnum constants

Enumeration	Value	Description
eigKQItem	0	A keyed item.
eigQItem	1	A non-keyed item. This is the default value for this parameter if it is not specified.

The eigAnswerYesNoEnum constants

Enumeration	Value	Description
eigAnswerYes	0	This value indicates that the sender ID should be returned.
eigAnswerNo	1	This value indicates that the sender ID should not be returned. This is the default value for this parameter if it is not specified in the method call.

The eigSearchKeyEnum constants

Enumeration	Value	Description
eigSearchKeyUnspecified	-1	This value indicates that the *SearchOrder* parameter is unspecified.
eigSearchKeyEqual	0	This value indicates a search for items equal to the specified *SearchKey* parameter.
eigSearchKeyGreaterThan	1	This value indicates a search for items greater than the specified *SearchKey* parameter.
eigSearchKeyLessThan	2	This value indicates a search for items less than the specified *SearchKey* parameter.
eigSearchKeyGreaterEqual	3	This value indicates a search for items greater than or equal to the specified *SearchKey* parameter.
eigSearchKeyLessEqual	4	This value indicates a search for items less than or equal to the specified *SearchKey* parameter.

Remarks

If the *BlockComplete* parameter is **eigAnswerNo** and no queue item is available, the request will be queued. Following the receipt of a queue data item, an event will be fired to the client indicating the availability of data. The client application will be required to call this function again in order to receive the queue data.

If the *BlockComplete* parameter is **eigAnswerYes** and no data arrives on the queue within the specified amount of time, the operation is cancelled and no data is returned. An error indication is returned to the client indicating that a timeout has occurred.

Each call to this method may result in a queued process. Multiple calls may result in multiple notifications.

If the *SenderInfo* item is empty, then the information will not be returned. The client must allocate the storage as an indication that it wishes to receive this information. The type of data queue is dependent on the value of the *QueueClass* parameter when the data queue is created. For a *QueueClass* of **eigQClassKeyed**, a keyed data queue is created. A *QueueClass* of **eigQClassFIFO** or **eigQClassLIFO** will result in a non-keyed data queue being created.

LocalLU Property

The **LocalLU** property on an **IEGDataQueueCtrl** object indicates the local LU alias for an APPC (SNA LU 6.2) connection type to the remote host computer using the Microsoft® Data Queue ActiveX® control. This property sets or returns a BSTR string value representing the local LU name. The default value for this property is the "LOCAL" string.

```
currentLocalLu = object.LocalLU
object.LocalLu = "Local2"
```

Remarks

The **LocalLU** property is used to set or return the local LU alias. When LU 6.2 (SNA) is selected for the ConnectionType property, this property must match the name of the local LU alias configured using SNA Manager.

ModeName Property

The **ModeName** property on an **IEGDataQueueCtrl** object indicates the APPC mode used for an APPC (SNA LU 6.2) connection type to the remote host computer using the Microsoft® Data Queue ActiveX® control. This property sets or returns a BSTR string value representing the APPC mode. The default value for this property is the "QPCSUPP" string.

```
currentAppcMode = object.ModeName
object.ModeName = "QPCSUPP"
```

Remarks

The **ModeName** property is used to set or return the APPC mode. When APPC (LU 6.2 SNA) is selected for the ConnectionType property, this field must bet set to the APPC mode that matches the host configuration and Microsoft® Host Integration Server configuration.

Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bi-directional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security).

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Password Property

The **Password** property on an **IEGDataQueueCtrl** object indicates the password used for authentication. This property affects connection and authentication to a host computer using the Microsoft® Data Queue ActiveX® control. This property sets or returns a BSTR and has no default value.

```
currentUserPassword = object.Password
object.Password = Dialog.UserPassword
```

Remarks

The **Password** property is used to set or return the password used for authenticating the user on a host computer. A valid user name and password are normally required to access data on a host computer. The password is case-sensitive and is normally displayed as asterisks in a dialog box for security purposes.

PCCodePage Property

The **PCCodePage** property on an **IEGDataQueueCtrl** object indicates the code page to be used on the PC. This property affects how data conversion is handled using the Microsoft® Data Queue ActiveX® control. This property sets or returns a short value representing the PC code page for the data file. The default value for this property is 1252 representing a PC code page of Latin 1.

```
currentPCCodePage = object.PCCodePage
object.PCCodePage = 1252
```

Remarks

The **PCCodePage** property is used to set or return the code page to be used on the PC. This value is used for data conversion of any character data in the host file to ANSI or Unicode character data in the local file on the computer running Microsoft® Windows®.

QueryAttribute Method

The **QueryAttribute** method on the **EIGDataQueue** object returns the value of an attribute associated with a data queue.

```
object.QueryAttribute Attribute, Value
```

Parameters

Attribute
This required parameter indicates the attribute value to be retrieved. This parameter can be set to one of the **eigAttributeEnum** constants listed in the table following the Parameters section.

Value
This required parameter points to a variant that will receive the value for this attribute.

The eigAttributeEnum constants

Enumeration	Value	Description
eigAttributeUnspecified	-1	No value
eigAttributeCCSID	0	The code character set identifier used on the host.
eigAttributeDirName	1	Directory name
eigAttributeDataClass	2	Data class name
eigAttributeKeyDef	3	Key definition
eigAttributeDupKeys	4	Indicates whether the duplicate keys capability is enabled for this data queue.
eigAttributeMgmCls	5	Management class name
eigAttributeQueCls	6	The queue class corresponding with the *QueueClass* parameter on the **CreateQueue** method.
eigAttributeSize	7	The queue initial size
eigAttributeQLoc	8	Queue location
eigAttributeSenderInfo	9	Queue senders ID kept
eigAttributeMaxMsgLen	10	The maximum record length for a message.
eigAttributeRecLenClass	11	Record length class
eigAttributeStgClass	12	Storage class name
eigAttributeTitle	13	Description text

Remarks

Most of these attributes correspond with the parameters specified to the CreateQueue method when the data queue is created.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

QueueName Property

The **QueueName** property on an **IEGDataQueue** object indicates the name of the data queue this object is associated with.

```
currentQueueName = object.QueueName
object.QueueName = "OrderEntry"
```

Remarks

The value of the **QueueName** property is the name of the queue represented as a BSTR string.

Following the successful creation of a queue using the CreateQueue method, the object has a virtual connection to the data queue, such that a single instance of this object represents a single queue connection. In order to break this connection, a client application can modify the **QueueName** property thus altering the queue association to a new value.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

RemoteLU Property

The **RemoteLU** property on an **IEGDataQueueCtrl** object indicates the remote LU alias for an APPC (SNA) connection type to the remote host computer using the Microsoft® Data Queue ActiveX® control. This property sets or returns a BSTR string value representing the remote LU name. This property has no default value.

```
currentRemoteLu = object.RemoteLU
object.RemoteLu = "Remote10"
```

Remarks

The **RemoteLU** property is used to set or return the remote LU alias. When LU 6.2 (SNA) is selected for the ConnectionType property, this property must match the name of the remote LU alias configured using SNA Manager.

SetAttribute Method

The **SetAttribute** method on the **EIGDataQueue** object changes an attribute associated with a data queue.

```
object.SetAttribute Attribute, Value
```

Parameters

Attribute
This required parameter indicates the attribute to be set. This parameter can be set to one of the **eigAttributeEnum** constants listed in the table following the Parameters section.
Value
This required parameter specifies a variant representing the value to set for this attribute.

The eigAttributeEnum constants

Enumeration	Value	Description
eigAttributeUnspecified	-1	No value
eigAttributeCCSID	0	Coded character set identifier
eigAttributeDirName	1	Directory name
eigAttributeDataClass	2	Data class name
eigAttributeKeyDef	3	Key definition
eigAttributeDupKeys	4	Duplicate keys capability
eigAttributeMgmCls	5	Management class name
eigAttributeQueCls	6	The queue class corresponding with the *QueueClass* parameter on the **CreateQueue** method.
eigAttributeSize	7	Queue initial size
eigAttributeQLoc	8	Queue location
eigAttributeSenderInfo	9	Queue senders ID kept
eigAttributeMaxMsgLen	10	Record length
eigAttributeRecLenClass	11	Record length class
eigAttributeStgClass	12	Storage class name
eigAttributeTitle	13	Description text

Remarks

Most of these attributes correspond with the parameters specified to the CreateQueue method when the data queue is created.

StopQueue Method

The **StopQueue** method on an **IEGDataQueue** object suspends send and receive operations for a queue using the Microsoft® Data Queue ActiveX® control.

```
object.StopQueue
```

Parameters

None.

UserID Property

The **UserID** property on an **IEGDataQueueCtrl** object indicates the user name used for authentication. This property affects connection and authentication to a host computer using the Microsoft® Data Queue ActiveX® control. This property sets or returns a BSTR and has no default value.

```
currentUserName = object.UserID
object.UserID = Dialog.UserName
```

Remarks

The **UserID** property is used to set or return the user name used for authenticating the user on a host computer. A valid user name and password are normally required to access data on a host computer. The user name is case-sensitive.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host File Transfer ActiveX Control Programmer's Reference

This section provides reference information about specific ActiveX® methods, properties, and event notifications supported by the Microsoft® Host File Transfer ActiveX control. The function syntax and code examples are based on Microsoft Visual Basic®.

This section contains:

- AppendToEnd Property
- Cancel Method
- CCSID Property
- Connect Method
- ConnectionState Property
- ConnectionType Property
- CreateIfNonExisting Property
- Disconnect Method
- GetFile Method
- LocalLU Property
- ModeName Property
- NetAddr Property
- NetPort Property
- OverwriteHostFile Property
- Password Property
- PCCodePage Property
- PutFile Method
- RDBName Property
- RemoteLU Property
- UserID Property

AppendToEnd Property

The **AppendToEnd** property on an **IEIGFileTransferCtl** object indicates whether a file transfer operation should append to the end of a file if the file exists, or whether a file transfer operation should overwrite the existing contents replacing the data with the new information. This property affects file transfer operations using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a Long value representing a **eigAnswerYesNoEnum**. The default value for this property is **eigAnswerYes**.

```
currentAppendFlag = object.AppendToEnd
object.AppendToEnd = eigAnswerYes
```

Remarks

The **AppendToEnd** property is used to set or return a flag that indicates whether a file transfer operation will append to the end of a file or overwrite the file. This property can be set to one of the following **eigAnswerYesNoEnum** constants:

Enumeration	Value	Description
eigAnswerYes	0	This value indicates that the file transfer operation will append to the end of a file if it exists.
eigAnswerNo	1	This value indicates that the file transfer operation will overwrite the existing contents of a file if it exists.

The **AppendToEnd** property and the **OverwriteHostFile** property are mutually exclusive, so it is not possible to enable (set to yes) one of these properties before the opposing property is disabled (set to no). The **AppendToEnd** property takes precedence over the **OverwriteHostFile** property, since **AppendToEnd** defaults to yes and **OverwriteHostFile** defaults to no. Consequently, the order in which these properties are set will affect the outcome. For example, the following order will result in the properties being set correctly:

```
FileTransfer.AppendToEnd = eigAnswerNo         // correctly set to no
FileTransfer.OverwriteHostFile = eigAnswerYes  // correctly set to yes
```

In contrast, setting the properties in the improper order will cause the properties to be set incorrectly as follows:

```
FileTransfer.OverwriteHostFile = eigAnswerYes   // remains at no
// AppendToEnd defaults to eigAnswerYes, so this change is illegal
FileTransfer.AppendToEnd = eigAnswerNo          // correctly set to no
```

In this second case, the **OverwriteHostFile** property cannot be set to yes (enabled) until the **AppendToEnd** property is set to no (disabled).

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Cancel Method

The **Cancel** method on an **IEIGFileTransferCtl** object terminates a file transfer operation that is already in progress. This method cancels a file transfer using the Microsoft® Host File Transfer ActiveX® control.

```
object.Cancel
```

Parameters

None.

Remarks

The **Cancel** method is used to cancel a file transfer operation that is already in progress. If the **Cancel** method is executed while uploading a file with the **AppendToEnd** property set to yes, this will result in no change to the host file. However, if the **Cancel** method is executed while uploading a file with the **OverwriteHostFile** property set to yes, this will result in an empty host file. The **Cancel** method implies the transfer has been stopped and all the files are at their original values, but this is not really the case when the **OverwriteHostFile** property is set to yes.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CCSID Property

The **CCSID** property on an **IEIGFileTransferCtl** object indicates the character code set identifier (CCSID) that must match the data in the file as represented on the remote host computer. This property affects how data conversion is handled using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a short value representing a host CCSID for the data file. The default value for this property is 37 representing a CCSID for U.S./Canada.

```
current CCSID = object.CCSID
object.CCSID = 37
```

Remarks

The **CCSID** property is used to set or return the character code set identifier (CCSID) matching the data in the file as represented on the remote host computer. This value is used for data conversion of any character data in the host file to the **PCCodePage** property specified representing ANSI or Unicode character data on the Microsoft® Windows® computer.

Connect Method

The **Connect** method on an **IEIGFileTransferCtl** object establishes a connection to the configured host using the Microsoft® Host File Transfer ActiveX® control and reports to the user an indication of the success or failure of the action.

```
object.Connect
```

Parameters

None.

Remarks

The **Connect** method is used to establish a connection to the host.

If the Host File Transfer ActiveX control support DLL cannot be loaded, the Win32® **SetErrorMode** function is called with an error value of SEM_NOOPENFILEERRORBOX | SEM_FAILCRITICALERRORS. Other types of errors are returned using the **ISupportErrorInfo** object.

ConnectionState Property

The **ConnectionState** property on an **IEIGFileTransferCtl** object indicates the current state of the connection to the host using the Microsoft® Host File Transfer ActiveX® control. The state of a connection can be unspecified, idle, connecting, connected, or disconnecting. This property returns a Long value representing an **eigConnectionStateEnum**. The default value for this property is **eigConnStateIdle**.

```
currentConnectionState = object.ConnectionState
```

Remarks

The **ConnectionState** property is used to return the current state of the connection to the host. This property is read-only and can be one of the following **eigConnectionStateEnum** constants:

Enumeration	**Value**	**Description**
eigConnStateUnspecified	-1	This value indicates that the connection state is unspecified.
eigConnStateIdle	0	This value indicates that the connection state is idle and no connection to the host exists.
eigConnStateConnecting	1	This value indicates that the connection state is in the process of connecting to the host.
eigConnStateConnected	2	This value indicates that the connection state is connected indicating a connection to the host.
eigConnStateDisconnecting	3	This value indicates that the connection state is in the process of disconnecting from the host.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ConnectionType Property

The **ConnectionType** property on an **IEIGFileTransferCtl** object indicates the network transport used for this connection. The **ConnectioneType** property designates whether the Microsoft® Host File Transfer ActiveX® control connects via APPC (SNA LU 6.2) or TCP/IP. This property sets or returns a Long value representing an **eigConnectionTypeEnum**. The default value for this property is **eigConnTypeAPPC** indicating an APPC connection using SNA.

```
currentConnectionType = object.ConnectionType
object.ConnectionType = eigConnTypeTCPIP
```

Remarks

The **ConnectionType** property is used to set or return the connection type used to connect to the host. This property can be one of the following **eigConnectionTypeEnum** constants:

Enumeration	Value	Description
eigConnTypeUnspecified	-1	This value indicates that the connection type is unspecified.
eigConnTypeAPPC	0	This value indicates an APPC connection to the host using SNA LU 6.2.
eigConnTypeTCPIP	1	This value indicates a TCP/IP connection to the host.

If APPC (SNA) is selected for **ConnectionType**, then values for the **LocalLU**, **ModeName**, and **RemoteLU** properties are required.

If TCP/IP is selected for **ConnectionType**, then values for the **NetAddr** and **NetPort** properties are required.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CreateIfNonExisting Property

The **CreateIfNonExisting** property on a **IEIGFileTransferCtl** object indicates whether a file transfer operation should create a new destination file if one does not already exist. This property affects file transfer operations using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a Long value representing an **eigAnswerYesNoEnum**. The default value for this property is **eigAnswerNo**.

```
currentCreateFlag = object.CreateIfNonExisting
object.CreateIfNonExisting = eigAnswerYes
```

Remarks

The **CreateIfNonExisting** property is used to set or return a flag that indicates whether a file transfer operation should create a new destination file if one does not already exist. This property can be set to one of the following **eigAnswerYesNoEnum** constants:

Enumeration	Value	Description
eigAnswerYes	0	This value indicates that the file transfer operation will create a new destination file if the file does not already exist.
eigAnswerNo	1	This value indicates that the file transfer operation will not create a new destination file if the file does not already exist. If the destination file does not already exist, then the file copy operation will not take place.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Disconnect Method

The **Disconnect** method on an **IEIGFileTransferCtl** object terminates an existing connection to a host computer using the Microsoft® Host File Transfer ActiveX® control.

```
object.Disconnect
```

Parameters

None.

Remarks

The **Disconnect** method is used to terminate a connection to the host. Errors are returned using the **ISupportErrorInfo** object.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

GetFile Method

The **GetFile** method on an **IEIGFileTransferCtl** object copies a file from host storage to local storage using the Microsoft® Host File Transfer ActiveX® control.

```
object.GetFile LocalFile, HostFile
```

Parameters

LocalFile
This required parameter specifies the path of a local file that will be written to as a result of this operation.
HostFile
This required parameter specifies the name of the host file that will be copied to the local file.

Remarks

The **GetFile** method can only be called after a connection has been established to the host (when the ConnectionState property is connected). The behavior of the **GetFile** method is affected by the values of the AppendToEnd, CreateIfNonExisting, and OverwriteHostFile properties.

Errors are returned for this method using the **ISupportErrorInfo** object.

LocalLU Property

The **LocalLU** property on an **IEIGFileTransferCtl** object indicates the local LU alias for an APPC (SNA) connection type to the remote host computer using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a BSTR string value representing the local LU name. The default value for this property is the "LOCAL" string.

```
currentLocalLu = object.LocalLU
object.LocalLu = "Local2"
```

Remarks

The **LocalLU** property is used to set or return the local LU alias. When LU 6.2 (SNA) is selected for the ConnectionType property, this property must match the name of the local LU alias configured using SNA Manager.

This property is ignored when TCP/IP is selected for the **ConnectionType** property.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ModeName Property

The **ModeName** property on an **IEIGFileTransferCtl** object indicates the APPC mode used for an APPC (SNA) connection type to the remote host computer using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a BSTR string value representing the APPC mode. The default value for this property is the "QPCSUPP" string.

```
currentAppcMode = object.ModeName
object.ModeName = "QPCSUPP"
```

Remarks

The **ModeName** property is used to set or return the APPC mode. When APPC (LU 6.2 SNA) is selected for the ConnectionType property, this field must bet set to the APPC mode that matches the host configuration and Host Integration Server configuration. This property is ignored when TCP/IP is selected for the **ConnectionType** property.

Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bi-directional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security).

NetAddr Property

The **NetAddr** property on an **IEIGFileTransferCtl** object indicates the IP address of the host computer for a TCP/IP connection type to the remote host computer using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a BSTR string value representing the IP address of the host computer. This property has no default value.

```
currentHostIP = object.NetAddr
object.NetAddr = "207.136.131.30"
```

Remarks

The **NetAddr** property is used to set or return the IP address of the host computer. When TCP/IP is selected for the ConnectionType property, this property must match the IP address of the host computer used where files will be transferred. This property can be an IP address or the name representing the host IP address using the Domain Name System (sna.microsoft.com, for example). This property is ignored when SNA is selected for the **ConnectionType** property.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

NetPort Property

The **NetPort** property on an **IEIGFileTransferCtl** object indicates the TCP/IP port used for communication with the host for a TCP/IP connection type to the remote host computer using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a BSTR string value representing the TCP/IP port used for communication with the host. The default value for this property is the string "446" representing TCP/IP port 446.

```
currentIPPort = object.NetPort
object.NetPort = "446"
```

Remarks

The **NetPort** property is used to set or return the TCP/IP port used for communication with the host. When TCP/IP has been selected for the ConnectionType property, this parameter is the TCP/IP port used for communication with the host. This property is ignored when SNA is selected for the **ConnectionType** property.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OverwriteHostFile Property

The **OverwriteHostFile** property on a **IEIGFileTransferCtl** object indicates whether a file transfer operation request to copy a file that will write over an existing file will be executed. This property affects file transfer operations using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a Long value representing an **eigAnswerYesNoEnum**. The default value for this property is **eigAnswerNo**.

```
currentOverwriteFlag = object.OverwriteHostFile
object.OverwriteHostFile = eigAnswerYes
```

Remarks

The **OverwriteHostFile** property is used to set or return a flag that indicates whether a file transfer operation will overwrite an existing file. This property can be set to one of the following **eigAnswerYesNoEnum** constants:

Enumeration	Value	Description
eigAnswerYes	0	This value indicates that the file transfer operation will overwrite an existing host file if it exists.
eigAnswerNo	1	This value indicates that the file transfer operation will not overwrite an existing host file file if it exists.

The **OverwriteHostFile** property and the **AppendToEnd** property are mutually exclusive, so it is not possible to enable (set to yes) one of these properties before the opposing property is disabled (set to no). The **AppendToEnd** property takes precedence over the **OverwriteHostFile** property, since **AppendToEnd** defaults to yes and **OverwriteHostFile** defaults to no. Consequently, the order in which these properties are set will affect the outcome. For example, the following order will result in the properties being set correctly:

```
FileTransfer.AppendToEnd = eigAnswerNo         // correctly set to no
FileTransfer.OverwriteHostFile = eigAnswerYes  // correctly set to yes
```

In contrast, setting the properties in the improper order will cause the properties to be set incorrectly as follows:

```
FileTransfer.OverwriteHostFile = eigAnswerYes   // remains at no
// AppendToEnd defaults to eigAnswerYes, so this change is illegal
FileTransfer.AppendToEnd = eigAnswerNo          // correctly set to no
```

In this second case, the **OverwriteHostFile** property cannot be set to yes (enabled) until the **AppendToEnd** property is set to no (disabled).

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Password Property

The **Password** property on an **IEIGFileTransferCtl** object indicates the password used for authentication. This property affects connection and authentication to a host computer using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a BSTR and has no default value.

```
currentUserPassword = object.Password
object.Password = Dialog.UserPassword
```

Remarks

The **Password** property is used to set or return the password used for authenticating the user on a host computer. A valid user name and password are normally required to access files on a host computer. The password is case-sensitive and is normally displayed as asterisks in a dialog box for security purposes.

PCCodePage Property

The **PCCodePage** property on an **IEIGFileTransferCtl** object indicates the code page to be used on the PC. This property affects how data conversion is handled using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a short value representing the PC code page for the data file. The default value for this property is 1252 representing a PC code page of Latin 1.

```
currentPCCodePage = object.PCCodePage
object.PCCodePage = 1252
```

Remarks

The **PCCodePage** property is used to set or return the code page to be used on the PC. This value is used for data conversion of any character data in the host file to ANSI or Unicode character data in the local file on the Microsoft® Windows® computer.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

PutFile Method

The **PutFile** method on an **IEIGFileTransferCtl** object copies a file from host storage to local storage using the Microsoft® Host File Transfer ActiveX® control.

```
object.PutFile HostFile, LocalFile
```

Parameters

HostFile
This required parameter specifies the name of the host file that will be written to as a result of this operation. This parameter is a BSTR.

LocalFile
This required parameter specifies the path to a local file that will be copied to the host file. This parameter is a BSTR.

Remarks

The **PutFile** method can only be called after a connection has been established to the host (when the ConnectionState property is connected). The behavior of the **PutFile** method is affected by the values of the AppendToEnd, CreateIfNonExisting, and OverwriteHostFile properties.

Errors are returned for this method using the **ISupportErrorInfo** object.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

RDBName Property

The **RDBName** property on an **IEIGFileTransferCtl** object indicates the remote database name and the host column description (HCD) file that describes the data types and data conversions used to transfer this file using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a BSTR string value and has no default value.

```
currentRDbName = object.RDBName
object.RDBName = "Inventory"
```

Remarks

The **RDBName** property is used to set or return the name of the remote database name and the host column description (HCD) file that describes the data types and data conversions used to transfer this file. The HCD file describing the data should be located in the system subdirectory below the root directory where Host Integration Server was installed. Setup defaults to the following location: C:\Program Files\Microsoft Host Integration Server

When TCP/IP is selected for the **ConnectionType** property, the **RDBName** must also match the name of the remote database system.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

RemoteLU Property

The **RemoteLU** property on an **IEIGFileTransferCtl** object indicates the remote LU alias for an APPC (SNA) connection type to the remote host computer using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a BSTR string value representing the remote LU name. This property has no default value.

```
currentRemoteLu = object.RemoteLU
object.RemoteLu = "Remote10"
```

Remarks

The **RemoteLU** property is used to set or return the remote LU alias. When LU 6.2 (SNA) is selected for the ConnectionType property, this property must match the name of the remote LU alias configured using SNA Manager.

This property is ignored when TCP/IP is selected for the **ConnectionType** property.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

UserID Property

The **UserID** property on an **IEIGFileTransferCtl** object indicates the user name used for authentication. This property affects connection and authentication to a host computer using the Microsoft® Host File Transfer ActiveX® control. This property sets or returns a BSTR and has no default value.

```
currentUserName = object.UserID
object.UserID = Dialog.UserName
```

Remarks

The **UserID** property is used to set or return the user name used for authenticating the user on a host computer. A valid user name and password are normally required to access files on a host computer. The user name is case-sensitive.

ADO Programmer's Reference

This section provides reference information about specific ActiveX® Data Objects (ADO) methods, properties, and collections supported in Microsoft® Host Integration Server 2004 using:

- The Microsoft OLE DB Provider for AS/400 and VSAM
- The Microsoft OLE DB Provider for DB2.
- The Microsoft ODBC Driver for DB2

For general information about programming with the OLE DB Provider for AS/400 and VSAM, see the OLE DB Provider for AS/400 and VSAM Programmer's Guide in the OLE DB Providers Programmer's Guide section of the SDK.

For general information about programming with the OLE DB Provider for DB2, see the OLE DB Provider for DB2 Programmer's Guide.

For general information about programming with the ODBC Driver for DB2, see the ODBC Driver for DB2 Programmer's Guide in the OLE DB Providers Programmer's Guide section of the SDK.

This section contains:

- ActiveCommand Property (ADO)
- ActiveConnection Property (ADO)
- ActualSize Property (ADO)
- AddNew Method (ADO)
- AppendChunk Method (ADO)
- Attributes Property Method (ADO)
- BOF Property (ADO)
- Bookmark Property (ADO)
- CacheSize Property (ADO)
- CancelBatch Method (ADO)
- CancelUpdate Method (ADO)
- Clear Method (ADO)
- Clone Method (ADO)
- Close Method (ADO)
- CommandText Property (ADO)
- CommandType Property (ADO)
- ConnectionString Property (ADO)
- CursorLocation Property (ADO)
- CursorType Property (ADO)
- DefinedSize Property (ADO)
- Delete Method (ADO)
- Description Property (ADO)
- EOF Property (ADO)
- EditMode Property (ADO)
- Execute Method on a Command Object (ADO)
- Execute Method on a Connection Object (ADO)
- Filter Property Method (ADO)
- Find Method (ADO)
- GetChunk Method (ADO)
- GetRows Method (ADO)
- IsolationLevel Property (ADO)
- Item Method (ADO)
- LockType Property (ADO)
- MaxRecords Property (ADO)
- Mode Property (ADO)
- Move Method (ADO)

- MoveFirst Method (ADO)
- MoveLast Method (ADO)
- MoveNext Method (ADO)
- MovePrevious Method (ADO)
- Name Property (ADO)
- NativeError Property (ADO)
- Number Property (ADO)
- NumericScale Property (ADO)
- Open Method on a Connection Object (ADO)
- Open Method on a Recordset Object (ADO)
- OpenSchema Method (ADO)
- OriginalValue Property (ADO)
- Precision Property (ADO)
- Provider Property (ADO)
- Refresh Method (ADO)
- Requery Method (ADO)
- Save Method (ADO)
- Sort Property (ADO)
- Source Property on an Error Object (ADO)
- Source Property on a Recordset Object (ADO)
- State Property (ADO)
- Status Property (ADO)
- Supports Method (ADO)
- Type Property (ADO)
- UnderlyingValue Property (ADO)
- Update Method (ADO)
- UpdateBatch Method (ADO)
- Value Property (ADO)
- Version Property (ADO)

ActiveCommand Property (ADO)

The **ActiveCommand** property on a **Recordset** object indicates which **Command** object created the associated **Recordset** object. This property returns a variant that contains a **Command** object. The default is a **Null** object reference.

```
currentCommand = recordset.ActiveCommand
```

Remarks

The **ActiveCommand** property is property is read-only. If a **Command** object was not used to create the current **Recordset**, then a **Null** object reference is returned.

Use this property to find the associated **Command** object when you are given only the resulting **Recordset** object.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ActiveConnection Property (ADO)

The **ActiveConnection** property on a **Command** or **Recordset** object indicates to which **Connection** object the specified **Command** or **Recordset** object currently belongs. This property sets or returns a String containing the definition for a connection or a **Connection** object. The default is a **Null** object reference.

```
command.ActiveConnection = connectionString
activeConnectionString = recordset.ActiveConnection
```

Remarks

The **ActiveConnection** property is used to determine the **Connection** object over which the specified **Command** object will execute or the specified **Recordset** will be opened.

For **Command** objects, the **ActiveConnection** property is read/write.

If you attempt to call the **Execute** method on a **Command** object before setting the **ActiveConnection** property to an open **Connection** object or valid connection string, an error occurs.

Under Microsoft® Visual Basic®, setting the **ActiveConnection** property to **Nothing** disassociates the **Command** object from the current **Connection** and causes the OLE DB Provider to release any associated resources on the data source. You can then associate the **Command** object with the same or another **Connection** object. Some providers allow you to change the **ActiveConnection** property setting from one **Connection** to another, without having to first set the property to **Nothing**.

Closing the **Connection** object with which a **Command** object is associated sets the **ActiveConnection** property to **Nothing**. Setting this property to a closed **Connection** object generates an error.

For open **Recordset** objects or for **Recordset** objects whose **Source** property is set to a valid **Command** object, the **ActiveConnection** property is read-only. Otherwise, it is read/write.

You can set the **ActiveConnection** property to a valid **Connection** object or to a valid connection string. In this case, the OLE DB Provider creates a new **Connection** object using this definition and opens the connection. Additionally, the provider may set this property to the new **Connection** object to give you a way to access the **Connection** object for extended error information or to execute other commands.

If the *ActiveConnection* parameter of the **Open** method is used to open a **Recordset** object, the **ActiveConnection** property will inherit the value of the argument.

If the **Source** property of the **Recordset** object is set to a valid **Command** object variable, the **ActiveConnection** property of the **Recordset** inherits the setting of the **Command** object's **ActiveConnection** property.

The information needed to establish a connection to a data source can be set in the **ActiveConnection** property of a **Recordset** object or passed as part of the **Open** method on a **Recordset** object in the *ActiveConnection* parameter. In either case, this information must be in a specific format for use with the Microsoft OLE DB Provider for AS/400 and VSAM, the Microsoft OLE DB Provider for DB2, or the Microsoft ODBC Driver for DB2. This information can be a data source name (DSN) or a detailed connection string containing a series of *argument=value* statements separated by semicolons.

ActiveX® Data Objects (ADO) supports several standard ADO-defined arguments for the **ActiveConnection** property as listed in the following table.

Argument	**Description**
Data Source	Specifies the name of the data source for the connection. This argument is optional when using the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
File Name	Specifies the name of the provider-specific file containing preset connection information. This argument cannot be used if a *Provider* argument is passed. This argument is not supported by the OLE DB Provider for AS/400 and VSAM.

Location	The remote database name used for connecting to OS/400 systems. This parameter is optional when connecting to mainframe systems.
Password	Specifies a valid mainframe or AS/400 password to use when opening the connection. This password is used to validate that the user can log on to the target host system and has appropriate access rights to the file.
Provider	Specifies the name of the provider to use for the connection. To use the OLE DB Provider for AS/400 and VSAM, the Provider string must be set to "SNAOLEDB". To use the OLE DB Provider for DB2, the Provider string must be set to "DB2OLEDB". To use the ODBC Driver for DB2, the Provider string must be set to "MSDASQL" or not used as part of the ConnectionString since this value is the default for ADO.
User ID	Specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used to validate that the user can log on to the target host system and has appropriate access rights to the file.

This section contains:

- ActiveConnection Property Support Using the OLE DB Provider for AS/400 and VSAM
- ActiveConnection Property Support Using the OLE DB Provider for DB2
- ActiveConnection Property Support Using the ODBC Driver for DB2

ActiveConnection Property Support Using the OLE DB Provider for AS/400 and VSAM

The Microsoft OLE DB Provider for AS/400 and VSAM also supports a number of provider-specific arguments, some of which have default values as specified in the table below. These arguments are listed in the following table.

Argument	Description
BinAsChar	This parameter indicates whether to process binary fields as character fields (default is 0; do not process binary fields as character fields).
CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If this argument is omitted, the default value is U.S./Canada (37).
Default Library	The default AS/400 library to be accessed. This parameter is not required for mainframe access and is optional when connecting to AS/400 files.
HCD FileName	The fully qualified filename of the DDM host column description (HCD) file. This parameter can be an UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the SNA system directory. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400.
Local LU	The name of the local LU alias configured in Host Integration Server.
ModeName	The APPC mode (must be set to a value that matches the host configuration and Host Integration Server configuration). Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes.
NetAddr	When TCP/IP has been selected for the Network Transport Library, this parameter indicates the IP address of the host.
NetPort	When TCP/IP has been selected for the Network Transport Library, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446.
NetLib	This parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA.
PCCodePage	The character code page to use on the PC. If this argument is omitted, the default value is set to Latin 1 (1252).
RDB	The remote database name for OS/400. You only need to specify this value if it is different from the remote LU alias configured in Host Integration Server.
Repair Host Keys	This parameter indicates whether the OLE DB provider should repair any host key values set in the registry and defaults to false.
RemoteLU	The name of the remote logical unit (LU) alias configured in Host Integration Server.
StrictVal	This parameter indicates whether strict validation should be used and defaults to false.

> **Note** Not all of these parameters are required. The user can also be prompted for this information.

A sample **ConnectionString** for use with the OLE DB Provider for AS/400 and VSAM follows:

```
Conn.Provider="SNAOLEDB"
Conn.ConnectionString = "User ID=USERNAME;Password=password",&_
  "LocalLU=LOCAL;RemoteLU=DATABASE",&_
  "ModeName=QPCSUPP;CCSID=37;PCCodePage=437"
Conn.Properties("PROMPT")=adPromptNever
Conn.Open
```

Note The &_ character combination is used for continuing long lines in Visual Basic.

When opening a connection object in ActiveX® Data Objects (ADO) version 2.0, you must specify the Prompt connection property. For example, the following is valid with ADO version 1.5 and ADO version 2.0 and will prompt the user for **ConnectionString** properties:

```
Conn.ConnectionString = "Provider=SNAOLEDB
Conn.Properties("PROMPT")=adPromptAlways
Conn.Open
```

ActiveConnection Property Support Using the OLE DB Provider for DB2

The Microsoft OLE DB Provider for DB2 also supports a number of provider-specific arguments, some of which have default values as specified in the tables below. The arguments supported by OLE DB Provider for DB2 supplied with Host Integration Server 2004 differ from the arguments supported by the earlier OLE DB Provider for DB2 included with SNA Server 4.0.

The arguments supported by the OLE DB Provider for DB2 supplied with Host Integration Server 2004 are listed in the following table.

Argument	**Description**
BinAsChar	When this parameter is set to **true**, the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This parameter defaults to **false**.
CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If this argument is omitted, the default value is U.S./Canada (37).
DefSch	The name of the default schema (collection/owner) where the system catalogs resides. This parameter can be QSYS2;SYSIBM; SYSTEM; CURLIB; or USERID depending on platform. This parameter does not have a default value.
InitCat	This parameter is used as the first part of a three-part fully qualified table name. In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. In DB2/400, this parameter is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then one can be created using the Add option. In DB2 Universal Database, this property is referred to as DATABASE. This parameter has no default value.
LocalLU	The name of the local logical unit (LU) alias configured in Host Integration Server.
ModeName	The Advanced Program-to-Program Communications (APPC) mode (must be set to a value that matches the host configuration and Host Integration Server configuration). Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes.
NetAddr	When TCP/IP has been selected for the Network Transport Library, this parameter indicates the IP address of the host.
NetPort	When TCP/IP has been selected for the Network Transport Library, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446.
NetLib	This parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA.

PCCodePage	The character code page to use on the computer. If this argument is omitted, the default value is set to Latin 1 (1252).
PkgCol	The name of the DRDA target collection (AS/400 library) where the OLE DB Provider for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft OLE DB Provider for DB2 uses packages to issue dynamic and static SQL statements. The OLE DB Provider will create packages dynamically in the location to which the user points using the Package Collection parameter.
RemoteLU	The name of the remote LU alias configured in Host Integration Server.
TPName	The Transaction Program (TP) Name parameter represents the default transaction program name for the DB2 DRDA application server (AS) which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, TPName is set to 0X07F9F9F9.
UOW	This parameter determines whether two-phase commit is enabled. The possible values for this parameter are DUW (distributed unit of work) or RUW (remote unit of work). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in the OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

Note Not all of these parameters are required. The user can also be prompted for this information.

A sample **ConnectionString** using the OLE DB Provider for DB2 follows:

```
Conn.Provider="DB2OLEDB"
Conn.ConnectionString = "User ID=USERNAME;Password=password",&_
  "LocalLU=LOCAL;RemoteLU=DATABASE",&_
  "ModeName=QPCSUPP;CCSID=37;PcCodePage=437"
Conn.Properties("PROMPT")=adPromptNever
Conn.Open
```

Note The &_ character combination is used for continuing long lines in Visual Basic.

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ActiveConnection Property Support Using the ODBC Driver for DB2

The Microsoft ODBC Driver for DB2 also supports a number of provider-specific arguments, some of which have default values as specified in the tables below. The arguments supported by ODBC Driver for DB2 supplied with Host Integration Server 2004 differ from the arguments supported by the earlier ODBC Driver for DB2 included with SNA Server 4.0.

The arguments supported by the ODBC Driver for DB2 supplied with Host Integration Server 2004 are listed in the following table.

Argument	**Description**
BAC	When the *BinAsChar* parameter is set to **true** (1), the ODBC Driver for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The character code set identifier (CCSID) and PCCodePage values are required input parameters.
CCSID	The CCSID matching the DB2 data as represented on the remote computer. The CCSID property is required when processing binary data as character data. Unless the BinAsChar value is set, character data is converted based on the DB2 column CCSID and default ANSI code page. If this argument is omitted, this parameter defaults to U.S./Canada (37).
CP	The character code page to use on the computer. This parameter is required when processing binary data as character data. Unless the Binary as Character (BAC) value is set, character data is converted based on the default ANSI code page configured in Windows. If this argument is omitted, the default value is set to Latin 1 (1252).
DESC	A field to provide a comment describing this ODBC data source. The description is an optional parameter and may be left blank.
DS	The Default Schema parameter is the name of the Collection where the ODBC Driver for DB2 looks for catalog information. The Default Schema is the "SCHEMA" name for the target collection of tables and views. The ODBC driver uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection (for example, ODBC Catalog SQLTables). For DB2, the Default Schema is the target AUTHENTICATION (User ID or "owner"). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, then the ODBC driver uses the USER_ID provided at login. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. Obviously, this default is inappropriate in many cases, therefore it is essential that the Default Schema value in the data source be defined.
DSN	The data source name is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file which is stored in the Program Files\Common Files\ODBC\Data Sources directory.
LLU	When SNA is used for the network transport, this field is the name of the remote LU alias configured in Host Integration Server.

MN	When SNA is used for the Network Transport Library (NTL), the Mode Name field is the APPC mode and must be set to a value that matches the host configuration and Host Integration Server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bidirectional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This parameter normally defaults to QPCSUPP.
NA	When TCP/IP is used for the Network Transport Library (NTL), the Network Address parameter indicates the IP address or the hostname alias of the host DB2 server.
NP	When TCP/IP is used for the Network Transport Library (NTL), the Network Port parameter indicates the TCP/IP port used for communication with the target DB2 DRDA service. The default value is TCP/IP port 446.
NTL	The Network Transport Library parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA. If the default SNA is selected, then values for LLU, MN, and RLU are required. If TCP/IP is selected, then values for NetAddr and NetPort are required.
PC	The name of the DRDA target collection (AS/400 library) where the Microsoft ODBC Driver for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft ODBC Driver for DB2, which is implemented as an IBM DRDA application requester, uses packages to issue dynamic and static SQL statements. The ODBC driver will create packages dynamically in the location to which the user points using the Package Collection parameter.
PDS	The Provider Data Source is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file which is stored in the Program Files\Common Files\ODBC\Data Sources directory.
PROV	Specifies the name of the provider to use for the connection. To use the ODBC Driver for DB2, the Provider string must be set to "MSDASQL" or not used as part of the ConnectionString since this value is the default for ADO.
PWD	Specifies a valid mainframe or AS/400 password to use when opening the connection. This password is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. Note that this parameter is the same as the Parameter parameter.
RDB	The Remote Database Name parameter is used as the first part of a three-part, fully qualified DB2 table name. This parameter is referred to by different names depending on the DB2 platform. In DB2 on MVS and OS/390, this parameter is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect on these platforms, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 installation manual. In DB2/400 on OS/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then a value can be created using the Add option. In DB2 Universal Database, this property is referred to as DATABASE.
RLU	When SNA is used for the network transport, this field is the name of the remote LU alias configured in Host Integration Server.
TPN	The Transaction Program (TP) Name parameter represents the default transaction program name for the DB2 DRDA application server (AS) which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, TPN is set to 0X07F9F9F9.
UID	Specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. This parameter is the same as the User ID parameter.

UOW	Determines whether two-phase commit is enabled. The possible values for this parameter are DUW (distributed unit of work) or RUW (remote unit of work). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in the OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

Note Not all of these parameters are required. The user can also be prompted for this information.

A sample **ConnectionString** using the ODBC Driver for DB2 supplied with Host Integration Server 2004 is as follows:

```
Conn.Provider="MSDASQL"
Conn.ConnectionString = "UID=USERNAME;PWD=password",&_
  "LLU=LOCAL;RLU=DATABASE",&_
  "MN=QPCSUPP;CCSID=37;CP=437"
Conn.Properties("PROMPT")=adPromptNever
Conn.Open
```

Note The &_ character combination is used for continuing long lines in Visual Basic.

ActualSize Property (ADO)

The **ActualSize** property on a **Field** object indicates the actual length of a field's value. This property returns a Long value.

```
size = field.ActualSize
```

Remarks

The **ActualSize** property is used to return the actual length of a **Field** object's value. For all fields, the **ActualSize** property is read-only. If ADO cannot determine the length of the **Field** object's value, the **ActualSize** property returns **adUnknown**.

The **ActualSize** and **DefinedSize** properties on a **Field** object can be different. For example, a **Field** object with a declared type of **adVarChar** (variable character data type) and a maximum length of 50 characters returns a **DefinedSize** property value of 50, but the **ActualSize** property value it returns is the length of the data stored in the field for the current record.

AddNew Method (ADO)

The **AddNew** method on a **Recordset** object creates a new record for an updatable **Recordset** object.

```
recordset.AddNew Fields, Values
```

Parameters

Fields
This optional parameter specifies a single name or an array of names or ordinal positions of the fields in the new record.

Values
This optional parameter specifies a single value or an array of values for the fields in the new record. If *Fields* is an array, *Values* must also be an array with the same number of members; otherwise, an error occurs. The order of field names must match the order of field values in each array.

Remarks

The **AddNew** method is used to create and initialize a new record. The **Supports** method can be used with **adAddNew** to verify whether records can be added to the current **Recordset** object.

After the **AddNew** method is called, the new record becomes the current record and remains current after the **Update** method is called. If the **Recordset** object does not support bookmarks, you may not be able to access the new record after you move to another record. Depending on your cursor type, you may need to call the **Requery** method to make the new record accessible.

If **AddNew** is called while editing the current record or while adding a new record, ADO calls the **Update** method to save any changes and then creates the new record.

The behavior of the **AddNew** method depends on the updating mode of the **Recordset** object and whether or not the *Fields* and *Values* arguments are passed.

In immediate update mode, the OLE DB Provider writes changes to the underlying data source after the **Update** method is called. In immediate update mode, calling the **AddNew** method without arguments sets the **EditMode** property to **adEditAdd**. The OLE DB Provider caches any field value changes locally. Calling the **Update** method posts the new record to the database and resets the **EditMode** property to **adEditNone**. If the *Fields* and *Values* arguments are passed, ADO immediately posts the new record to the database (no **Update** call is necessary) and the **EditMode** property value does not change (**adEditNone**).

In batch update mode, the OLE DB Provider caches multiple changes and writes them to the underlying data source only when the **UpdateBatch** method is called. In batch update mode, calling the **AddNew** method without arguments sets the **EditMode** property to **adEditAdd**. The OLE DB Provider caches any field value changes locally. Calling the **Update** method adds the new record to the current **Recordset** object and resets the **EditMode** property to **adEditNone**, but the OLE DB Provider does not post the changes to the underlying database until the **UpdateBatch** method is called. If the *Fields* and *Values* arguments are passed, ADO sends the new record to the provider for storage in a cache and the **UpdateBatch** method must be called to post the new record to the underlying database.

AppendChunk Method (ADO)

The **AppendChunk** method on a **Field** object appends data to a large text or binary data **Field** object.

```
field.AppendChunk Data
```

Parameters

Data

This parameter specifies a Variant containing the data to be appended to the **Field** object.

Remarks

The **AppendChunk** method is used on a **Field** object to fill it with long binary or character data. In situations where system memory is limited, the **AppendChunk** method can be used to manipulate long values in portions rather than in their entirety.

If the **adFldLong** bit in the **Attributes** property of a **Field** object is set to **True**, the **AppendChunk** method can be used for that field.

The first **AppendChunk** call on a **Field** object writes data to the field, overwriting any existing data. Subsequent **AppendChunk** calls add to existing data. If you are appending data to one field and then set or read the value of another field in the current record, ActiveX® Data Objects (ADO) assumes that you are finished appending data to the first field. If the **AppendChunk** method is called on the first field again, ADO interprets the call as a new **AppendChunk** operation and overwrites the existing data. Accessing fields in other **Recordset** objects (that are not clones of the first **Recordset** object) will not disrupt **AppendChunk** operations.

If there is no current record when the **AppendChunk** method is called on a **Field** object, an error occurs.

Attributes Property (ADO)

The **Attributes** property on a **Field** object or a **Property** object in a **Properties** collection indicates one or more characteristics of an object. This property returns a Long value.

```
attribute = field.Attributes
```

Remarks

The **Attributes** property is used to return characteristics of **Field** objects or **Property** objects.

For a **Field** object, the **Attributes** property is read-only and its value can be the sum of any one or more of the **FieldAttributeEnum** values. The allowable **FieldAttributeEnum** values can be one of the constants in the following table.

Enumeration	Value	Description
adFldMayDefer	0x2	This value indicates that the field is deferred, that is, the field values are not retrieved from the data source with the whole record, but only when you explicitly access them.
adFldUpdatable	0x4	This value indicates that you can write to the field.
adFldUnknownUpdatable	0x8	This value indicates that the provider cannot determine if you can write to the field.
adFldFixed	0x10	This value indicates that the field contains fixed-length data.
adFldIsNullable	0x20	This value indicates that the field accepts Null values.
adFldMayBeNull	0x40	This value indicates that you can read Null values from the field.
adFldLong	0x80	This value indicates that the field is a long binary field. This value also indicates that the **AppendChunk** and **GetChunk** methods on the **Field** object can be used.
adFldRowID	0x100	This value indicates that the field contains some kind of record identifier (record number, unique identifier, and so on).
adFldRowVersion	0x200	This value indicates that the field contains some kind of time or date stamp (often used to track updates).
adFldCacheDeferred	0x1000	This value indicates that the provider caches field values and that subsequent reads are done from the cache.

For a **Property** object, the **Attributes** property is read-only and its value can be the sum of any one or more of the **PropertyAttributesEnum** values. The allowable **PropertyAttributesEnum** values can be one of the constants in the following table.

Enumeration	Value	Description
adPropNotSupported	0	This value indicates that the property is not supported by the provider.
adPropRequired	0x1	This value indicates that the user must specify a value for this property before the data source is initialized.
adPropOptional	0x2	This value indicates that the user does not need to specify a value for this property before the data source is initialized.
adPropRead	0x200	This value indicates that the user can read the property.
adPropWrite	0x400	This value indicates that the user can set the property.

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BOF Property (ADO)

The **BOF** property on a **Recordset** object indicates that the current record position is before the first record in a **Recordset** object. This property returns a Boolean value.

```
IsBOF = recordset.BOF
```

Remarks

The **BOF** property is used to determine whether a **Recordset** object contains records or whether you have gone beyond the limits of a **Recordset** object when you move from record to record.

The **BOF** property returns **True** if the current record position is before the first record and **False** if the current record position is on or after the first record.

If the **BOF** property is **True**, there is no current record.

If a **Recordset** object is opened containing no records, both the **BOF** and **EOF** properties are set to **True** and the **Recordset** object's **RecordCount** property setting is zero. When a **Recordset** object is opened that contains at least one record, the first record is the current record and the **BOF** and **EOF** properties are **False**.

If the last remaining record in the **Recordset** object is deleted, the **BOF** and **EOF** properties may remain **False** until you attempt to reposition the current record.

This table below indicates which **Move** methods are allowed with different combinations of the **BOF** and **EOF** properties.

	MoveFirst **MoveLast**	**MovePrevious** **Move < 0**	**Move 0**	**MoveNext** **Move > 0**
BOF=True **EOF=False**	Allowed	Error	Error	Allowed
BOF=False **EOF=True**	Allowed	Allowed	Error	Error
Both True	Error	Error	Error	Error
Both False	Allowed	Allowed	Allowed	Allowed

> **Note** Executing a **Move** 0 method when the **BOF** property is **True** does not currently generate an error using the OLE DB Provider for AS/400 and VSAM.

> **Note** Allowing a **Move** method does not guarantee that the method will successfully locate a record; it only means that calling the specified **Move** method will not generate an error.

The following table shows what happens to the **BOF** and **EOF** property settings when various **Move** methods are called but are unable to successfully locate a record.

	BOF property	**EOF property**
MoveFirst **MoveLast**	Set to **True**	Set to **True**
Move 0	No change	No change
MovePrevious **Move < 0**	Set to **True**	No change
MoveNext **Move > 0**	No change	Set to **True**

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Bookmark Property (ADO)

The **Bookmark** property on a **Recordset** object returns a bookmark that uniquely identifies the current record in a **Recordset** object or sets the current record in a **Recordset** object to the record identified by a valid bookmark. This property sets or returns a **Variant** expression that evaluates to a valid bookmark.

```
FirstBookmark = recordset.Bookmark
recordset.Bookmark = PreviousBookmark
```

Remarks

The **Bookmark** property is used to save the position of the current record and return to that record at any time. Bookmarks are available only in **Recordset** objects (host tables) that support the bookmark feature.

When a **Recordset** object is opened, each of its records has a unique bookmark. To save the bookmark for the current record, assign the value of the **Bookmark** property to a variable. To quickly return to that record at any time after moving to a different record, set the **Recordset** object's **Bookmark** property to the value of that variable.

The user may not be able to view the value of the bookmark. Also, users should not expect bookmarks to be directly comparable—two bookmarks that refer to the same record may have different values.

If the **Clone** method is used to create a copy of a **Recordset** object, the **Bookmark** property settings for the original and the duplicate **Recordset** objects are identical and you can use them interchangeably. However, you cannot use bookmarks from different **Recordset** objects interchangeably, even if they were created from the same source or command.

Using the OLE DB Provider for AS/400 and VSAM, only some data sources can be bookmarked. Calling the **Supports** method with the **adBookmark** argument will indicate if the data source (table) can be bookmarked.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CacheSize Property (ADO)

The **CacheSize** property on a **Recordset** object indicates the number of records from a **Recordset** object that are cached locally in memory. This property sets or returns a Long value that must be greater than zero. The default value for the **CacheSize** property is 1.

```
previousSize = recordset.CacheSize
recordset.CacheSize = 1
```

Remarks

The **CacheSize** property is used to control how many records the provider keeps in its buffer and how many to retrieve at one time into local memory. For example, if the **CacheSize** is 10, after first opening the **Recordset** object, the provider retrieves the first 10 records into local memory. As you move through the **Recordset** object, the provider returns the data from the local memory buffer. As soon as you move past the last record in the cache, the provider retrieves the next 10 records from the data source into the cache.

The value of the **CacheSize** property can be adjusted during the life of the **Recordset** object, but changing this value only affects the number of records in the cache after subsequent retrievals from the data source. Changing the property value alone will not change the current contents of the cache.

If there are fewer records to retrieve than the **CacheSize** property specifies, the provider returns the remaining records; no error occurs.

A **CacheSize** setting of zero is not allowed and returns an error. Non-bookmarkable files cannot have the **CacheSize** property set to greater than one, or an error will occur.

It is strongly recommended that a **CacheSize** of 1 be used with the OLE DB Provider for AS/400 and VSAM. If the **CacheSize** is set greater than 1, it is possible for the local data cached in memory to be out of date from changes made by other users on the host.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CancelBatch Method (ADO)

The **CancelBatch** method on a **Recordset** object cancels a pending batch update.

```
recordset.CancelBatch AffectedRecords
```

Parameters

AffectedRecords

This optional parameter specifies an **AffectEnum** value that determines how many records the **CancelBatch** method will affect. The **AffectEnum** value can be one of the constants in the following table.

Enumeration	Value	Description
adAffectCurrent	1	This value cancels pending updates only for the current record.
adAffectGroup	2	This value cancels pending updates for records that satisfy the current Filter property setting. You must set the **Filter** property to one of the valid predefined constants to use this option.
adAffectAll	3	This value cancels pending updates for all the records in the **Recordset** object, including any hidden by the current **Filter** property setting. This value is the default.

Remarks

The **CancelBatch** method is used to cancel any pending updates in a **Recordset** object in batch update mode. If the **Recordset** object is in immediate update mode, calling **CancelBatch** without **adAffectCurrent** generates an error.

If you are editing the current record or are adding a new record when **CancelBatch** is called, ActiveX® Data Objects (ADO) first calls the CancelUpdate Method to cancel any cached changes, and then all pending changes in the recordset are canceled.

It is possible that the current record will be indeterminable after a **CancelBatch** call, especially if you were in the process of adding a new record. For this reason, it is prudent to set the current record position to a known location in the recordset after the **CancelBatch** method is called. For example, call the **MoveFirst** method.

If the attempt to cancel the pending updates fails because of a conflict with the underlying data (for example, a record has been deleted by another user), the provider returns warnings to the **Errors** collection but does not halt program execution. A run-time error occurs only if there are conflicts on all the requested records. The Filter Property (**adFilterAffectedRecords**) and the **Status** property can be used to locate records with conflicts.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CancelUpdate Method (ADO)

The **CancelUpdate** method on a **Recordset** object cancels any changes made to the current record or to a new record prior to calling the **Update** method.

```
recordset.CancelUpdate
```

Parameters

None.

Remarks

The **CancelUpdate** method is used to cancel any changes made to the current record or to discard a newly added record. You cannot undo changes to the current record or to a new record after the **Update** method is called unless the changes are part of a batch update that you can cancel with the CancelBatch Method.

If you are adding a new record when the **CancelUpdate** method is called, the record that was current prior to the AddNew Method call becomes the current record again.

If you have not changed the current record or added a new record, calling the **CancelUpdate** method generates an error.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Clear Method (ADO)

The **Clear** method on a **Collection** object removes all of the objects in a collection.

```
collection.Clear
```

Parameters

None.

Remarks

The **Clear** method is used on the **Errors** collection to remove all existing **Error** objects from the collection. When an error occurs, ActiveX® Data Objects (ADO) automatically clears the **Errors** collection and fills it with **Error** objects based on the new error. However, some properties and methods return warnings that appear as **Error** objects in the **Errors** collection but do not halt a program's execution. Before calling the **Resync**, **UpdateBatch**, or CancelBatch Methods on a **Recordset** object or before setting the Filter Property on a **Recordset** object, call the **Clear** method on the **Errors** collection. Doing so enables you to read the **Count** property of the **Errors** collection to test for returned warnings as a result of these specific calls.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Clone Method (ADO)

The **Clone** method on a **Recordset** object creates a duplicate **Recordset** object from an existing **Recordset** object.

```
rstDuplicate = rstOriginal.Clone
```

Parameters

rstDuplicate
This object variable specifies the duplicate **Recordset** object to be created.
rstOriginal
This object variable specifies the **Recordset** object to be duplicated.

Remarks

The **Clone** method is used on a **Recordset** object to create multiple, duplicate **Recordset** objects, particularly if you want to be able to maintain more than one current record in a given set of records. Using the **Clone** method is more efficient than creating and opening a new **Recordset** object with the same definition as the original.

The current record of a newly created clone is set to the first record.

Changes made to one **Recordset** object are visible in all of its clones regardless of cursor type. However, after you execute **Requery** on the original **Recordset**, the clones will no longer be synchronized to the original.

Closing the original **Recordset** does not close its copies; closing a copy does not close the original or any of the other copies.

You can only clone a **Recordset** object that supports bookmarks. Bookmark values are interchangeable; that is, a bookmark reference from one **Recordset** object refers to the same record in any of its clones.

Close Method (ADO)

The **Close** method on a **Connection** or **Recordset** object closes an open object and any dependent objects.

```
recordSet.Close
```

Parameters

None

Remarks

The **Close** method is used to close either a **Connection** object or a **Recordset** object to free any associated system resources. Closing an object does not remove it from memory; you may change its property settings and open it again later. To completely eliminate an object from memory, set the object variable to **Nothing**.

Using the **Close** method to close a **Connection** object also closes any active **Recordset** objects associated with the connection. A **Command** object associated with the **Connection** object you are closing will persist, but it will no longer be associated with a **Connection** object, that is, its **ActiveConnection** property will be set to **Nothing**.

You can later call the **Open** method to reestablish the connection to the same or another data source. While the **Connection** object is closed, calling any methods that require an open connection to the data source generates an error. Closing a **Connection** object while there are open **Recordset** objects on the connection rolls back any pending changes in all of the **Recordset** objects.

Using the **Close** method to close a **Recordset** object releases the associated data and any exclusive access you may have had to the data through this particular **Recordset** object. You can later call the **Open** method to reopen the recordset with the same or modified attributes. While the **Recordset** object is closed, calling any methods that require a live cursor generates an error.

If an edit is in progress while in immediate update mode, calling the **Close** method generates an error. The **Update** or CancelUpdate Methods should be called first. If you close the **Recordset** object during batch updating, everything changes since the last **UpdateBatch** call is lost.

CommandText Property (ADO)

The **CommandText** property on a **Command** object contains the text of a command that you want to issue against a provider. This property sets or returns a String value containing a provider command, such as an AS/400 Command Language (CL) command for execution by the remote OS/400 DDM target server or an SQL command for execution on a DB2 database server. The default value for the **CommandText** property is a zero-length string.

```
previousCommandtext = command.CommandText
command.CommandText = "EXEC COMMAND DDMCmd"
```

Remarks

The **CommandText** property is used to set or return the text of a **Command** object. When used with the OLE DB Provider for AS/400 and VSAM, the text can be an AS/400 CL command for execution by the remote OS/400 DDM target server or a request to open a table on a host (a remote DDM Server). When used with the OLE DB Provider for DB2, the text can be an SQL command for execution or a call to a stored procedure.

If the **Prepared** property of the **Command** object is set to **True** and the **Command** object is bound to an open connection when you set the **CommandText** property, ActiveX® Data Objects (ADO) prepares the query when you call the **Execute** or **Open** methods.

Depending on the **CommandType** property setting, ADO may alter the **CommandText** property. The **CommandText** property can be read at any time to see the actual command text that ADO will use during execution.

The **CommandText** property defines the text version of a command. The syntax for the string in the **CommandText** property when used with the OLE DB Provider for AS/400 and VSAM is as follows:

```
EXEC COMMAND DDMCmd
```

where *DDMCmd* represents a valid OS/400 control language (CL) command. Note that only OS/400 CL commands are supported. These commands allow you to request functions from the OS/400 operating system. Some examples are the DLTF (Delete File) or DSPFFD (Display File Description) commands. These are the same commands that could be issued on the command line if you were connected to an AS/400 via a 5250 terminal session. See the 'OS/400 CL Reference for your platform for a detailed list of possible commands.

With the OLE DB Provider for AS/400 and VSAM, the **Command** object can also be used to open a data file after a **Connection** object has been opened and the **ActiveConnection** property has been set to this open connection. The **CommandText** property defines the data file to open. When used with the OLE DB Provider for AS/400 and VSAM, the syntax for the **CommandText** property string in this case is as follows:

```
EXEC OPEN DataSetName
```

where *DataSetName* represents a valid data file or library member on the host. If you open a host data file from a **Command** object, then the data file is opened as read-only. This results from the limitation that no argument or option is passed by ADO that supplies a parameter describing whether the data set should be opened as read-only or updatable.

The syntax for the string in the **CommandText** property when used with the OLE DB Provider for DB2 can be one of the following:

```
EXEC SQLStatement
```

where SQLStatement represents a valid SQL statement supported by DB2.

```
CALL StoredProcedure
```

where StoredProcedure represents a valid DB2 stored procedure on the database server.

The **CommandType** property specifies the type of command described in the **CommandText** property prior to execution in order to optimize performance. The **CommandType** property must be set to **adCmdText** for use with the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.

CommandType Property (ADO)

The **CommandType** property on a **Command** object Indicates the type of a **Command** object. This property sets or returns a **CommandTypeEnum** value.

```
oldType = command.CommandType
command.CommandType = newType
```

Remarks

The **CommandType** property is used to set or return the type of a **Command** object. This property specifies a **CommandTypeEnum** value that can be one of the constants in the following table.

Enumeration	Value	Description
adCmdUnspecified	-1	This value indicates that the **CommandType** property has been unspecified.
adCmdText	1	This value evaluates the **CommandText** property as a textual definition of a command or stored procedure call.
adCmdTable	2	This value evaluates the **CommandText** property as a table name. This value is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adCmdStoredProc	4	This value evaluates the **CommandText** property as a stored procedure. This value is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2. See remarks below regarding using stored procedures using the OLE DB Provider for DB2.
adCmdUnknown	8	This value indicates that the type of command in a **CommandText** property is not known. This is the default value.

The OLE DB Provider for AS/400 and VSAM and the OLE DB Provider for DB2 only support the **adCmdText** type for the **CommandType** property. If any other value for the **CommandType** property is set, errors will occur.

The OLE DB Provider for DB2 supports calling DB2 stored procedures. An application must use the CALL keyword before the SQL statement in order to execute a stored procedure. When using ADO, a **CommandType** property of **adCmdStoredProc** cannot be used for executing a stored procedure since ActiveX® Data Objects (ADO) inserts an EXEC not CALL keyword before the command text. In order to execute a stored procedure using ADO, the **CommandType** property should be set to **adCmdText** and the CALL keyword should be used before the SQL statement containing the stored procedure to be executed.

ConnectionString Property (ADO)

The **ConnectionString** property on a **Connection** object contains the information used to establish a connection to a data source. This property sets or returns a string value.

```
oldString = connection.ConnectionString
connection.ConnectionString = newString
```

Remarks

The **ConnectionString** property is used to specify a data source by passing a detailed connection string containing a series of *argument* = *value* statements separated by semicolons.

Microsoft ActiveX® Data Objects (ADO) supports several standard arguments for the **ConnectionString** property. Any other arguments are passed directly to the provider without any processing by ADO. This information must be in a specific format for use with the Microsoft® OLE DB Provider for AS/400 and VSAM, the Microsoft OLE DB Provider for DB2 or the Microsoft ODBC Driver for DB2. This information can be a data source name (DSN) or a detailed connection string containing a series of *argument=value* statements separated by semicolons. ADO supports several standard ADO-defined arguments for the **ConnectionString** property as listed in the following table.

Argument	**Description**
Data Source	This argument specifies the name of the data source for the connection. This argument is optional when using the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
File Name	This argument specifies the name of the provider-specific file containing preset connection information. This argument cannot be used if a *Provider* argument is passed. This argument is not supported by the OLE DB Provider for AS/400 and VSAM.
Location	The remote database name used for connecting to OS/400 systems. This parameter is optional when connecting to mainframe systems.
Password	This argument specifies a valid mainframe or AS/400 password to use when opening the connection. This password is used to validate that the user can log on to the target host system and has appropriate access rights to the file.
Provider	This argument specifies the name of the provider to use for the connection. To use the OLE DB Provider for AS/400 and VSAM, the Provider string must be set to "SNAOLEDB". To use the OLE DB Provider for DB2, the Provider string must be set to "DB2OLEDB". To use the ODBC Driver for DB2, the Provider string must be set to "MSDASQL" or not used as part of the ConnectionString since this value is the default for ADO.
Remote Provider	This argument specifies the name of a provider to use when opening a client-side connection (for a Remote Data Service only). This argument is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
Remote Server	This argument specifies the path name of a server to use when opening a client-side connection (for a Remote Data Service only). This argument is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
User ID	This argument specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used to validate that the user can log on to the target host system and has appropriate access rights to the file.

Note Not all of these parameters are required. The user can also be prompted for this information.

The OLE DB Provider for AS/400 and VSAM also support a number of provider-specific arguments, some of which default have default values as specified in the following table.

Argument	**Description**
BinAsChar	This parameter indicates whether to process binary fields as character fields (default is 0; do not process binary fields as character fields).

CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If this argument is omitted, the default value is U.S./Canada (37).
Default Library	The default AS/400 library to be accessed. This parameter is not required for mainframe access and is optional when connecting to AS/400 files.
HCD FileName	The fully qualified filename of the DDM host column description (HCD) file. This parameter can be an UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the SNA system directory. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400.
LocalLU	The name of the local LU alias configured in Host Integration Server.
ModeName	The APPC mode (must be set to a value that matches the host configuration and Host Integration Server configuration). Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes.
NetAddr	When TCP/IP has been selected for the Network Transport Library, this parameter indicates the IP address of the host.
NetPort	When TCP/IP has been selected for the Network Transport Library, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446.
NetLib	This parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA.
PCCodePage	The character code page to use on the PC. If this argument is omitted, the default value is set to Latin 1 (1252).
RDB	The remote database name for OS/400. You only need to specify this value if it is different from the remote LU alias configured in Host Integration Server.
Repair Host Keys	This parameter indicates whether the OLE DB provider should repair any host key values set in the registry and defaults to false.
RemoteLU	The name of the remote LU alias configured in Host Integration Server.
StrictVal	This parameter indicates whether strict validation should be used and defaults to false.

Note Not all of these parameters are required. The user can also be prompted for this information.

A sample **ConnectionString** for use with the OLE DB Provider for AS/400 and VSAM follows:

```
Conn.Provider="SNAOLEDB"
Conn.ConnectionString = "User ID=USERNAME;Password=password",&_
  "LocalLU=LOCAL;RemoteLU=DATABASE",&_
  "ModeName=QPCSUPP;CCSID=37;PCCodePage=437"
Conn.Properties("PROMPT")=adPromptNever
Conn.Open
```

Note The &_ character combination is used for continuing long lines in Visual Basic.

When opening a connection object in ADO 2.0, you must specify the Prompt connection property. For example, the following is valid with ADO 1.5 and ADO 2.0 and will prompt the user for **ConnectionString** properties:

```
Conn.ConnectionString = "Provider=SNAOLEDB
Conn.Properties("PROMPT")=adPromptAlways
Conn.Open
```

The OLE DB Provider for DB2 also supports a number of provider-specific arguments, some of which have default values as specified in the tables below. The arguments supported by OLE DB Provider for DB2 supplied with Microsoft® Host Integration Server 2004 differ from the arguments supported by the earlier OLE DB Provider for DB2 included with SNA Server 4.0.

The arguments supported by the OLE DB Provider for DB2 supplied with Host Integration Server 2004 are listed in the following table.

Argument	Description
BinAsChar	When this parameter is set to true, the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This parameter defaults to false.
CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If this argument is omitted, the default value is U.S./Canada (37).
DefSch	The name of the default schema (collection/owner) where the system catalogs resides. This parameter can be QSYS2, SYSIBM, SYSTEM, CURLIB, or USERID depending on platform. This parameter does not have a default value.
InitCat	This parameter is used as the first part of a 3-part fully qualified table name. In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. In DB2/400, this parameter is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then one can be created using the Add option. In DB2 Universal Database, this property is referred to as DATABASE. This parameter has no default value.
LocalLU	The name of the local LU alias configured in Host Integration Server.
ModeName	The APPC mode (must be set to a value that matches the host configuration and Host Integration Server configuration). Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes.
NetAddr	When TCP/IP has been selected for the Network Transport Library, this parameter indicates the IP address of the host.
NetPort	When TCP/IP has been selected for the Network Transport Library, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446.
NetLib	This parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA.
PCCodePage	The character code page to use on the PC. If this argument is omitted, the default value is set to Latin 1 (1252).
PkgCol	The name of the DRDA target collection (AS/400 library) where the Microsoft OLE DB Provider for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft OLE DB Provider for DB2 uses packages to issue dynamic and static SQL statements. The OLE DB Provider will create packages dynamically in the location to which the user points using the Package Collection parameter.

RemoteLU	The name of the remote LU alias configured in Host Integration Server.
TPName	The Transaction Program (TP) Name parameter represents the default transaction program name for the DB2 DRDA application server (AS) which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, TPName is set to 0X07F9F9F9.
UOW	This parameter determines whether two-phase commit is enabled. The possible values for this parameter are DUW (distributed unit of work) or RUW (remote unit of work). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in the OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

Note Not all of these parameters are required. The user can also be prompted for this information.

The ODBC Driver for DB2 supports a number of provider-specific arguments, some of which have default values as specified in the following tables. The arguments supported by ODBC Driver for DB2 supplied with Host Integration Server 2004 differ from the arguments supported by the earlier ODBC Driver for DB2 included with SNA Server 4.0.

The arguments supported by the ODBC Driver for DB2 supplied with Host Integration Server 2004 are listed in the following table.

Argument	**Description**
BAC	When the *BinAsChar* parameter is set to **true** (1), the ODBC Driver for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The CCSID and PCCodePage values are required input parameters.
CCSID	The character code set identifier (CCSID) matching the DB2 data as represented on the remote computer. The CCSID property is required when processing binary data as character data. Unless the BinAsChar value is set, character data is converted based on the DB2 column CCSID and default ANSI code page. If this argument is omitted, this parameter defaults to U.S./Canada (37).
CP	The character code page to use on the PC. This parameter is required when processing binary data as character data. Unless the Binary as Character (BAC) value is set, character data is converted based on the default ANSI code page configured in Windows. If this argument is omitted, the default value is set to Latin 1 (1252).
DESC	A field to provide a comment describing this ODBC data source. The description is an optional parameter and may be left blank.

DS	The Default Schema parameter is the name of the Collection where the ODBC Driver for DB2 looks for catalog information. The Default Schema is the "SCHEMA" name for the target collection of tables and views. The ODBC driver uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection (e.g., ODBC Catalog SQLTables). For DB2, the Default Schema is the target AUTHENTICATION (User ID or "owner"). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, then the ODBC driver uses the USER_ID provided at login. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. Obviously, this default is inappropriate in many cases, therefore it is essential that the Default Schema value in the data source be defined.
DSN	The data source name is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file which is stored in the Program Files\Common Files\ODBC\Data Sources directory.
LLU	When SNA is used for the network transport, this field is the name of the remote LU alias configured in Host Integration Server.
MN	When SNA is used for the Network Transport Library (NTL), the Mode Name field is the APPC mode and must be set to a value that matches the host configuration and Host Integration Server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bidirectional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This parameter normally defaults to QPCSUPP.
NA	When TCP/IP is used for the Network Transport Library (NTL), the Network Address parameter indicates the IP address or the hostname alias of the host DB2 server.
NP	When TCP/IP is used for the Network Transport Library (NTL), the Network Port parameter indicates the TCP/IP port used for communication with the target DB2 DRDA service. The default value is TCP/IP port 446.
NTL	The Network Transport Library parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA. If the default SNA is selected, then values for LLU, MN, and RLU are required. If TCP/IP is selected, then values for NetAddr and NetPort are required.
PC	The name of the DRDA target collection (AS/400 library) where the Microsoft ODBC Driver for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft ODBC Driver for DB2, which is implemented as an IBM DRDA application requester, uses packages to issue dynamic and static SQL statements. The ODBC driver will create packages dynamically in the location to which the user points using the Package Collection parameter.
PDS	The Provider Data Source is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file which is stored in the Program Files\Common Files\ODBC\Data Sources directory.
PROV	Specifies the name of the provider to use for the connection. To use the ODBC Driver for DB2, the Provider string must be set to "MSDASQL" or not used as part of the ConnectionString since this value is the default for ADO.
PWD	Specifies a valid mainframe or AS/400 password to use when opening the connection. This password is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. Note that this parameter is the same as the Parameter parameter.

RDB	The remote database name parameter is used as the first part of a three-part, fully qualified DB2 table name. This parameter is referred to by different names depending on the DB2 platform. In DB2 on MVS and OS/390, this parameter is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect on these platforms, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 installation manual. In DB2/400 on OS/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then a value can be created using the Add option. In DB2 Universal Database, this property is referred to as DATABASE.
RLU	When SNA is used for the network transport, this field is the name of the remote LU alias configured in Host Integration Server.
TPN	The Transaction Program (TP) Name parameter represents the default transaction program name for the DB2 DRDA application server (AS) which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, TPN is set to 0X07F9F9F9.
UID	Specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. This parameter is the same as the User ID parameter.
UOW	Determines whether two-phase commit is enabled. The possible values for this parameter are DUW (distributed unit of work) or RUW (remote unit of work). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in the OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

Note Not all of these parameters are required. The user can also be prompted for this information.

A sample **ConnectionString** using the ODBC Driver for DB2 supplied with Host Integration Server 2004 is as follows:

```
Conn.Provider="MSDASQL"
Conn.ConnectionString = "UID=USERNAME;PWD=password",&_
  "LLU=LOCAL;RLU=DATABASE",&_
  "MN=QPCSUPP;CCSID=37;CP=437"
Conn.Properties("PROMPT")=adPromptNever
Conn.Open
```

Note The &_ character combination is used for continuing long lines in Visual Basic.

After the **ConnectionString** property is set and the **Connection** object is opened, the provider may alter the contents of the property, for example, by mapping the ADO-defined argument names to their provider equivalents. Using the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2, three items are stripped from the **ConnectionString** after a **Connection** object is opened: Data Source, User ID, and Password.

The **ConnectionString** property automatically inherits the value used for the *ConnectionString* argument of the **Open** method on a **Connection** object, so you can override the current **ConnectionString** property during the **Open** method call. Therefore, the **ConnectionString** property of the **Connection** object can be set before opening the **Connection** object, or the *ConnectionString* parameter can be used to set or override the current connection parameters during the **Open** method call.

The **ConnectionString** property is read/write when the connection is closed and read-only when it is open.

If user and password information is set in both the **ConnectionString** property and in the optional *UserID* and *Password* parameters to the **Open** method, the results may be unpredictable. Such information should only be passed in either the **ConnectionString** property (or the *ConnectionString* parameter to the **Open** method call) or in the *UserID* and *Password* parameters.

There are a number of different ways to open a connection. The **Open** method can pass all of the appropriate connection information as part of the *ConnectionString* parameter or by setting the **ConnectionString** property of the **Connection** object, if this information is known in advance. The syntax in this case using the **ConnectionString** property is as follows:

```
connection = CreateObject("ADODB.Connection.2.0")
connection.Provider="SNAOLEDB"
connection.ConnectionString = "User ID=USERNAME;Password=password;Local LU=LOCAL;Remote LU=DA
TABASE;ModeName=QPCSUPP;CCSID=37;CodePage=437"
Conn.Properties("PROMPT")=adPromptNever
Conn.Open
```

There is a lack of spaces after the semicolons in the string. If spaces are inserted after the semicolons, an error will occur.

The simplest form of a **ConnectionString** property that contains all necessary information is as follows:

```
connection = CreateObject("ADODB.Connection.2.0")
connection.ConnectionString = "Provider=SNAOLEDB;Data Source=REMLU;User ID=USERNAME;Password=
password;ModeName=QPCSUPP"
```

> **Note** The User ID and Password must be included. Note the lack of spaces after the semicolons in the string. If spaces are inserted after the semicolons, an error will occur.

In the case where you would like the user to input the connection information, the following syntax can be used. This syntax does not specify any connection information except the provider, which is always required unless this is set in the **ConnectionString** or **Provider** property of the **Connection** object:

```
connection = CreateObject("ADODB.Connection.2.0")
connection.ConnectionString = "Provider=SNAOLEDB"
Conn.Properties("PROMPT")=adPromptAlways
connection.Open
```

This method of invoking the **Open** method automatically causes a dialog box to appear asking the user for the user name, password, and other necessary information.

CursorLocation Property (ADO)

The **CursorLocation** property on a **Connection** object or **Recordset** object indicates the location of the cursor engine. This property sets or returns a Long value representing a **CursorLocationEnum**.

```
cursor = connection.CursorLocation
connection.CursorLocation = adUseServer
```

Remarks

The **CursorLocation** property is used to set or return the location of the cursor. This property can be set to one of the **CursorLocationEnum** constants listed in the following table.

Enumeration	Value	Description
adUseNone	1	This value indicates no cursor location. This value is not supported by the Microsoft® OLE DB Provider for AS/400 and VSAM.
adUseServer	2	This value indicates that the data provider or driver-supplied cursor is used.
adUseClient	3	This value indicates that a client-side cursor supplied by a local cursor library is to be used.
adUseClientBatch	3	For backward compatibility, this value indicates that a client-side cursor supplied by a local cursor library is to be used.

This property setting only affects connections established after the property has been set. Changing the **CursorLocation** property has no effect on existing connections.

This property is read/write on a **Connection** object or a closed **Recordset**, object and read-only on an open **Recordset**.

If the **CursorLocation** property is set to **adUseClient**, the recordset will be accessible as read-only, and recordset updates to the host are not possible. When the CursorLocation property is set to **adUseClient** (use the client cursor engine), the **Find** method, **Filter** property, and **Sort** property will work if MDAC 2.0 or higher is installed, but will not work properly with earlier versions of ADO.

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CursorType Property (ADO)

The **CursorType** property on a **Recordset** object indicates the type of the cursor engine. This property sets or returns a Long value representing a **CursorTypeEnum**.

```
oldType = recordset.CursorType
recordset.CursorType = newType
```

Remarks

The **CursorType** property is used to set or return the type of the cursor that the provider should use when opening the **Recordset**. This property can be one of the enumerated values for **CursorTypeEnum** listed in the following table.

Enumeration	Value	Description
adOpenUnspecified	-1	This indicates an unspecified value for the *CursorType*. This value is not supported by the Microsoft® OLE DB Provider for AS/400 and VSAM or the Microsoft OLE DB Provider for DB2.
adOpenForwardOnly	0	Specifying this value opens a forward-only-type cursor. This *CursorType* is identical to a static cursor, except that you can only scroll forward through records. This improves performance when only one pass through a **Recordset** is needed. This value is not supported by the Microsoft OLE DB Provider for AS/400 and VSAM.
adOpenKeyset	1	Specifying this value opens a keyset-type cursor. This *CursorType is* similar to a dynamic cursor with a few exceptions. Records that other users delete are inaccessible from your **Recordset**. Data changes to existing records by other users are still visible, but records added by other users are not visible (cannot be seen). This value is not supported by the OLE DB Provider for AS/400 and VSAM.
adOpenDynamic	2	Specifying this value opens a dynamic-type cursor. Additions, changes, and deletions by other users are visible, and all types of movement through the recordset are allowed, except for bookmarks if the provider does not support them. A dynamic cursor is the only *CursorType* supported by the OLE DB Provider for AS/400 and VSAM.
adOpenStatic	3	Specifying this value opens a static-type cursor. A static cursor provides a static copy of a set of records that can be used to find data or generate reports. Additions, changes, or deletions by other users are not visible with a static cursor. This value is not supported by the OLE DB Provider for AS/400 and VSAM.

Note that the **Open** method on a **Recordset** object defaults this property to **adOpenForwardOnly**, a value that is mapped to **adOpenDynamic** by the OLE DB provider for AS/400 and VSAM.

This property setting only affects connections established after the property has been set. Changing the **CursorType** property has no effect on existing connections. The **CursorType** property is read/write when the **Recordset** is closed and read-only when it is open.

If a provider does not support the requested cursor type, the provider may return another cursor type. The **CursorType** property will change to match the actual cursor type in use when the **Recordset** object is open. To verify whether a specific returned cursor is supported, use the **Supports** method. When using the OLE DB Provider for AS/400 and VSAM, the **Supports** method returns **adMovePrevious** as true with **CursorType** set to **adOpenDynamic**. After you close the **Recordset**, the **CursorType** property reverts to its original setting.

DefinedSize Property (ADO)

The **DefinedSize** property on a **Field** object indicates the defined size of a field object. This property returns a Long value that reflects the defined size of a field as a number of bytes.

```
size = field.DefinedSize
```

Remarks

The **DefinedSize** property is used to return the data capacity or length of a **Field** object. For all fields, the **DefinedSize** property is read-only. If ActiveX® Data Objects (ADO) cannot determine the length of the **Field** object, the **ActualSize** property returns **adUnknown**.

The **ActualSize** and **DefinedSize** properties on a field object can be different. For example, a **Field** object with a declared type of **adVarChar** (variable character data type) and a maximum length of 50 characters returns a **DefinedSize** property value of 50, but the **ActualSize** property value it returns is the length of the data stored in the field for the current record.

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Delete Method (ADO)

The **Delete** method on a **Recordset** object deletes the current record or a group of records.

```
recordSet.Delete AffectedRecords
```

Parameter

AffectedRecords

This optional parameter specifies an **AffectEnum** value that determines how many records the **Delete** method will affect. The **AffectEnum** value can be one of the constants listed in the following table.

Enumeration	Value	Description
adAffectCurrent	1	This value deletes only the current record.
adAffectGroup	2	This value deletes the records that satisfy the current Filter Property setting. You must set the **Filter** property to one of the valid predefined constants to use this option.

Remarks

The **Delete** method is used to mark the current record or a group of records in a **Recordset** object for deletion. If the **Recordset** object does not allow record deletion, an error occurs. If you are in immediate update mode, deletions occur in the database immediately. Otherwise, the records are marked for deletion from the cache and the actual deletion happens when the **UpdateBatch** method is called. (Use the **Filter** property to view the deleted records.)

Retrieving field values from the deleted record generates an error. After deleting the current record, the deleted record remains current until you move to a different record. After you move away from the deleted record, it is no longer accessible.

If you are in batch update mode, use the CancelBatch Method to cancel a pending deletion or group of pending deletions.

If the attempt to delete records fails because of a conflict with the underlying data (for example, a record has already been deleted by another user), the data provider returns warnings to the **Errors** collection but does not halt program execution. A run-time error occurs only if there are conflicts on all the requested records.

Description Property (ADO)

The **Description** property on an **Error** object describes the **Error** object. This property returns a String value that contains a description of the error.

```
errorString = currentError.Description
```

Remarks

The **Description** property on an **Error** object is used to obtain a short description of the error. Applications can display this property to alert the user to an error that the application does not want to handle. The string will come from either ActiveX® Data Objects (ADO) or a data provider such as the Microsoft® OLE DB Provider for AS/400 and VSAM, the Microsoft OLE DB Provider for DB2, or the Microsoft ODBC Driver for DB2. The provider is responsible for passing specific error text to ADO.

ADO adds an **Error** object to the **Errors** collection for each provider error or warning it receives. An application can enumerate the **Errors** collection to trace the errors that the provider passes.

EditMode Property (ADO)

The **EditMode** property on a **Recordset** object indicates the editing status of the current record. This property returns a Long value representing an **EditModeEnum**.

```
currentMode = recordset.EditMode
connection.CursorType = newType
```

Remarks

The **EditMode** property is used to return the editing status of the current recordset. This property can be one of the enumerated values for **EditModeEnum** listed in the following table.

Enumeration	Value	Description
adEditNone	0	This value indicates that no editing operation is in progress.
adEditInProgress	1	This value indicates that data in the current record has been modified but not saved.
adEditAdd	2	This value indicates that the **AddNew** method has been called, and the current record in the copy buffer is a new record that has not been saved in the database.
adEditDelete	4	This value indicates that the current record has been deleted.

ActiveX® Data Objects (ADO) maintains an editing buffer associated with the current record. The **EditMode** property indicates whether changes have been made to this buffer, or whether a new record has been created. Use the **EditMode** property to determine the editing status of the current record. You can test for pending changes if an editing process has been interrupted and determine whether you need to use the Update Method or the CancelUpdate Method.

See the AddNew Method for a more detailed description of the **EditMode** property under different editing conditions.

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EOF Property (ADO)

The **EOF** property on a **Recordset** object indicates that the current record position is after the last record in a **Recordset** object. This property returns a Boolean value.

```
IsEOF = recordset.EOF
```

Remarks

The **EOF** property is used to determine whether a **Recordset** object contains records or whether you have gone beyond the limits of a **Recordset** object when you move from record to record.

The **EOF** property returns **True** if the current record position is after the last record and **False** if the current record position is on or before the last record.

If the **EOF** property is **True**, there is no current record.

If a **Recordset** object is opened containing no records, both the **BOF** and **EOF** properties are set to **True** and the **Recordset** object's **RecordCount** property setting is zero. When a **Recordset** object is opened that contains at least one record, the first record is the current record and the **BOF** and **EOF** properties are **False**.

If the last remaining record in the **Recordset** object is deleted, the **BOF** and **EOF** properties may remain **False** until you attempt to reposition the current record.

This table below indicates which **Move** methods are allowed with different combinations of the **BOF** and **EOF** properties.

	MoveFirst **MoveLast**	**MovePrevious** **Move < 0**	**Move 0**	**MoveNext** **Move > 0**
BOF=True **EOF=False**	Allowed	Error	Error	Allowed
BOF=False **EOF=True**	Allowed	Allowed	Error	Error
Both True	Error	Error	Error	Error
Both False	Allowed	Allowed	Allowed	Allowed

Allowing a **Move** method does not guarantee that the method will successfully locate a record; it only means that calling the specified **Move** method will not generate an error.

The following table shows what happens to the **BOF** and **EOF** property settings when various **Move** methods are called, but are unable to successfully locate a record.

	BOF Property	**EOF Property**
MoveFirst **MoveLast**	Set to **True**	Set to **True**
Move 0	No change	No change
MovePrevious **Move < 0**	Set to **True**	No change
MoveNext **Move > 0**	No change	Set to **True**

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Execute Method on a Command Object (ADO)

The **Execute** method on a **Command** object executes the statement specified in the **CommandText** property.

```
command.Execute( RecordsAffected, Parameters, Options )
set recordSet = command.Execute( RecordsAffected, Parameters,
Options )
```

Parameters

RecordsAffected
This optional parameter specifies a Long variable to which the provider returns the number of records that the operation affected.

Parameters
This optional parameter specifies a Variant array of parameter values passed with an SQL statement and is not used by the OLE DB Provider for AS/400 and VSAM.

Options
This optional parameter specifies a Long value representing a **CommandTypeEnum** value that indicates how the provider should evaluate the **CommandText** property of the **Command** object.

The **CommandTypeEnum** value can be one of the constants listed in the following table.

Enumeration	Value	Description
adCmdUnspecified	-1	This value indicates that the **CommandText** property is unspecified. This value is not supported by the Microsoft® OLE DB Provider for AS/400 and VSAM.
adCmdText	1	This value evaluates the **CommandText** property as a as a textual definition of a command or stored procedure call.
adCmdTable	2	This value evaluates the **CommandText** property as a table name. This value is not supported by the OLE DB Provider for AS/400 and VSAM or the Microsoft OLE DB Provider for DB2.
adCmdStoredProc	4	This value evaluates the **CommandText** property as a stored procedure name. This value is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adCmdUnknown	8	This value indicates that the type of command in **CommandText** is not known. This value is the default. This value is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.

The default for *Option* is a**dCmdText** under the OLE DB Provider for AS/400 and VSAM and the OLE DB Provider for DB2.

Remarks

When used with the OLE DB Provider for AS/400 and VSAM, the **Execute** method on a **Command** object can be used to open tables or execute DDM commands on a remote DDM server. The *Options* parameter must be set to **adCmdText** for use with the OLE DB Provider for AS/400 and VSAM.

The primary purpose of the **Command** object in the context of the OLE DB Provider for AS/400 and VSAM is to issue AS/400 Command Language (CL) commands for execution by the remote OS/400 DDM target server. To invoke DDM commands on a remote DDM server, the **CommandText** property defines the text version of a command which must have been set to:

```
EXEC COMMAND DDMCmd
```

where *DDMCmd* represents a valid OS/400 control language (CL) command. Note that only OS/400 CL commands are supported. These commands allow you to request functions from the OS/400 operating system. Some examples are the DLTF (Delete File) or DSPFFD (Display File Description) commands. These are the same commands that could be issued on the command line if you were connected to an AS/400 via a 5250 terminal session. See the 'OS/400 CL Reference for your platform for a detailed list of possible commands.

Note that this method does not return the results or output of a remote DDM CL command. If the results or output of a remote command are to be captured, the ***DDMCmd*** statement to be executed must include syntax to redirect the command output to a file on the AS/400 host and then explicitly open this output file after the command has completed.

The **Execute** method on a **Command** object can also be used to open a data file after a **Connection** object has been opened and the **ActiveConnection** property has been set to this open connection. The **CommandText** property defines the data file to open and must be set to:

```
EXEC OPEN DataSetName
```

where *DataSetName* represents a valid data file or library member on the host. When used in this way, the **Execute** method returns a **Recordset** object. If you open a host data file from a **Command** object, then the data file is opened as read-only. This results from the limitation that no argument or option is passed by ActiveX® Data Objects (ADO) that supplies a parameter describing whether the data set should be opened as read-only or updatable.

When used with the OLE DB Provider for DB2, the **Execute** method on a **Command** object can be used to execute SQL statements or call a stored procedure. The **CommandText** property defines the SQL statements to execute and must be set to one of the following:

```
EXEC SQLStatement
```

where SQLStatement represents a valid SQL statement supported by DB2.

```
CALL StoredProcedure
```

where StoredProcedure represents a valid DB2 stored procedure on the database server.

If errors occur, these can be examined with the **Errors** collection on the **Command** object.

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Execute Method on a Connection Object (ADO)

The **Execute** method on a **Connection** object executes the statement specified in the **CommandText** property.

```
connection.Execute CommandText, RecordsAffected, Options
set recordset = connection.Execute( CommandText, RecordsAffected,
Options )
```

Parameters

RecordsAffected
This optional parameter specifies a Long variable to which the provider returns the number of records that the operation affected.

Options
This optional parameter specifies a Long value representing a **CommandTypeEnum** value that indicates how the provider should evaluate the **CommandText** property of the Command object.

The **CommandTypeEnum** value can be one of the constants listed in the following table.

Enumeration	Value	Description
adCmdUnspecified	-1	This value indicates that the **CommandText** property is unspecified. This value is not supported by the Microsoft® OLE DB Provider for AS/400 and VSAM or the Microsoft OLE DB Provider for DB2.
adCmdText	1	This value evaluates the **CommandText** property as a textual definition of a command or stored procedure call.
adCmdTable	2	This value evaluates the **CommandText** property as a table name. This value is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adCmdStoredProc	4	This value evaluates the **CommandText** property as a stored procedure name. This value is not supported by the OLE DB Provider for AS/400 and VSAM.
adCmdUnknown	8	This value indicates that the type of command in **CommandText** is not known. This value is the default. This value is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.

Remarks

The **Execute** method on a **Connection** object can be used to open tables or execute DDM commands on a remote DDM server. The *Options* parameter must be set to **adCmdText** for use with the OLE DB Provider for AS/400 and VSAM.

The **Execute** method on a **Connection** object is primarily used to open a data file after a **Connection** object has been created. The **CommandText** property defines the data file to open and must be set to:

```
EXEC OPEN DataSetName
```

where *DataSetName* represents a valid data file or library member on the host. When used in this way, the **Execute** method returns a **Recordset** object. If you open a host data file from a **Connection** object, then the data file is opened as read-only. This results from the limitation that no argument or option is passed by ActiveX® Data Objects (ADO) that supplies a parameter describing whether the data set should be opened as read-only or updatable. If a **Recordset** object is desired that is not read-only, then first create a **Recordset** object with the desired property settings, and use the **Recordset** object’s **Open** method to return the open **Recordset**.

The **Execute** method on a **Connection** object can also be used to issue AS/400 Command Language (CL) commands for execution by the remote OS/400 DDM target server. To invoke DDM commands on a remote DDM server, the **CommandText** property defines the text version of a command which must have been set to:

```
EXEC COMMAND DDMCmd
```

where *DDMCmd* represents a valid OS/400 control language (CL) command. Note that only OS/400 CL commands are supported. These commands allow you to request functions from the OS/400 operating system. Some examples are the DLTF (Delete File) or DSPFFD (Display File Description) commands. These are the same commands that could be issued on the command line if you were connected to an AS/400 via a 5250 terminal session. See the 'OS/400 CL Reference for your platform for a detailed list of possible commands.

Note that this method does not return the results or output of a remote DDM CL command. If the results or output of a remote command are to be captured, the ***DDMCmd*** statement to be executed must include syntax to redirect the command output to a file on the AS/400 host and then explicitly open this output file after the command has completed.

If errors occur, these can be examined with the **Errors** collection on the **Connection** object.

Filter Property (ADO)

The **Filter** property on a **Recordset** object indicates a filter for data in a **Recordset**. This property sets or returns a Variant value.

```
recordset.Filter = Criteria
```

Parameters

Criteria
This parameter specifies a Variant.

It can be either a criteria (a where clause) or one of the enumerated values for **FilterGroupEnum** listed in the following table.

Enumeration	Value	Description
adFilterNone	0	No filter. This value removes the current filter and restores all records to view.
adFilterPendingRecords	1	Use the pending records. This value allows viewing only those records that have changed but have not yet been sent to the server. This value is only applicable for batch update mode.
adFilterAffectedRecords	2	Use only records affected by the last **Delete**, **Resync**, **UpdateBatch**, or **CancelBatch** call.
adFilterFetchedRecords	3	Use the last fetched records. This value allows viewing the records in the current cache returned as a result of the last call to retrieve records (implying a resynchronization).
adFilterConflictingRecords	5	Use the conflicting records. This value allows viewing only those records that failed the last batch update.

Remarks

The **Filter** property is not supported by the Microsoft® OLE DB Provider for DB2 or the Microsoft ODBC Driver for DB2.

The **Filter** property is supported by the Microsoft OLE DB Provider for AS/400 and VSAM on certain files. In order to use the Recordset **Filter** property, an AS/400 logical file, an AS/400 keyed physical file, a mainframe KSDS file with a unique key, or a mainframe RRDS file with a unique key must be used. If this property is used on an AS/400 non-keyed physical file or any other mainframe file type, then the method fails.

When the **Filter** property is used with a criteria, the where clause is a combination of triplets. Each triplet consists of a column name, an operator, and a literal value. These where clause triplets can be combined with **AND**s and **OR**s for more complex logical filters.

If *Criteria* is a single-condition where clause, then any operator can be used. The construction of a single-condition where clause consists of a column name (the database field), an operator (greater than or equal, for example), and a literal value.

Examples of a single-condition where clause is as follows:

- recordset.Filter = "LastName = 'Jones' "
- recordset.Filter ="Salary > 30000.0"

The *Criteria* argument can be a two-condition with the following restrictions:

- If the column name (the database field) is the same in both clauses, then the separate where clauses must define a contiguous range.
- If the column names are different, then the operators must be the same. If the operators are "LIKE", then the filtered region may be unexpected.

Examples of acceptable two-condition where clauses are as follows:

- recordset.Filter = "LastName = 'Jones' **AND** FirstName = 'Tom' "
- recordset.Filter = "Cost = 5000.00 **OR** Cost > 5000.00 "

The *Criteria* argument can be three or more conditions with the following restrictions:

- The operators must be the same for all conditions. If the operators are "LIKE", then the filtered region may be unexpected.

In all cases, if the "=" operator is used, then the column names specified in the where clause must be keyed columns in the file.

One restriction on these combinations is that **OR** clauses can only be used at the highest (major) level of the logical operation.

Examples of acceptable *Criteria* meeting these conditions are:

- recordset.Filter = "(Title='Manager' **AND** Salary>30000) **OR** (Title='Administrator' **AND** Salary>50000)"
- recordset.Filter ="Salary > 30000.0"

An example of illegal *Criteria* is:

- recordset.Filter = "(Title='Associate' **OR** Salary >30000) **AND** (Title='Administrator')"

The operator can also use wildcards (* or %) in character expressions as follows:

- recordset.Filter = "Lastname LIKE '*SMITH*'"

To determine if any records were found meeting the *Criteria*, the application should check the **Recordset EOF** property. If **EOF** is true, then no records were found meeting the where clause specified in the *Criteria* parameter.

If the CursorLocation Property is set to **adUseClient** (use the client cursor engine), the **Filter** property will work if MDAC 2.0 or later is installed but will not work properly with earlier versions of ADO.

When operating on large VSAM files and only querying data on a subset of the records, using the **Filter** property is not desirable because of the performance impact. The entire VSAM file is transferred to the client for filtering. A better solution is to use the server cursor engine and the **Find** method.

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Find Method (ADO)

The **Find** method on a **Recordset** object locates or seeks to the next record in a **Recordset** object that meets a particular condition and makes this the current record. This method can be used to seek to a specific record in a **Recordset** object based on a where clause (similar to an SQL where clause) defined by the user.

```
recordset.Find Criteria, SkipRecords, SearchDirection, Start
```

Parameters

ActiveX® Data Objects (ADO) supports four arguments for the **Find** method, but the last three arguments are optional and have default values as noted below:

Criteria

This BSTR parameter specifies the criteria used for locating or seeking to a record in a **Recordset** object.

SkipRecords

This optional parameter specifies a Long expression that indicates the number of records to skip (whether to skip the current record) when locating a record in a **Recordset** object. The default value for this argument is 0 (do not skip the current record). The first time a **Find** method is used, this argument is usually set to 0 (the default). On subsequent calls to this method to seek other records that meet the specified condition, this argument would normally be set to 1, to skip one record forward before finding the next record that matches the search *Criteria*. A negative value for this parameter is not supported by the Microsoft® OLE DB Provider for AS/400 and VSAM.

SearchDirection

This optional parameter is an enumeration that specifies the direction for the search.

It can be one of the enumerated values for **SearchDirectionEnum** listed in the following table.

Enumeration	Value	Description
adSearchForward	0	Search forward from the current record.
adSearchBackward	1	Search backward from the current record. This option is not supported by the OLE DB Provider for AS/400 and VSAM.

This optional argument defaults to **adSearchForward**.

Start

This optional parameter specifies the starting location for a search, which can be a bookmark or an enumeration indicating the current, first, or last record in a **Recordset** object.

This argument is a Variant and can be either a bookmark or one of the enumerated values for **BookmarkEnum** listed in the following table.

Enumeration	Value	Description
adBookmarkCurrent	0	The current record.
adBookmarkFirst	1	The first record.
adBookmarkLast	2	The last record.

This optional argument defaults to **adBookmarkCurrent**.

Remarks

The **Find** method is not supported by the Microsoft OLE DB Provider for DB2 or the Microsoft ODBC Driver for DB2.

The **Find** method is supported by the Microsoft OLE DB Provider for AS/400 and VSAM on certain files. In order to use the Recordset **Find** method, an AS/400 logical file, an AS/400 keyed physical file, a mainframe KSDS file with a unique key, or a mainframe RRDS file with a unique key must be used. If this method is used on an AS/400 non-keyed physical file or any other mainframe file type, then the method fails.

The first parameter is the only required argument for the **Find** method. All of the other arguments are optional and have default values. This first argument is a single-condition where clause. The construction of a single-condition where clause consists of a column name (the database field), an operator (greater than or equal, for example), and a literal value.

Examples of acceptable single-condition where clauses are as follows:

- recordset.Find, "Cost > 10000.00"
- recordset.Find, "Cost < 100.00"
- recordset.Find, "Cost = 5000.00"
- recordset.Find, "LastName = 'Jones' "

Note that variables cannot be used as substitutes for literal values. If the file has multiple keys in the index, using the "=" operator will always fail since the values of all keys cannot be specified.

If the CursorLocation Property is set to **adUseClient** (use the client cursor engine), the **Filter** method will work if MDAC 2.0 or later is installed, but will not work properly with earlier versions of ADO.

When operating on large VSAM files and only querying data on a subset of the records, using the **Filter** property is not desirable because of the performance impact. The entire VSAM file is transferred to the client for filtering. A better solution is to use the server cursor engine and the **Find** method.

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GetChunk Method (ADO)

The **GetChunk** method on a **Field** object returns all or a portion of the contents of a large text or binary data **Field** object.

```
variable = field.GetChunk( Size )
```

Parameters

Size
This parameter specifies a Long expression equal to the number of bytes or characters to be retrieved.

Return Values

A Variant.

Remarks

The **GetChunk** method on a **Field** object is used to retrieve part or all of its long binary or character data. In situations where system memory is limited, the **GetChunk** method can be used to manipulate long values in portions rather than in their entirety.

The data that a **GetChunk** method returns is assigned to a variable. If the *Size* parameter is greater than the remaining data, the **GetChunk** method returns only the remaining data without padding the variable with empty spaces. If the **Field** object is empty, the **GetChunk** method returns Null.

Each subsequent **GetChunk** method call retrieves data starting from where the previous **GetChunk** call left off. However, if you are retrieving data from one field and then set or read the value of another field in the current record, ActiveX® Data Objects (ADO) assumes you are finished retrieving data from the first field. If the **GetChunk** method is called on the first field again, ADO interprets the call as a new **GetChunk** operation and starts reading from the beginning of the data. Accessing **Field** objects in other **Recordset** objects (that are not clones of the first **Recordset** object) will not disrupt **GetChunk** operations.

If the **adFldLong** bit in the **Attributes** property of a **Field** object is set to **True**, the **GetChunk** method can be used for that **Field** object.

If there is no current record when the **GetChunk** method is invoked on a **Field** object, error 3021 (no current record) occurs.

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GetRows Method (ADO)

The **GetRows** method on a **Recordset** object retrieves multiple records of a recordset into an array.

```
array = recordset.GetRows( Rows, Start, Fields )
```

Parameters

Rows
This optional parameter specifies a Long expression indicating the number of records to retrieve. The default value if this parameter is not specified is a **GetRowSetEnum** which is **adGetRowsRest** (value = -1).

Start
This optional parameter specifies the starting location for the record from which the **GetRows** operation should begin, which can be a bookmark or an enumeration indicating the current, first, or last record in a **Recordset** object.

This argument is a Variant and can be either a bookmark or one of the enumerated values for **BookmarkEnum** listed in the following table.

Enumeration	Value	Description
adBookmarkCurrent	0	The current record
adBookmarkFirst	1	The first record
adBookmarkLast	2	The last record

This optional argument defaults to **adBookmarkCurrent**.

Fields
This optional parameter is a Variant and specifies a single field name or ordinal position or an array of field names or ordinal position numbers. ADO returns only the data in these fields.

Return Values

A two-dimensional array.

Remarks

The **GetRows** method is used to copy records from a recordset into a two-dimensional array. The first subscript of the array identifies the field and the second array subscript identifies the record number. The array variable is automatically dimensioned to the correct size when the **GetRows** method returns the data.

If a value is not specified for the *Rows* parameter, the **GetRows** method automatically retrieves all the records in the **Recordset** object. If more records are requested than are available, **GetRows** returns only the number of available records.

If the **Recordset** object supports bookmarks, you can specify at which record the **GetRows** method should begin retrieving data by passing the value of that record's **Bookmark** property.

To restrict the fields that the **GetRows** method returns, you can pass either a single field name/number or an array of field names/numbers in the *Fields* argument.

After the **GetRows** method is called, the next unread record becomes the current record, or the **EOF** property is set to **True** if there are no more records.

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IsolationLevel Property (ADO)

The **IsolationLevel** property on a **Connection** object indicates the level of isolation for a **Connection** object. This property sets or returns a Long value representing an **IsolationLevelEnum**. The default value for this property is **adXactChaos.**

```
currentIsoLevel = connection.IsolationLevel
connection.IsolationLevel = newIsoLevel
```

Remarks

The **IsolationLevel** property is used to set the type of isolation level placed on a connection that the provider should use when opening the **Connection** object. This property can also be used to return the type of isolation level in use on an open **Connection** object.

This property can be one of the enumerated values for **IsolationLevelEnum** listed in the following table.

Enumeration	Value	Description
adXactUnspecified	-1	This value indicates that the provider is using a different isolation level than specified, but that the level cannot be determined.
adXactChaos	16	This value indicates that pending changes from more highly isolated transactions cannot be overwritten.
adXactBrowse	256	This value indicates that from one transaction you can view uncommitted changes in other transactions.
adXactReadUncommitted	256	Same as **adXactBrowse**.
adXactCursorStability	4096	This value indicates that from one transaction you can view changes in other transactions only after they have been committed.
adXactReadCommitted	4096	Same as **adXactCursorStability**.
adXactRepeatableRead	65536	This value indicates that from one transaction you cannot see changes made in other transactions, but that re-querying can retrieve new **Recordset** objects.
adXactIsolated	1048576	This value indicates that transactions are conducted in isolation of other transactions.
adXactSerializable	1048576	Same as **adXactIsolated**.

This property is not supported by the Microsoft® OLE DB Provider for AS/400 and VSAM.

When setting the **IsolationLevel** property, this change does not take effect until the next time that the **BeginTrans** method is called.

If the level of isolation you request is unavailable, the provider may return the next greater level of isolation.

When used with the Microsoft OLE DB Provider for DB2 or the Microsoft OLE DB Driver for DB2, the ActiveX® Data Objects (ADO) **IsolationLevel** property corresponds with the isolation level defined by the ANSI SQL standard and with IBM's DB2 implementation of isolation level. The table below indicates how the ADO **IsolationLevel** property corresponds with the terms used by ANSI SQL for isolation level and with IBM documentation for isolation level in DB2.

ADO IsolationLevel property	ANSI SQL isolation level	IBM documentation
	AUTOCOMMITTED (Note that this applies only to DB2/400 and does not correspond with an ANSI SQL isolation level	COMMIT(*NONE) (NC). This isolation level is used in DB2/400 auto-commit mode only and has no corresponding isolation level on other DB2 platforms or in ANSI SQL.
adXactReadUncommitted	READ UNCOMMITTED	UNCOMMITTED READ (UR). This isolation level corresponds with ANSI SQL READ UNCOMMITTED.

adXactReadCommitted or **adXactCursorStability**	READ COMMITTED	CURSOR STABILITY (CS). This isolation level corresponds with ANSI SQL READ COMMITTED.
adXactRepeatableRead	REPEATABLE READ	READ STABILITY (RS). This isolation level corresponds with ANSI SQL REPEATABLE READ.
adXactSerializable or **adXactIsolated**	SERIALIZABLE	REPEATABLE READ (RR). This isolation level corresponds with ANSI SQL SERIALIZABLE.

When used with the Remote Data Service on a client-side **Connection** object, the **IsolationLevel** property can be set only to **adXactUnspecified**. Because users are working with disconnected **Recordset** objects on a client-side cache, there may be multi-user issues. For instance, when two different users try to update the same record, Remote Data Service simply allows the user who updates the record first to "win." The second user's update request will fail with an error.

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Item Method (ADO)

The **Item** method on a **Collection** object returns a specific member object of a collection by name or ordinal number. This method is supported for the **Errors**, **Fields**, and **Properties** collections using the OLE DB Provider for AS/400 and VSAM.

```
set Object = collection.Item ( Index )
```

Parameters

Index
This parameter specifies a Variant that evaluates either to the name or to the ordinal number of an object in a collection.

Return Values

An object reference from the collection.

Remarks

The **Item** method is used to return a specific object in a collection. If the method cannot find an object in the collection corresponding to the *Index* parameter, an error occurs. Also, some collections do not support named objects; for these collections, you must use ordinal number references.

The **Item** method is the default method for all collections; therefore, the following syntax forms are interchangeable:

collection.Item (*Index*)

collection (*Index*)

This method is only supported on the **Errors**, **Fields**, and **Properties** collections under the OLE DB Provider for AS/400 and VSAM.

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LockType Property (ADO)

The **LockType** property on a **Recordset** object indicates the type of locks placed on records during editing. This property sets or returns a Long value representing a **LockTypeEnum**. The default value for this property is **adLockReadOnly**.

```
currentLock = recordset.LockType
recordset.LockType = newtype
```

Remarks

The **LockType** property is used to set the type of locks placed on records that the provider should use when opening the **Recordset**. This property can also be used to return the type of locking in use on an open **Recordset** object. This property can be one of the enumerated values for **LockTypeEnum** as listed in the following table.

Enumeration	Value	Description
adLockUnspecified	-1	This value does not specify a type of lock. For a recordset created with the **Clone** method, the clone is created with the same lock type as the original.
adLockReadOnly	1	This value indicates read-only records where the data cannot be altered.
adLockPessimistic	2	This value indicates pessimistic locking, record by record. The provider does what is necessary to ensure successful editing of the records, usually by locking records at the data source immediately after editing. This lock type is supported by the Microsoft® OLE DB Provider for AS/400 and VSAM and the Microsoft OLE DB Provider for DB2. However, the OLE DB Provider for AS/400 and VSAM internally maps this lock type to **adLockBatchOptimistic**.
adLockOptimistic	3	This value indicates optimistic locking, record by record. The provider uses optimistic locking, locking records only when the **Update** method is called. This lock type is not supported by the OLE DB Provider for DB2.
adLockBatchOptimistic	4	This value indicates optimistic batch updates and is required for batch update mode. This option is not supported by the OLE DB Provider for DB2.

If a provider cannot support the requested **LockType** setting, it will substitute another type of locking. To determine the actual locking options available on a **Recordset** object, use the **Supports** method with **adUpdate** and **adUpdateBatch**.

The **adLockPessimistic** setting is not supported if the **CursorLocation** property is set to **adUseClient**. If an unsupported value is set, then no error will result; the closest supported **LockType** will be used instead.

The **LockType** property is read/write when the **Recordset** is closed and read-only when it is open.

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MaxRecords Property (ADO)

The **MaxRecords** property on a **Recordset** indicates the maximum number of records to return to a **Recordset** from a query. This property sets or returns a Long value that indicates the maximum number of records to return. The default value for this property is zero (no limit).

```
cntRecords = recordset.MaxRecords
recordset.MaxRecords = count
```

Remarks

The **MaxRecords** property is used to limit the number of records returned from a data source. The default setting of this property is zero, which means that all requested records are returned.

The **MaxRecords** property is read/write when the **Recordset** is closed and read-only when it is open.

Mode Property (ADO)

The **Mode** property on a **Connection** object sets or returns the available permissions for modifying data on a **Connection**.

```
currentMode = connection.Mode
connection.Mode = newMode
```

Remarks

The **Mode** property is used to set or return the access permissions in use by the provider on the current connection. The **Mode** property can only be set when the **Connection** object is closed.

Several of the ActiveX® Data Objects (ADO) enumerated values for the mode settings imply that the using certain mode settings will prevent other applications from opening a connection to the file or table. Under the Microsoft® OLE DB provider for AS/400 and VSAM, these mode settings result in a file lock, but do not prevent other applications from opening a connection.

The value for the **Mode** can be one of the enumerated values for **ConnectModeEnum** as listed in the following table.

Enumeration	**Value**	**Description**
adModeUnknown	0	This value indicates that the permissions have not yet been set or cannot be determined.
adModeRead	1	This value indicates read-only permissions.
adModeWrite	2	This value indicates write-only permissions. This value is not supported by the OLE DB provider for AS/400 and VSAM.
adModeReadWrite	3	This value indicates read/write permissions.
adModeShareDenyRead	4	This value prevents others from opening a connection with read permissions.
adModeShareDenyWrite	8	This value prevents others from opening a connection with write permissions. Under the OLE DB provider for AS/400 and VSAM, this mode setting is implemented as a file lock and does not result in excluding other applications from opening a connection. Other applications opening a connection will not receive an error, but the table or file will be locked preventing any changes from other applications.
adModeShareExclusive	0xc	This value prevents others from opening a connection. Under the OLE DB provider for AS/400 and VSAM, this mode setting is implemented as a file lock and does not result in excluding other applications from opening a connection. Other applications opening a connection will not receive an error, but the table or file will be locked preventing any changes from other applications.
adModeShareDenyNone	0x10	This value prevents others from opening a connection with any permissions. Under the OLE DB provider for AS/400 and VSAM this mode setting is implemented as a file lock and does not result in excluding other applications from opening a connection. Other applications opening a connection will not receive an error, but the table or file will be locked preventing any changes from other applications.

The **Mode** property defaults to **adModeUnknown**.

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Move Method (ADO)

The **Move** method on a **Recordset** object moves the position of the current record in a **Recordset** object.

```
recordset.Move NumRecords, Start
```

Parameters

NumRecords
This parameter specifies a signed Long expression specifying the number of records the current record position moves.

Start
This optional parameter specifies the starting location for the record from which the **Move** operation should begin, which can be a bookmark or an enumeration indicating the current, first, or last record in a **Recordset** object.

This argument is a Variant and can be either a bookmark or one of the enumerated values for **BookmarkEnum** as listed in the following table.

Enumeration	Value	Description
adBookmarkCurrent	0	The current record
adBookmarkFirst	1	The first record
adBookmarkLast	2	The last record

This optional argument defaults to **adBookmarkCurrent**.

Return Values

None.

Remarks

The **Move** method is supported on all **Recordset** objects.

If the *NumRecords* parameter is greater than zero, the current record position moves forward (toward the end of the recordset). If *NumRecords* is less than zero, the current record position moves backward (toward the beginning of the recordset).

If the **Move** method would move the current record position to a point before the first record, ActiveX® Data Objects (ADO) sets the current record to the position before the first record in the recordset (the **BOF** property is set to **True**). An attempt to move backward when the **BOF** property is already **True** generates an error.

If the **Move** call would move the current record position to a point after the last record, ADO sets the current record to the position after the last record in the recordset (the **EOF** property is set to **True**). An attempt to move forward when the **EOF** property is already **True** generates an error.

Invoking the **Move** method from an empty **Recordset** object generates an error.

If the *Start* parameter is specified, the move is relative to the record with this bookmark assuming the **Recordset** object supports bookmarks. If not specified, the move is relative to the current record.

If the **CacheSize** property is set to greater than 1 to locally cache records from the provider, passing a *NumRecords* value that moves the current record position outside of the current group of cached records forces ADO to retrieve a new group of records starting from the destination record. The **CacheSize** property determines the size of the newly retrieved group, and the destination record is the first record retrieved.

If the **Recordset** object is forward-only, a user can still pass a *NumRecords* value less than zero as long as the destination is within the current set of cached records. If the **Move** method call would move the current record position to a record before the first cached record, an error occurs. Thus, you can use a record cache that supports full scrolling over a provider that only supports forward scrolling. Because cached records are loaded into memory, you should avoid caching more records than necessary. Even if a forward-only **Recordset** object supports backward moves in this way, calling the **MovePrevious** method on any forward-only **Recordset** object still generates an error.

MoveFirst Method (ADO)

The **MoveFirst** method on a **Recordset** object moves to the first record in a specified **Recordset** object and makes that record current.

```
recordset.MoveFirst
```

Parameters

None.

Remarks

The **MoveFirst** method is used to move the current record position to the first record in the recordset. The **MoveFirst** method can be invoked on a forward-only **Recordset** object; but doing so may cause the provider to re-execute the command that generated the **Recordset** object.

MoveLast Method (ADO)

The **MoveLast** method on a **Recordset** object moves to the last record in a specified **Recordset** object and makes that record current.

```
recordset.MoveLast
```

Parameters

None.

Remarks

The **MoveLast** method is used to move the current record position to the last record in the recordset.

When using a server-side cursor, the **Recordset** object must support bookmarks or backward cursor movement; otherwise, the **MoveLast** method call generates an error.

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MoveNext Method (ADO)

The **MoveNext** method on a **Recordset** object moves to the next record in a specified **Recordset** object and makes that record current.

```
recordset.MoveLast
```

Parameters

None.

Remarks

The **MoveNext** method is used to move the current record position one record forward (toward the bottom of the recordset). If the last record is the current record and the **MoveNext** method is invoked, ActiveX® Data Objects (ADO) sets the current record to the position after the last record in the recordset (the **EOF** property is set to **True**). An attempt to move forward when the **EOF** property is already **True** generates an error.

MovePrevious Method (ADO)

The **MovePrevious** method on a **Recordset** object moves to the previous record in a specified **Recordset** object and makes that record current.

```
recordset.MovePrevious
```

Parameters

None.

Remarks

The **MovePrevious** method is used to move the current record position one record backward (toward the top of the recordset).

When using a server-side cursor, if the **Recordset** object does not support either bookmarks or backward cursor movement, the **MovePrevious** method generates an error.

If the first record is the current record and the **MovePrevious** method is invoked, ADO sets the current record to the position before the first record in the recordset (the **BOF** property is set to **True**). An attempt to move backward when the **BOF** property is already **True** generates an error.

Note that if a **MovePrevious** method is invoked after **Delete** method is invoked, this moves the current record back two records instead of one.

Name Property (ADO)

The **Name** property on a **Command** object sets or returns a string value indicating the name of the object. The **Name** property on a **Field** or **Property** returns a string value indicating the name of the object.

```
currentName = command.Name
command.Name = newName
```

Remarks

The **Name** property is used to assign a name to or retrieve the name of a **Command**, **Field**, or **Property** object. This value is read/write on a **Command** object and read-only on a **Property** or **Field** object. Note that the **Name** property on a **Command** object cannot be assigned (set) using the OLE DB Provider for AS/400 and VSAM.

The **Name** property of an object can be retrieved by an ordinal reference, after which you can refer to the object directly by name. For example, if **recordset.Properties(20).Name** yields updatability, you can subsequently refer to this property as **recordset.Properties("Updatability")**.

NativeError Property (ADO)

The **NativeError** property on an **Error** object indicates the provider-specific error code for a given **Error** object. This property returns a Long value that indicates the error code.

```
errorCode = currentError.NativeError
```

Remarks

The **NativeError** property on an **Error** object is used to retrieve the database-specific error information for a particular **Error** object. For example, when using the Microsoft® OLE DB Provider for DB2, native error codes that originate from the OLE DB Provider for DB2 pass through ActiveX® Data Objects (ADO) to the ADO **NativeError** property.

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Number Property (ADO)

The **Number** property on an **Error** object indicates the number that uniquely identifies an **Error** object. This property returns a Long value that may correspond to one of the **ErrorValueEnum** constants.

```
errorNumber = currentError.Number
```

Remarks

The **Number** property on an **Error** object is used to determine which error occurred. The value of the property is a unique number that corresponds to the error condition.

The **Errors** collection returns an HRESULT. These HRESULTs can be raised by underlying components, such as OLE DB or even OLE itself.

The value for the **Number** property on the **Error** object representing an ADO error (not an OLE DB error) can be one of the following enumerated values for **ErrorValueEnum** listed in the table below. Note that three forms of the error number value are listed in the table:

- Positive decimal—The lower two bytes of the full number in decimal format. This number is displayed in the default Microsoft® Visual Basic® error message dialog box. For example, **Run-time error '3707'**.
- Negative decimal—The decimal translation of the full error number.
- Hexadecimal—The hexadecimal representation of the full error number. The Windows facility code is the lowest hexadecimal fourth digit in the upper two bytes of the number. The facility code for ADO error numbers is *A*. For example: 0x800**A**0E7B.

Note that OLE DB errors may be passed to an ADO application. Typically, these OLE DB errors can be identified by a Windows® facility code of *4*. For example, 0x800**4**xxxx. For more information about the possible error numbers returned by OLE DB, see Chapter 16 of the *OLE DB Programmer's Reference*.

Enumeration	Value	Description
adErrBoundToCommand	3707 -2146824581 0x800A0E7B	The application cannot change the **ActiveConnection** property of a **Recordset** object that has a **Command** object as its source.
adErrCannotComplete	3732 -2146824556 0x800A0E94	The server cannot complete the operation.
adErrCantChangeConnection	3748 -2146824540 0x800A0EA4	The connection was denied. The new connection requested has different characteristics than the one already in use.
adErrCantChangeProvider	3220 -2146825068 0X800A0C94	The supplied provider is different from the one already in use.
adErrCantConvertvalue	3724 -2146824564 0x800A0E8C	The data value cannot be converted for reasons other than sign mismatch or data overflow. For example, conversion would have truncated data.
adErrCantCreate	3725 -2146824563 0x800A0E8D	The data value cannot be set or retrieved because the field data type was unknown, or the provider had insufficient resources to perform the operation.

adErrCatalogNotSet	3747 -2146824541 0x800A0EA3	The operation requires a valid **ParentCatalog**.
adErrColumnNotOnThisRow	3726 -2146824562 0x800A0E8E	The record does not contain this field.
adErrDataConversion	3421 -2146824867 0x800A0D5D	The application uses a value of the wrong type for the current operation.
adErrDataOverflow	3721 -2146824567 0x800A0E89	The data value is too large to be represented by the field data type.
adErrDelResOutOfScope	3738 -2146824550 0x800A0E9A	The URL of the object to be deleted is outside the scope of the current record.
adErrDenyNotSupported	3750 -2146824538 0x800A0EA6	The provider does not support sharing restrictions.
adErrDenyTypeNotSupported	3751 -2146824537 0x800A0EA7	The provider does not support the requested kind of sharing restriction.
adErrFeatureNotAvailable	3251 -2146825037 0x800A0CB3	The object or provider is not capable of performing requested operation.
adErrFieldsUpdateFailed	3749 -2146824539 0x800A0EA5	The **Fields** update failed. For further information, examine the **Status** property of individual field objects.
adErrIllegalOperation	3219 -2146825069 0x800A0C93	The operation is not allowed in this context.
adErrIntegrityViolation	3719 -2146824569 0x800A0E87	The data value conflicts with the integrity constraints of the field.
adErrInTransaction	3246 -2146825042 0x800A0CAE	The **Connection** object cannot be explicitly closed while in a transaction.

adErrInvalidArgument	3001 -2146825287 0x800A0BB9	The arguments are of the wrong type, are out of acceptable range, or are in conflict with one another.
adErrInvalidConnection	3709 -2146824579 0x800A0E7D	The operation is not allowed on an object referencing a closed or invalid connection.
adErrInvalidParamInfo	3708 -2146824580 0x800A0E7C	The **Parameter** object is improperly defined. Inconsistent or incomplete information was provided.
adErrInvalidTransaction	3714 -2146824574 0x800A0E82	The coordinating transaction is invalid or has not started.
adErrInvalidURL	3729 -2146824559 0x800A0E91	The URL contains invalid characters. Make sure the URL is typed correctly.
adErrItemNotFound	3265 -2146825023 0x800A0CC1	The item cannot be found in the collection corresponding to the requested name or ordinal.
adErrNoCurrentRecord	3021 -2146825267 0x800A0BCD	Either the **BOF** or **EOF** property is True, or the current record has been deleted. The requested operation requires a current record.
adErrNotExecuting	3715 -2146824573 0x800A0E83	The operation cannot be performed while not executing.
adErrNotReentrant	3710 -2146824578 0x800A0E7E	The operation cannot be performed while processing event.
adErrObjectClosed	3704 -2146824584 0x800A0E78	The operation is not allowed when the object is closed.
adErrObjectInCollection	3367 -2146824921 0x800A0D27	The object is already in collection. Cannot append.
adErrObjectNotSet	3420 -2146824868 0x800A0D5C	The object is no longer valid.

adErrObjectOpen	3705 -2146824583 0x800A0E79	The operation is not allowed when the object is open.
adErrOpeningFile	3002 -2146825286 0x800A0BBA	The file could not be opened.
adErrOperationCancelled	3712 -2146824576 0x800A0E80	The operation has been cancelled by the user.
adErrOutOfSpace	3734 -2146824554 0x800A0E96	The operation cannot be performed. Provider cannot obtain enough storage space.
adErrPermissionDenied	3720 -2146824568 0x800A0E88	Insufficient permission prevents writing to the field.
adErrPropConflicting	3742 -2146824546 0x800A0E9E	Property value conflicts with a related property.
adErrPropInvalidColumn	3739 -2146824549 0x800A0E9B	Property cannot apply to the specified field.
adErrPropInvalidOption	3740 -2146824548 0x800A0E9C	Property attribute is invalid.
adErrPropInvalidValue	3741 -2146824547 0x800A0E9D	Property value is invalid. Make sure the value is typed correctly.
adErrPropNotAllSettable	3743 -2146824545 0x800A0E9F	Property is read-only or cannot be set.
adErrPropNotSet	3744 -2146824544 0x800A0EA0	Optional property value was not set.
adErrPropNotSettable	3745 -2146824543 0x800A0EA1	Read-only property value was not set.

adErrPropNotSupported	3746 -2146824542 0x800A0EA2	Provider does not support the property.
adErrProviderFailed	3000 -2146825288 0x800A0BB8	Provider failed to perform the requested operation.
adErrProviderNotFound	3706 -2146824582 0x800A0E7A	Provider cannot be found. It may not be properly installed.
adErrReadFile	3003 -2146825285 0x800A0BBB	File could not be read.
adErrResourceExists	3731 -2146824557 0x800A0E93	Copy operation cannot be performed. Object named by destination URL already exists. Specify **adCopyOverwrite** to replace the object.
adErrResourceLocked	3730 -2146824558 0x800A0E92	Object represented by the specified URL is locked by one or more other processes. Wait until the process has finished and attempt the operation again.
adErrResourceOutOfScope	3735 -2146824553 0x800A0E97	Source or destination URL is outside the scope of the current record.
adErrSchemaViolation	3722 -2146824566 0x800A0E8A	Data value conflicts with the data type or constraints of the field.
adErrSignMismatch	3723 -2146824565 0x800A0E8B	Conversion failed because the data value was signed and the field data type used by the provider was unsigned.
adErrStillConnecting	3713 -2146824575 0x800A0E81	Operation cannot be performed while connecting asynchronously.
adErrStillExecuting	3711 -2146824577 0x800A0E7F	Operation cannot be performed while executing asynchronously.
adErrTreePermissionDenied	3728 -2146824560 0x800A0E90	Permissions are insufficient to access tree or subtree.

adErrUnavailable	3736 -2146824552 0x800A0E98	Operation failed to complete and the status is unavailable. The field may be unavailable or the operation was not attempted.
adErrUnsafeOperation	3716 -2146824572 0x800A0E84	Safety settings on this computer prohibit accessing a data source on another domain.
adErrURLDoesNotExist	3727 -2146824561 0x800A0E8F	Either the source URL or the parent of the destination URL does not exist.
adErrURLNamedRowDoesNotExist	3737 -2146824551 0x800A0E99	Record named by this URL does not exist.
adErrVolumeNotFound	3733 -2146824555 0x800A0E95	Provider cannot locate the storage device indicated by the URL. Make sure the URL is typed correctly.
adErrWriteFile	3004 -2146825284 0x800A0BBC	Write to file failed.

NumericScale Property (ADO)

The **NumericScale** property on a **Field** object indicates the scale of Numeric values in a **Field** object. This property returns a byte value indicating the number of decimal places to which numeric values will be resolved.

```
scale = currentfield.NumericScale
```

Remarks

The **NumericScale** property is used to determine how many digits to the right of the decimal point will be used to represent values for a numeric **Field** object.

The byte value that the **NumericScale** property will return is dependent on the data type of the **Field** object. The value for the ActiveX® Data Objects (ADO) data type of the **Field** object can be one of the enumerated values for **DataTypeEnum** as listed in the following table.

Enumeration	Value	Description
adEmpty	0	This data type indicates that no value was specified (DBTYPE_EMPTY).
adSmallInt	2	This data type indicates a 2-byte (16-bit) signed integer (DBTYPE_I2).
adInteger	3	This data type indicates a 4-byte (32-bit) signed integer (DBTYPE_I4).
adSingle	4	This data type indicates a 4-byte (32-bit) single precision IEEE floating point number (DBTYPE_R4).
adDouble	5	This data type indicates an 8-byte (64-bit) double precision IEEE floating point number (DBTYPE_R8).
adCurrency	6	A data type indicates a currency value (DBTYPE_CY). Currency is a fixed-point number with 4 digits to the right of the decimal point. It is stored in an 8-byte signed integer scaled by 10,000. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adDate	7	This data type indicates a date value stored as a Double, the whole part of which is the number of days since December 30, 1899, and the fractional part of which is the fraction of a day. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBSTR	8	This data type indicates a null-terminated Unicode character string (DBTYPE_BSTR). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adIDispatch	9	This data type indicates a pointer to an IDispatch interface on an OLE object (DBTYPE_IDISPATCH). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adError	10	This data type indicates a 32-bit error code (DBTYPE_ERROR). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBoolean	11	This data type indicates a Boolean value (DBTYPE_BOOL). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adVariant	12	This data type indicates an automation variant (DBTYPE_VARIANT). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adIUnknown	13	This data type indicates a pointer to an IUnknown interface on an OLE object (DBTYPE_IUNKNOWN). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adDecimal	14	This data type indicates numeric data with a fixed precision and scale (DBTYPE_DECIMAL).
adTinyInt	16	This data type indicates a single-byte (8-bit) signed integer (DBTYPE_I1). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adUnsignedTinyInt	17	This data type indicates a single-byte (8-bit) unsigned integer (DBTYPE_UI1). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adUnsignedSmallInt	18	This data type indicates a 2-byte (16-bit) unsigned integer (DBTYPE_UI2). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.

adUnsignedInt	19	This data type indicates a 4-byte (32-bit) unsigned integer (DBTYPE_UI4). This data type is not supported by the OLE DB Provider or the OLE DB Provider for DB2.
adBigInt	20	This data type indicates an 8-byte (64-bit) signed integer (DBTYPE_I8). This data type is not supported by the OLE DB Provider for AS/400 and VSAM.
adUnsignedBigInt	21	This data type indicates an 8-byte (64-bit) unsigned integer (DBTYPE_UI8). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adGUID	72	This data type indicates a globally unique identifier or GUID (DBTYPE_GUID). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBinary	128	This data type indicates fixed-length binary data (DBTYPE_BYTES).
adChar	129	This data type indicates a character string value (DBTYPE_STR).
adWChar	130	This data type indicates a null-terminated Unicode character string (DBTYPE_WSTR). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adNumeric	131	This data type indicates numeric data where the precision and scale are exactly as specified (DBTYPE_NUMERIC).
adUserDefined	132	This data type indicates user-defined data (DBTYPE_UDT). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adDBDate	133	This data type indicates an OLE DB date structure (DBTYPE_DATE).
adDBTime	134	This data type indicates an OLE DB time structure (DBTYPE_TIME).
adDBTimeStamp	135	This data type indicates an OLE DB timestamp structure (DBTYPE_TIMESTAMP).
adVarChar	200	This data type indicates variable-length character data (DBTYPE_STR).
adLongVarChar	201	This data type indicates a long string value.
adVarWChar	202	This data type indicates a Unicode string value. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adLongVarWChar	203	This data type indicates a long Unicode string value. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adVarBinary	204	This data type indicates variable-length binary data (DBTYPE_BYTES).
adLongVarBinary	205	This data type indicates a long binary value.

Open Method on a Connection Object (ADO)

The **Open** method on a **Connection** object opens a connection to a data source.

```
connection.Open ConnectionString, UserID, Password
```

Parameters

ConnectionString
This optional parameter specifies a string containing connection information. See the **ConnectionString** property on a **Connection** object for details on valid settings.
UserID
This optional parameter specifies a string containing a user name to use when establishing the connection.
Password
This optional parameter specifies a string containing a password to use when establishing the connection.

Values used for the ConnectionString parameter

The information needed to establish a connection to a data source can be set in the **ConnectionString** property or passed as part of the **Open** method in the *ConnectionString* parameter. In either case, this information must be in a specific format for use with the Microsoft® OLE DB Provider for AS/400 and VSAM. This information can be a data source name (DSN) or a detailed connection string containing a series of *argument=value* statements separated by semicolons. ActiveX® Data Objects (ADO) supports several standard ADO-defined arguments for the **ConnectionString** property as listed in the following table.

Argument	**Description**
Data Source	This argument specifies the name of the data source for the connection. This argument is the Data Source name stored in the registry under the OLE DB Provider for AS/400 and VSAM.
File Name	This argument specifies the name of the provider-specific file containing preset connection information. This argument cannot be used if a *Provider* argument is passed. This argument is not supported by the OLE DB Provider for AS/400 and VSAM.
Location	This argument specifies the Remote Database Name used for connecting to OS/400 systems. This parameter is optional when connecting to mainframe systems.
Password	This argument specifies a valid mainframe or AS/400 password to use when opening the connection. This password is used to validate that the user can log on to the target host system and has appropriate access rights to the file.
Provider	This argument specifies the name of the provider to use for the connection. To use the OLE DB Provider for AS/400 and VSAM, the Provider string must be set to "SNAOLEDB". To use the Microsoft OLE DB Provider for DB2, the Provider string must be set to "DB2OLEDB". To use the Microsoft ODBC Driver for DB2, the Provider string must be set to "MSDASQL" or not used as part of the **ConnectionString** since this value is the default for ADO.
Remote Provider	This argument specifies the name of a provider to use when opening a client-side connection (for a Remote Data Service only). This argument is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
Remote Server	This argument specifies the path name of a server to use when opening a client-side connection (for a Remote Data Service only). This argument is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
User ID	This argument specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used to validate that the user can log on to the target host system and has appropriate access rights to the file.

The OLE DB Provider for AS/400 and VSAM also supports a number of provider-specific arguments, some of which have default values as specified in the table below. These arguments are listed in the following table.

Argument	**Description**

BinAsChar	This parameter indicates whether to process binary fields as character fields (default is 0; do not process binary fields as character fields).
CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If this argument is omitted, the default value is U.S./Canada (37).
Default Library	The default AS/400 library to be accessed. This parameter is not required for mainframe access and is optional when connecting to AS/400 files.
HCD FileName	The fully qualified filename of the DDM host column description (HCD) file. This parameter can be an UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the SNA System directory. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400.
Local LU	The name of the local LU alias configured in Host Integration Server.
ModeName	The APPC mode (must be set to a value that matches the host configuration and Host Integration Server configuration). Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes.
NetAddr	When TCP/IP has been selected for the Network Transport Library, this parameter indicates the IP address of the host.
NetPort	When TCP/IP has been selected for the Network Transport Library, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446.
NetLib	This parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA.
PCCodePage	The character code page to use on the PC. If this argument is omitted, the default value is set to Latin 1 (1252).
RDB	The remote database name for OS/400. You only need to specify this value if it is different from the remote LU alias configured in Host Integration Server.
Repair Host Keys	This parameter indicates whether the OLE DB provider should repair any host key values set in the registry and defaults to false.
RemoteLU	The name of the remote LU alias configured in the Host Integration server.
Strict Val	This parameter indicates whether strict validation should be used and defaults to false.

The OLE DB Provider for DB2 also supports a number of provider-specific arguments, some of which have default values as specified in the tables below. The arguments supported by OLE DB Provider for DB2 supplied with Host Integration Server 2004 differ from the arguments supported by the earlier OLE DB Provider for DB2 included with SNA Server 4.0.

The arguments supported by the OLE DB Provider for DB2 supplied with Host Integration Server 2004 are listed in the following table.

Argument	**Description**
BinAsChar	When this parameter is set to true, the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This parameter defaults to false.
CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If this argument is omitted, the default value is U.S./Canada (37).

DefSch	The name of the default schema (collection/owner) where the system catalogs resides. This parameter can be QSYS2;SYSIBM; SYSTEM; CURLIB; or USERID depending on platform. This parameter does not have a default value.
InitCat	This parameter is used as the first part of a 3-part fully qualified table name. In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. In DB2/400, this parameter is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then one can be created using the Add option. In DB2 Universal Database, this property is referred to as DATABASE. This parameter has no default value.
LocalLU	The name of the local LU alias configured in Host Integration Server.
ModeName	The APPC mode (must be set to a value that matches the host configuration and Host Integration Server configuration). Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes.
NetAddr	When TCP/IP has been selected for the Network Transport Library, this parameter indicates the IP address of the host.
NetPort	When TCP/IP has been selected for the Network Transport Library, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446.
NetLib	This parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA.
PCCodePage	The character code page to use on the PC. If this argument is omitted, the default value is set to Latin 1 (1252).
PkgCol	The name of the DRDA target collection (AS/400 library) where the Microsoft® OLE DB Provider for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft OLE DB Provider for DB2 uses packages to issue dynamic and static SQL statements. The OLE DB Provider will create packages dynamically in the location to which the user points using the Package Collection parameter.
RemoteLU	The name of the remote LU alias configured in Host Integration Server.
TPName	The Transaction Program (TP) Name parameter represents the default transaction program name for the DB2 DRDA application server (AS) which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, TPName is set to 0X07F9F9F9.

UOW	This parameter determines whether two-phase commit is enabled. The possible values for this parameter are DUW (distributed unit of work) or RUW (remote unit of work). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in the OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

Note Not all of these parameters are required. The user can also be prompted for this information.

The ODBC Driver for DB2 also supports a number of provider-specific arguments, some of which have default values as specified in the tables below. The arguments supported by ODBC Driver for DB2 supplied with Host Integration Server 2004 differ from the arguments supported by the earlier ODBC Driver for DB2 included with SNA Server 4.0.

The arguments supported by the ODBC Driver for DB2 supplied with Host Integration Server 2004 are listed in the following table.

Argument	**Description**
BAC	When the *BinAsChar* parameter is set to true (1), the ODBC Driver for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The CCSID and PCCodePage values are required input parameters.
CCSID	The character code set identifier (CCSID) matching the DB2 data as represented on the remote computer. The CCSID property is required when processing binary data as character data. Unless the BinAsChar value is set, character data is converted based on the DB2 column CCSID and default ANSI code page. If this argument is omitted, this parameter defaults to U.S./Canada (37).
CP	The character code page to use on the computer. This parameter is required when processing binary data as character data. Unless the Binary as Character (BAC) value is set, character data is converted based on the default ANSI code page configured in Windows®. If this argument is omitted, the default value is set to Latin 1 (1252).
DESC	A field to provide a comment describing this ODBC data source. The description is an optional parameter and may be left blank.
DS	The Default Schema parameter is the name of the Collection where the ODBC Driver for DB2 looks for catalog information. The Default Schema is the "SCHEMA" name for the target collection of tables and views. The ODBC driver uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection (e.g., ODBC Catalog SQLTables). For DB2, the Default Schema is the target AUTHENTICATION (User ID or "owner"). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, then the ODBC driver uses the USER_ID provided at login. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. Obviously, this default is inappropriate in many cases, therefore it is essential that the Default Schema value in the data source be defined.
DSN	The data source name is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file which is stored in the Program Files\Common Files\ODBC\Data Sources directory.

LLU	When SNA is used for the network transport, this field is the name of the remote LU alias configured in Host Integration Server.
MN	When SNA is used for the Network Transport Library (NTL), the Mode Name field is the APPC mode and must be set to a value that matches the host configuration and Host Integration Server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bidirectional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This parameter normally defaults to QPCSUPP.
NA	When TCP/IP is used for the Network Transport Library (NTL), the Network Address parameter indicates the IP address or the hostname alias of the host DB2 server.
NP	When TCP/IP is used for the Network Transport Library (NTL), the Network Port parameter indicates the TCP/IP port used for communication with the target DB2 DRDA service. The default value is TCP/IP port 446.
NTL	The Network Transport Library parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA. If the default SNA is selected, then values for LLU, MN, and RLU are required. If TCP/IP is selected, then values for NetAddr and NetPort are required.
PC	The name of the DRDA target collection (AS/400 library) where the Microsoft ODBC Driver for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft ODBC Driver for DB2, which is implemented as an IBM DRDA application requester, uses packages to issue dynamic and static SQL statements. The ODBC driver will create packages dynamically in the location to which the user points using the Package Collection parameter.
PDS	The Provider Data Source is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file which is stored in the Program Files\Common Files\ODBC\Data Sources directory.
PROV	Specifies the name of the provider to use for the connection. To use the ODBC Driver for DB2, the Provider string must be set to "MSDASQL" or not used as part of the **ConnectionString** since this value is the default for ADO.
PWD	Specifies a valid mainframe or AS/400 password to use when opening the connection. This password is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. Note that this parameter is the same as the Parameter parameter.
RDB	The remote database name parameter is used as the first part of a three-part, fully qualified DB2 table name. This parameter is referred to by different names depending on the DB2 platform. In DB2 on MVS and OS/390, this parameter is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect on these platforms, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 installation manual. In DB2/400 on OS/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then a value can be created using the Add option. In DB2 Universal Database, this property is referred to as DATABASE.
RLU	When SNA is used for the network transport, this field is the name of the remote LU alias configured in Host Integration Server.
TPN	The Transaction Program (TP) Name parameter represents the default transaction program name for the DB2 DRDA application server (AS) which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, TPN is set to 0X07F9F9F9.

UID	Specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. This parameter is the same as the User ID parameter.
UOW	Determines whether two-phase commit is enabled. The possible values for this parameter are DUW (distributed unit of work) or RUW (remote unit of work). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in the OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

> **Note** Not all of these parameters are required. The user can also be prompted for this information.

Remarks

The **Open** method on a **Connection** object is used to open tables on a remote DDM server. Using the **Open** method on a **Connection** object establishes the physical connection to a data source. After this method successfully completes, the connection is live and other methods can be invoked on the **Connection** object to process results.

The optional *ConnectionString* parameter is used to specify a connection string containing a series of *argument=value* statements separated by semicolons. The **ConnectionString** property on a **Connection** object automatically inherits the value used for the *ConnectionString* parameter. Therefore, the **ConnectionString** property of the **Connection** object can be set before opening the **Connection** object, or the *ConnectionString* parameter can be used to set or override the current connection parameters during the **Open** method call.

If user and password information is set in both the *ConnectionString* parameter and in the optional *UserID* and *Password* parameters, the results may be unpredictable. Such information should only be passed in either the *ConnectionString* parameter or the *UserID* and *Password* parameters.

There are a number of different ways to open a connection. The **Open** method can pass all of the appropriate connection information as part of the *ConnectionString* parameter or by setting the **ConnectionString** property of the **Connection** object, if this information is known in advance. The syntax in this case using the *ConnectionString* parameter for use with the OLE DB Provider for AS/400 and VSAM is as follows:

```
connection = CreateObject("ADODB.Connection.2.0")
connection.Open "Provider=SNAOLEDB;Data Source=REMLU;User ID=USERNAME;Password=password;Local
LU=LOCAL;Remote LU=DATABASE;ModeName=QPCSUPP;CCSID=37;CodePage=437"
```

Note that not all of these parameters are required. The registry settings for the Data Source usually have default values set for remote LU, local LU, APPC mode, CCSID, and CodePage. If a data source is specified, this other information is not usually needed. These registry settings are configured by using the Microsoft Management Console snap-in for the OLE DB Provider for AS/400 and VSAM.

The simplest form of an **Open** command that contains all necessary information is as follows:

```
connection = CreateObject("ADODB.Connection.2.0")
connection.Open "Provider=SNAOLEDB;Data Source=REMLU;User ID=USERNAME;Password=password"
```

> **Note** The Data Source, User ID and Password must be included.

In the case where you would like the user to input the connection information, the following syntax can be used. This syntax does not specify any connection information except the provider, which is always required unless this is set in the **ConnectionString** or **Provider** property of the **Connection** object:

```
connection = CreateObject("ADODB.Connection.2.0")
connection.ConnectionString = "Provider=SNAOLEDB"
connection.Open
```

This method of invoking the **Open** method automatically causes a dialog box to appear asking the user for the data source, user name, and password.

When operations have been concluded over an open **Connection** object, the **Close** method should be invoked on the

Connection object to free any associated system resources. Closing a **Connection** object does not remove it from memory; you may change its property settings and use the **Open** method to open it again later. To completely eliminate an object from memory, set the **Connection** object variable to **Nothing**.

If errors occur, these can be examined with the **Errors** collection on the **Connection** object.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Open Method on a Recordset Object (ADO)

The **Open** method on a **Recordset** object opens a cursor that represents records from a base table or the results of a query.

```
recordset.Open Source, ActiveConnection, CursorType, LockType,
Options
```

Parameters

Source
This optional parameter specifies a Variant that evaluates to a valid **Command** object variable name or a valid string specifying the command text specific to the Microsoft® OLE DB Provider for AS/400 and VSAM to open a data file on the host.

ActiveConnection
This optional parameter specifies either a Variant that evaluates to a valid **Connection** object variable name or a String containing connection information equivalent to the **ConnectionString** property of a **Connection** object. Possible values are listed at the end of the **Parameters** section.

CursorType
This optional parameter specifies a **CursorTypeEnum** value that determines the type of cursor that the provider should use when opening the **Recordset**. See the CursorType Property of a **Recordset** object for more information. Possible values are listed at the end of the **Parameters** section.

LockType
This optional parameter specifies a **LockTypeEnum** value that determines what type of locking (concurrency) the provider should use when opening the recordset. See the LockType Property of a **Recordset** object for more information. Possible values are listed at the end of the **Parameters** section.

Options
This optional parameter specifies a Long value representing a **CommandTypeEnum** value that indicates how the provider should evaluate the *Source* parameter.

Values used for the ActiveConnection property

The information needed to establish a connection to a data source can be set in the **ActiveConnection** property of a **Recordset** object or passed as part of the **Open** method on a **Recordset** object in the *ActiveConnection* parameter. In either case, this information must be in a specific format for use with the OLE DB Provider for AS/400 and VSAM. This information can be a data source name (DSN) or a detailed connection string containing a series of *argument=value* statements separated by semicolons. ActiveX® Data Objects (ADO) supports several standard ADO-defined arguments for the **ActiveConnection** property as listed in the following table.

Argument	Description
Data Source	This argument specifies the name of the data source for the connection. This argument is the optional when used with OLE DB Provider for AS/400 and VSAM or the Microsoft OLE Provider for DB2.
File Name	This argument specifies the name of the provider-specific file containing preset connection information. This argument cannot be used if a *Provider* argument is passed. This argument is not supported by the OLE DB Provider for AS/400 and VSAM.
Location	This argument specifies the Remote Database Name used for connecting to OS/400 systems. This parameter is optional when connecting to mainframe systems.
Password	This argument specifies a valid mainframe or AS/400 password to use when opening the connection. This password is used by Host Integration Server 2004 to validate that the user can log on to the target host system and has appropriate access rights to the file.
Provider	This argument specifies the name of the provider to use for the connection. To use the OLE DB Provider for AS/400 and VSAM, the Provider string must be set to "SNAOLEDB". To use the OLE DB Provider for DB2, the Provider string must be set to "DB2OLEDB". To use the ODBC Driver for DB2, the Provider string must be set to "MSDASQL" or not used as part of the ConnectionString since this value is the default for ADO.
Remote Provider	This argument specifies the name of a provider to use when opening a client-side connection (for a Remote Data Service only). This argument is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.

Remote Server	This argument specifies the path name of a server to use when opening a client-side connection (for a Remote Data Service only). This argument is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
User ID	This argument specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used by Host Integration Server 2004 to validate that the user can log on to the target host system and has appropriate access rights to the file.

The OLE DB Provider for AS/400 and VSAM also supports a number of provider-specific arguments, some of which have default values as specified in the table below. These arguments are as listed in the following table.

Argument	**Description**
BinAsChar	This parameter indicates whether to process binary fields as character fields (default is 0; do not process binary fields as character fields).
CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If this argument is omitted, the default value is U.S./Canada (37).
Default Library	The default AS/400 library to be accessed. This parameter is not required for mainframe access and is optional when connecting to AS/400 files.
HCD FileName	The fully qualified file name of the DDM host column description (HCD) file. This parameter can be an UNC string up to 256 characters in length. A path does not need to be included in the name if the HCD file is located in the SNA system directory. This parameter is required when connecting to mainframe systems and is optional when connecting to OS/400.
Local LU	The name of the local LU alias configured in the SNA server.
ModeName	The APPC mode (must be set to a value that matches the host configuration and SNA server configuration). Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes.
NetAddr	When TCP/IP has been selected for the Network Transport Library, this parameter indicates the IP address of the host.
NetPort	When TCP/IP has been selected for the Network Transport Library, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446.
NetLib	This parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA.
PCCodePage	The character code page to use on the computer. If this argument is omitted, the default value is set to Latin 1 (1252).
RDB	The remote database name for OS/400. You only need to specify this value if it is different from the remote LU alias configured in the SNA server.
Repair Host Keys	This parameter indicates whether the OLE DB provider should repair any host key values set in the registry and defaults to false.
RemoteLU	The name of the remote LU alias configured in the SNA server.
Strict Val	This parameter indicates whether strict validation should be used and defaults to false.

Note Not all of these parameters are required. The user can also be prompted for this information.

The OLE DB Provider for DB2 also supports a number of provider-specific arguments, some of which have default values as specified in the tables below. The arguments supported by OLE DB Provider for DB2 supplied with Host Integration Server 2004 differ from the arguments supported by the earlier OLE DB Provider for DB2 included with SNA Server 4.0.

The arguments supported by the OLE DB Provider for DB2 supplied with Host Integration Server 2004 are listed in the following table.

Argument	Description
BinAsChar	When this parameter is set to true, the OLE DB Provider for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The Host CCSID and PC Code Page values are required input and output parameters. This parameter defaults to false.
CCSID	The Code Character Set Identifier (CCSID) attribute indicates the character set used on the host. If this argument is omitted, the default value is U.S./Canada (37).
DefSch	The name of the default schema (collection/owner) where the system catalogs resides. This parameter can be QSYS2;SYSIBM; SYSTEM; CURLIB; or USERID depending on platform. This parameter does not have a default value.
InitCat	This parameter is used as the first part of a 3-part fully qualified table name. In DB2 (MVS, OS/390), this property is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. In DB2/400, this parameter is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then one can be created using the Add option. In DB2 Universal Database, this property is referred to as DATABASE. This parameter has no default value.
LocalLU	The name of the local LU alias configured in Host Integration Server.
ModeName	The APPC mode (must be set to a value that matches the host configuration and Host Integration Server configuration). Legal values for the APPC mode include QPCSUPP (5250), #NTER (interactive), #NTERSC (interactive), #BATCH (batch), #BATCHSC (batch), and custom modes.
NetAddr	When TCP/IP has been selected for the Network Transport Library, this parameter indicates the IP address of the host.
NetPort	When TCP/IP has been selected for the Network Transport Library, this parameter is the TCP/IP port used for communication with the source. The default value is TCP/IP port 446.
NetLib	This parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA.
PCCodePage	The character code page to use on the PC. If this argument is omitted, the default value is set to Latin 1 (1252).
PkgCol	The name of the DRDA target collection (AS/400 library) where the Microsoft OLE DB Provider for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft OLE DB Provider for DB2 uses packages to issue dynamic and static SQL statements. The OLE DB Provider will create packages dynamically in the location to which the user points using the Package Collection parameter.

RemoteLU	The name of the remote LU alias configured in Host Integration Server.
TPName	The Transaction Program (TP) Name parameter represents the default transaction program name for the DB2 DRDA application server (AS) which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, TPName is set to 0X07F9F9F9.
UOW	This parameter determines whether two-phase commit is enabled. The possible values for this parameter are DUW (distributed unit of work) or RUW (remote unit of work). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in the OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

Note Not all of these parameters are required. The user can also be prompted for this information.

The ODBC Driver for DB2 also supports a number of provider-specific arguments, some of which have default values as specified in the tables below. The arguments supported by ODBC Driver for DB2 supplied with Host Integration Server 2004 differ from the arguments supported by the earlier ODBC Driver for DB2 included with SNA Server 4.0.

The arguments supported by the ODBC Driver for DB2 supplied with Host Integration Server 2004 are listed in the following table.

Argument	**Description**
BAC	When the *BinAsChar* parameter is set to **true** (1), the ODBC Driver for DB2 treats binary data type fields (with a CCSID of 65535) as character data type fields on a per-data source basis. The **CCSID** and **PCCodePage** values are required input parameters.
CCSID	The character code set identifier (CCSID) matching the DB2 data as represented on the remote computer. The CCSID property is required when processing binary data as character data. Unless the **BinAsChar** value is set, character data is converted based on the DB2 column CCSID and default ANSI code page. If this argument is omitted, this parameter defaults to U.S./Canada (37).
CP	The character code page to use on the PC. This parameter is required when processing binary data as character data. Unless the Binary as Character (BAC) value is set, character data is converted based on the default ANSI code page configured in Windows. If this argument is omitted, the default value is set to Latin 1 (1252).
DESC	A field to provide a comment describing this ODBC data source. The description is an optional parameter and may be left blank.

DS	The Default Schema parameter is the name of the Collection where the ODBC Driver for DB2 looks for catalog information. The Default Schema is the "SCHEMA" name for the target collection of tables and views. The ODBC driver uses Default Schema to restrict results sets for popular operations, such as enumerating a list of tables in a target collection (for example, ODBC Catalog SQLTables). For DB2, the Default Schema is the target AUTHENTICATION (User ID or "owner"). For DB2/400, the Default Schema is the target COLLECTION name. For DB2 Universal Database (UDB), the Default Schema is the SCHEMA name. If the user does not provide a value for Default Schema, then the ODBC driver uses the USER_ID provided at logon. For DB2/400, the driver will use QSYS2 if there is no collection found matching the USER_ID value. Obviously, this default is inappropriate in many cases, therefore it is essential that the Default Schema value in the data source be defined.
DSN	The data source name is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file, which is stored in the Program Files\Common Files\ODBC\Data Sources directory.
LLU	When SNA is used for the network transport, this field is the name of the remote LU alias configured in Host Integration Server.
MN	When SNA is used for the Network Transport Library (NTL), the Mode Name field is the APPC mode and must be set to a value that matches the host configuration and Host Integration Server configuration. Legal values for the APPC mode include QPCSUPP (common system default often used by 5250), #INTER (interactive), #INTERSC (interactive with minimal routing security), #BATCH (batch), #BATCHSC (batch with minimal routing security), #IBMRDB (DB2 remote database access), and custom modes. The following modes that support bidirectional LZ89 compression are also legal: #INTERC (interactive with compression), INTERCS (interactive with compression and minimal routing security), BATCHC (batch with compression), and BATCHCS (batch with compression and minimal routing security). This parameter normally defaults to QPCSUPP.
NA	When TCP/IP is used for the Network Transport Library (NTL), the Network Address parameter indicates the IP address or the hostname alias of the host DB2 server.
NP	When TCP/IP is used for the Network Transport Library (NTL), the Network Port parameter indicates the TCP/IP port used for communication with the target DB2 DRDA service. The default value is TCP/IP port 446.
NTL	The Network Transport Library parameter determines whether TCP/IP or SNA APPC is used for network communication. The possible values for this parameter are TCPIP or SNA. This value defaults to SNA. If the default SNA is selected, then values for LLU, MN, and RLU are required. If TCP/IP is selected, then values for NetAddr and NetPort are required.
PC	The name of the DRDA target collection (AS/400 library) where the Microsoft ODBC Driver for DB2 should store and bind DB2 packages. This could be same as the Default Schema. The Microsoft ODBC Driver for DB2, which is implemented as an IBM DRDA application requester, uses packages to issue dynamic and static SQL statements. The ODBC driver will create packages dynamically in the location to which the user points using the Package Collection parameter.
PDS	The Provider Data Source is a required parameter that is used to define the data source. The ODBC driver manager uses this attribute value to load the correct ODBC data source configuration from the registry or from a file. For File data sources, this field is used to name the DSN file, which is stored in the Program Files\Common Files\ODBC\Data Sources directory.
PROV	Specifies the name of the provider to use for the connection. To use the ODBC Driver for DB2, the Provider string must be set to "MSDASQL" or not used as part of the **ConnectionString** since this value is the default for ADO.
PWD	Specifies a valid mainframe or AS/400 password to use when opening the connection. This password is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. Note that this parameter is the same as the Parameter parameter.

RDB	The remote database name parameter is used as the first part of a three-part, fully qualified DB2 table name. This parameter is referred to by different names depending on the DB2 platform. In DB2 on MVS and OS/390, this parameter is referred to as LOCATION. The SYSIBM.LOCATIONS table lists all the accessible locations. To find the location of the DB2 to which you need to connect on these platforms, ask the administrator to look in the TSO Clist DSNTINST under the DDF definitions. These definitions are provided in the DSNTIPR panel in the DB2 Installation manual. In DB2/400 on OS/400, this property is referred to as RDBNAM. The RDBNAM value can be determined by invoking the WRKRDBDIRE command from the console to the OS/400 system. If there is no RDBNAM value, then a value can be created using the **Add** option. In DB2 Universal Database, this property is referred to as DATABASE.
RLU	When SNA is used for the network transport, this field is the name of the remote LU alias configured in Host Integration Server.
TPN	The Transaction Program (TP) Name parameter represents the default transaction program name for the DB2 DRDA application server (AS) which is 07F6DB (DB2DRDA). However, some DB2 installations may be configured to use an alternate TP name. Host Integration Server 2004 uses the alternate TP name in the off-line demo configuration (DRDADEMO.UDL). In that case, TPN is set to 0X07F9F9F9.
UID	Specifies a valid mainframe or AS/400 user name to use when opening the connection. This user name is used to validate that the user can log on to the target DB2 host system and has appropriate access rights to the database. This parameter is the same as the User ID parameter.
UOW	Determines whether two-phase commit is enabled. The possible values for this parameter are DUW (distributed unit of work) or RUW (remote unit of work). This value defaults to RUW. When this parameter is set to RUW, two-phase commit is disabled. When this parameter is set to DUW, two-phase commit is enabled in the OLE DB Provider for DB2. Distributed transactions are handled using Microsoft Transaction Server, Microsoft Distributed Transaction Coordinator, and the SNA LU 6.2 Resync Service. This option works only with DB2 for OS/390 v5R1 or later. This option also requires that SNA (LU 6.2) service is selected as the network transport and Microsoft Transaction Server (MTS) is installed.

Note Not all of these parameters are required. The user can also be prompted for this information.

Values used for the CursorType parameter

This parameter can be one of the enumerated values for **CursorTypeEnum** as listed in the following table.

Enumeration	Value	Description
adOpenUnspecified	-1	This indicates an unspecified value for the *CursorType*. This value is not supported by the Microsoft OLE DB Provider for AS/400 and VSAM or the Microsoft OLE DB Provider for DB2.
adOpenForwardOnly	0	Specifying this value opens a forward-only-type cursor. This *CursorType* is identical to a static cursor, except that you can only scroll forward through records. This improves performance when only one pass through a **Recordset** is needed. This value is not supported by the Microsoft OLE DB Provider for AS/400 and VSAM.
adOpenKeyset	1	Specifying this value opens a keyset-type cursor. This *CursorType is* similar to a dynamic cursor with a few exceptions. Records that other users delete are inaccessible from your **Recordset**. Data changes to existing records by other users are still visible, but records added by other users are not visible (cannot be seen). This value is not supported by the OLE DB Provider for AS/400 and VSAM.
adOpenDynamic	2	Specifying this value opens a dynamic-type cursor. Additions, changes, and deletions by other users are visible, and all types of movement through the recordset are allowed, except for bookmarks if the provider does not support them. A dynamic cursor is the only *CursorType* supported by the OLE DB Provider for AS/400 and VSAM.

adOpenStatic	3	Specifying this value opens a static-type cursor. A static cursor provides a static copy of a set of records that can be used to find data or generate reports. Additions, changes, or deletions by other users are not visible with a static cursor. This value is not supported by the OLE DB Provider for AS/400 and VSAM.

This optional argument defaults to **adOpenForwardOnly**, a value that is mapped to **adOpenDynamic** by the OLE DB provider for AS/400 and VSAM.

Values used for the LockType parameter

This parameter can be one of the enumerated values for **LockTypeEnum** as listed in the following table.

Enumeration	**Value**	**Description**
adLockUnspecified	-1	Indicates an unspecified value for the *LockType*. This value is not supported by the OLE DB Provider for AS/400 and VSAM.
adLockReadOnly	1	Specifying this value opens a **Recordset** object read-only and data cannot be altered.
adLockPessimistic	2	Specifying this value opens a recordset with pessimistic locking. Record-by-record, the OLE DB Provider does whatever is necessary to ensure successful editing of the records, usually by locking records at the data source immediately upon editing. This lock type is supported by the OLE DB Provider for AS/400 and VSAM and the OLE DB Provider. However, the OLE DB Provider for AS/400 and VSAM internally maps this lock type to **adLockBatchOptimistic**.
adLockOptimistic	3	Specifying this value opens a recordset with optimistic locking. Record-by-record, the OLE DB Provider locks records only when the **Update** method is invoked on a **Recordset** object. This lock type is not supported by the OLE DB Provider for DB2.
adLockBatchOptimistic	4	Specifying this value opens a **Recordset** with batch optimistic locking. This value is required for batch update mode as opposed to immediate update. This lock type is not supported by the OLE DB Provider for DB2.

This optional argument defaults to **adLockReadOnly**.

Values used by the Options property

The **CommandTypeEnum** value can be one of the constants listed in the following table.

Enumeration	**Value**	**Description**
adCmdUnspecified	-1	This value indicates that the **CommandText** property is unspecified. This value is not supported by the OLE DB Provider for AS/400 and VSAM.
adCmdText	1	This value evaluates the **CommandText** property as a textual definition of a command or stored procedure call.
adCmdTable	2	This value evaluates the **CommandText** property as a table name. This value is not supported by the OLE DB Provider for AS/400 and VSAM.
adCmdStoredProc	4	This value evaluates the **CommandText** property as a stored procedure name. This value is not supported by the OLE DB Provider for AS/400 and VSAM.
adCmdUnknown	8	This value indicates that the type of command in **CommandText** property is not known. This is the default value. This value is not supported by the OLE DB Provider for AS/400 and VSAM.

Remarks

The **Open** method on a **Recordset** object is used to open tables on a remote DDM server. Using the **Open** method on a **Recordset** object establishes the physical connection to a data source and opens a cursor that represents records from a base table or the results of a query. After this method successfully completes, the **Recordset** object is live and other methods can be invoked on the **Recordset** object to process results.

The optional *Source* parameter is used to specify the command text required to open a data file on the host using the OLE DB Provider for AS/400 and VSAM. The syntax in this case is as follows:

```
recordset = CreateObject("ADODB.Recordset.2.0")
recordset.Open "EXEC OPEN LIBRARY/FILE", connection, adOpenDynamic, adLockOptimistic, adCmdTe
xt
```

Using the OLE DB Provider for AS/400 and VSAM, the *Source* parameter represents a table name and uses one of the following host file naming conventions.

Host file type	File naming convention
VSAM Data Sets	DATASETNAME.FILENAME
Partitioned Data Sets	DATASETNAME.FILENAME(MEMBER)
OS/400 Files	LIBRARY/FILE
OS/400 Files	LIBRARY/FILE.NAME
OS/400 File Members	LIBRARY/FILE(MEMBER)
OS/400 File Members	LIBRARY/FILE.NAME(MEMBER)

Note that if a member of a library contains a dot in the member name, the member name must be surrounded by double quotes. For example, if the member name is NAMES.DAT, the proper syntax for command text used for the **Recordset.Open** method is:

```
recordset = CreateObject("ADODB.Recordset.2.0")
recordset.Open "EXEC OPEN LIBRARY/FILE(""NAMES.DAT"")", connection, adOpenDynamic, adLockOpti
mistic, adCmdText
```

Note the doubled quotes are required surrounding the member name in this example since the member name contains a period. The full path to the mainframe data set must be specified when using the OLE DB Provider for AS/400 and VSAM. In the example above, there are two path elements (LIBRARY/FILE) and one name element (NAMES.DAT).

Whenever a VSAM data set is allocated, it is given a unique name composed of one or more segments. Each segment of the data set name is joined by periods and represents a level of qualification. For example, the following data set has four segments that comprise the fully-qualified data set name (three path elements and one name element):

```
SAMPLES.DEMO.KSDS.TITLES
```

The high-level qualifier is SAMPLES. The low-level qualifier is TITLES. Each segment can be from 1-8 characters in length (the first character must be alphabetic, while the remainder can be alphanumeric or hyphens). The full data set name must be no more than 44 characters in length and contain no more than 22 segments.

The optional *ActiveConnection* parameter corresponds to the **ActiveConnection** property on a **Recordset** object and specifies on which connection to open the **Recordset** object. If a connection string definition is passed for this argument, ADO opens a new connection using the specified parameters. The value of this **ActiveConnection** property can be changed after opening the **Recordset** to send updates to another provider. The **ActiveConnection** property is set to **Nothing** (in Microsoft® Visual Basic®) to disconnect the recordset from the OLE DB Provider. If the optional *ActiveConnection* parameter is used to specify a connection string, this string must contain a series of *argument=value* statements separated by semicolons.

The **ActiveConnection** property on a **Recordset** object automatically inherits the value used for the *ActiveConnection* parameter. Therefore, the **ActiveConnection** property of the **Recordset** object can be set before opening the **Recordset** object, or the *ActiveConnection* parameter can be used to set or override the current connection parameters during the **Open** method call.

The *CursorType* parameter cannot be omitted using the OLE DB Provider for AS/400 and VSAM since this parameter defaults to **adOpenForwardOnly**, a *CursorType* that is not supported on the OLE DB Provider. The *CursorType* parameter must be set to **adOpenDynamic**, otherwise an error will occur and results will be unpredictable.

There are a number of different ways to open a recordset and connect to a data source. The **Open** method of the **Recordset** object can pass all of the appropriate connection information as part of the *ActiveConnection* parameter or by setting the **ActiveConnection** property of the **Recordset** object, if this information is known in advance. The syntax, in this case using the *ActiveConnection* parameter and the OLE DB Provider for AS/400 and VSAM, is as follows:

```
recordset = CreateObject("ADODB.Recordset.2.0")
recordset.Open "EXEC OPEN LIBRARY/FILE","Provider=SNAOLEDB;Data Source=REMLU;User ID=USERNAME
;Password=password;Local LU=LOCAL;Remote LU=DATABASE;ModeName=QPCSUPP;CCSID=37;CodePage=437",
adOpenDynamic, adLockOptimistic, adCmdText
```

> **Note** Not all of these parameters are required. The registry settings for the Data Source usually have default values set for remote LU, local LU, APPC mode, CCSID, and CodePage. If a data source is specified, this other information is not usually needed. These registry settings are configured by using the Microsoft Management Console snap-in for the OLE DB Provider for AS/400 and VSAM.

For the other parameters that correspond directly to the properties of a **Recordset** object (*Source*, *CursorType*, and *LockType*), the relationships of the parameters to the properties are:

- The property is read/write before the **Recordset** object is opened.
- The property settings are used unless the corresponding parameters are passed when executing the **Open** method. If a parameter is passed, it overrides the corresponding property setting, and the property setting is updated with the parameter value.
- After the **Recordset** object is opened, these properties become read-only.

> **Note** For **Recordset** objects whose **Source** property is set to a valid **Command** object, the **ActiveConnection** property is read-only, even if the **Recordset** object is not open.

If a **Command** object is passed in the *Source* parameter and an *ActiveConnection* parameter is also passed, an error occurs. The **ActiveConnection** property of the **Command** object must already be set to a valid **Connection** object or connection string.

If a **Command** object is not passed in the *Source* argument, the *Options* argument must be set to **adCmdText**. If the *Options* argument is not defined, you may experience diminished performance because ADO must make calls to the OLE DB Provider to determine if the argument is a command statement. If you know what *Source* type you are using, setting the *Options* argument instructs ADO to jump directly to the relevant code.

If the data source returns no records, the provider sets both the **BOF** and **EOF** properties on the **Recordset** object to **True**, and the current record position is undefined. You can still add new data to this empty **Recordset** object if the cursor type allows it.

When operations have been concluded over an open **Recordset** object, the **Close** method should be invoked on the **Recordset** object to free any associated system resources. Closing a **Recordset** object does not remove it from memory; you may change its property settings and use the **Open** method to open it again later. To completely eliminate an object from memory, set the **Recordset** object variable to **Nothing**.

If errors occur, these can be examined with the **Errors** collection on the **Recordset** object.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OpenSchema Method (ADO)

The **OpenSchema** method on a **Connection** object obtains database schema information from the provider.

```
recordset = connection.OpenSchema ( QueryType, Criteria, SchemaID )
```

Parameters

QueryType

This parameter specifies a **SchemaEnum** value that indicates the type of schema query to run.

The **SchemaEnum** values supported by the Microsoft® OLE DB Provider for AS/400 and VSAM can be one of the constants listed in the table following the Parameters section.

Criteria

This optional parameter specifies an array of query constraints for each *QueryType* option, as listed below.

The values supported by the OLE DB Provider for AS/400 and VSAM can be one of the constants listed in the table following the Parameters section. This value depends on the *QueryType*.

> **Note** The **adSchemaindexes** TYPE restriction is not supported by the OLE DB Provider for DB2.

> **Note** The **adSchemaProcedures** PROCEDURE_SCHEMA, and **adSchemaProcedureParameters** PROCEDURE_SCHEMA restrictions are not supported when connecting to DB/2 on OS/390 platforms.

SchemaID

This optional parameter specifies the GUID for a provider-schema schema query not defined by the OLE DB specification. This parameter is required if the *QueryType* parameter is set to **adSchemaProviderSpecific**; otherwise, it is not used. This parameter is not supported by the OLE DB Provider for AS/400 and VSAM.

Values for QueryType

Enumeration	Value	Description
adSchemaColumns	4	This value indicates that the *QueryType* is requesting column information for tables on the server (not supported when connecting to mainframes).
adSchemaIndexes	12	This value indicates that the *QueryType* is requesting index information about the tables on the server (not supported when connecting to mainframes).
adSchemaTables	20	This value indicates that the *QueryType* is requesting information about the tables on the server.
adSchemaProviderTypes	22	This value indicates that the *QueryType* is requesting provider-type information.

The **SchemaEnum** values supported by the Microsoft OLE DB Provider for DB2 and the Microsoft ODBC Driver for DB2 can be one of the constants listed in the following table.

Enumeration	Value	Description
adSchemaColumns	4	This value indicates that the *QueryType* is requesting column information for tables on the server (not supported when connecting to mainframes).
adSchemaIndexes	12	This value indicates that the *QueryType* is requesting index information about the tables on the server (not supported when connecting to mainframes).
adSchemaProcedures	16	This value indicates that the *QueryType* is requesting information about stored procedures on the server.
adSchemaTables	20	This value indicates that the *QueryType* is requesting information about the tables on the server.
adSchemaProviderTypes	22	This value indicates that the *QueryType* is requesting provider-type information.
adSchemaProcedureParameters	26	This value indicates that the *QueryType* is requesting information about parameters used by stored procedures on the server.
adSchemaPrimaryKeys	28	This value indicates that the *QueryType* is requesting information about the primary keys for tables on the server.

Values for *Criteria*

QueryType / Enumeration

adSchemaColumns
TABLE_CATALOG
TABLE_SCHEMA
TABLE_NAME
COLUMN_NAME
adSchemaIndexes
TABLE_CATALOG
TABLE_SCHEMA
INDEX_NAME
TYPE
TABLE_NAME
adSchemaTables
TABLE_CATALOG
TABLE_SCHEMA
TABLE_NAME
TABLE_TYPE
adSchemaProviderTypes
DATA_TYPE
BEST_MATCH

The values supported by the OLE DB Provider for DB2 and the ODBC Driver for DB2 can be one of the constants listed in the following table, depending on the *QueryType*.

QueryType / Enumeration
adSchemaColumns
TABLE_CATALOG
TABLE_SCHEMA
TABLE_NAME
COLUMN_NAME
adSchemaIndexes
TABLE_CATALOG
TABLE_SCHEMA
INDEX_NAME
TABLE_NAME
adSchemaPrimaryKeys
TABLE_CATALOG
TABLE_SCHEMA
TABLE_NAME
adSchemaProcedures
PROCEDURE_CATALOG
PROCEDURE_SCHEMA (see Notes)
PROCEDURE_NAME
PROCEDURE_TYPE
adSchemaProcedureParameters
PROCEDURE_CATALOG
PROCEDURE_SCHEMA (see Notes)
PROCEDURE_NAME
PROCEDURE_TYPE
adSchemaProviderTypes
DATA_TYPE
BEST_MATCH
adSchemaTables
TABLE_CATALOG
TABLE_SCHEMA
TABLE_NAME

TABLE_TYPE

Return Values

Returns a **Recordset** object that contains schema information requested.

Remarks

The **OpenSchema** method on a **Connection** object is used to return information about the data source, such as information about the tables on the server and the columns in the tables.

The *Criteria* argument is an array of values that can be used to limit the results of a schema query. Each schema query supports a different set of parameters. The actual schemas are defined by the OLE DB specification under the **IDBSchemaRowset** interface. The schema queries supported in ActiveX® Data Objects (ADO) version 1.5 and later by the OLE DB Provider for AS/400 and VSAM are listed above.

The **OpenSchema** method allows an application to pass at run time the target library of a Partitioned Data Set (PDS/PDSE), a dataset, or a member name as one of the *Criteria* array arguments to retrieve the schema.

Providers are not required to support all of the OLE DB standard schema *QueryType* values. Specifically, only **adSchemaTables**, **adSchemaColumns**, and **adSchemaProviderTypes** are required by the OLE DB specification. However, the provider is not required to support the *Criteria* constraints listed above for those schema queries. Support for other schema *QueryType* values is optional.

The schema information specified in OLE DB is based on the assumption that providers support the concepts of a catalog and a schema. The ANSI SQL 92 specification defines them as follows:

- A catalog contains one or more schemas, but always contains a schema named INFORMATION_SCHEMA which contains the views and domains of the information schema. In Microsoft SQL Server™ and Microsoft Access terms, a catalog is a database; in ODBC 2.*x* terms, a catalog is a qualifier.
- A schema is a collection of database objects that are owned or have been created by a particular user. In Microsoft SQL Server and ODBC 2.*x* terms, a schema is an owner; there is no equivalent to a schema in a Microsoft Access database.

Schema information in ADO and OLE DB is retrieved using predefined schema rowsets.

This section contains:

- adSchemaColumns
- adSchemaIndexes
- adSchemaPrimaryKeys
- adSchemaProcedures
- adSchemaProcedureParameters
- adSchemaProviderTypes
- adSchemaTables

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adSchemaColumns

The **adSchemaColumns** *QueryType* identifies the columns of tables defined in the catalog that are accessible to a given user. This *QueryType* is supported by the Microsoft OLE DB Provider for AS/400 and VSAM and the Microsoft OLE DB Provider for DB2.

The rowset returned by an **adSchemaColumns** *QueryType* contains the columns listed in the following table.

Column name	**Type indicator**	**Description**
TABLE_CATALOG	DBTYPE_WSTR	Catalog name. NULL if the provider does not support catalogs.
TABLE_SCHEMA	DBTYPE_WSTR	Unqualified schema name. NULL if the provider does not support schemas.
TABLE_NAME	DBTYPE_WSTR	Table name.
COLUMN_NAME	DBTYPE_WSTR	The name of the column; this might not be unique. If this cannot be determined, a NULL is returned. This column, together with the COLUMN_GUID and COLUMN_PROPID columns, forms the column ID. One or more of these columns will be NULL depending on which elements of the DBID structure the provider uses. If possible, the resulting column ID should be persistent. However, some providers do not support persistent identifiers for columns. The column ID of a base table should be invariant under views.
COLUMN_GUID	DBTYPE_GUID	Column GUID.
COLUMN_PROPID	DBTYPE_UI4	Column property ID.
ORDINAL_POSITION	DBTYPE_UI4	The ordinal of the column. Columns are numbered starting from one. NULL if there is no stable ordinal value for the column.
COLUMN_HASDEFAULT	DBTYPE_BOOL	VARIANT_TRUE: The column has a default value. VARIANT_FALSE: The column does not have a default value or it is unknown whether the column has a default value.

COLUMN_DEFAULT	DBTYPE_WSTR	Default value of the column. A provider may expose DBCOLUMN_DEFAULTVALUE but not DBCOLUMN_HASDEFAULT (for SQL 92 tables) in the rowset returned by **IColumnsRowset::GetColumnsRowset**. If the default value is the NULL value, COLUMN_HASDEFAULT is VARIANT_TRUE, and the COLUMN_DEFAULT column is a NULL value.
COLUMN_FLAGS	DBTYPE_UI4	A bitmask that describes column characteristics. The DBCOLUMNFLAGS enumerated type specifies the bits in the bitmask. For information about DBCOLUMNFLAGS, see **IColumnsInfo::GetColumnInfo**. This column cannot contain a NULL value.
IS_NULLABLE	DBTYPE_BOOL	VARIANT_TRUE: The column might be nullable. VARIANT_FALSE: The column is known not to be nullable.
DATA_TYPE	DBTYPE_UI2	The indicator of the column's data type. If the data type of the column varies from row to row, this must be DBTYPE_VARIANT.
TYPE_GUID	DBTYPE_GUID	The GUID of the column's data type.
CHARACTER_MAXIMUM_LENGTH	DBTYPE_UI4	The maximum possible length of a value in the column. For character, binary, or bit columns, this is one of the following: The maximum length of the column in characters, bytes, or bits, respectively, if one is defined. For example, a CHAR(5) column in an SQL table has a maximum length of five (5). The maximum length of the data type in characters, bytes, or bits, respectively, if the column does not have a defined length. Zero (0) if neither the column nor the data type has a defined maximum length. NULL for all other types of columns.
CHARACTER_OCTET_LENGTH	DBTYPE_UI4	Maximum length in octets (bytes) of the column, if the type of the column is character or binary. A value of zero means the column has no maximum length. NULL for all other types of columns.
NUMERIC_PRECISION	DBTYPE_UI2	If the column's data type is numeric, this is the maximum precision of the column. The precision of columns with a data type of DBTYPE_DECIMAL or DBTYPE_NUMERIC depends on the definition of the column. If the column's data type is not numeric, this is NULL.
NUMERIC_SCALE	DBTYPE_I2	If column's type indicator is DBTYPE_DECIMAL or DBTYPE_NUMERIC, this is the number of digits to the right of the decimal point. Otherwise, this is NULL.
DATETIME_PRECISION	DBTYPE_UI4	Datetime precision (number of digits in the fractional seconds portion) of the column if the column is a datetime or interval type.

CHARACTER_SET_CATALOG	DBTYPE_WSTR	Catalog name in which the character set is defined. NULL if the provider does not support catalogs or different character sets.
CHARACTER_SET_SCHEMA	DBTYPE_WSTR	Unqualified schema name in which the character set is defined. NULL if the provider does not support schemas or different character sets.
CHARACTER_SET_NAME	DBTYPE_WSTR	Character set name. NULL if the provider does not support different character sets.
COLLATION_CATALOG	DBTYPE_WSTR	Catalog name in which the collation is defined. NULL if the provider does not support catalogs or different collations.
COLLATION_SCHEMA	DBTYPE_WSTR	Unqualified schema name in which the collation is defined. NULL if the provider does not support schemas or different collations.
COLLATION_NAME	DBTYPE_WSTR	Collation name. NULL if the provider does not support different collations.
DOMAIN_CATALOG	DBTYPE_WSTR	Catalog name in which the domain is defined. NULL if the provider does not support catalogs or domains.
DOMAIN_SCHEMA	DBTYPE_WSTR	Unqualified schema name in which the domain is defined. NULL if the provider does not support schemas or domains.
DOMAIN_NAME	DBTYPE_WSTR	Domain name. NULL if the provider does not support domains.
DESCRIPTION	DBTYPE_WSTR	Human-readable description of the column. For example, the description for a column named Name in the Employee table might be "Employee name."

The default sort order for the **adSchemaColumns** rowset is TABLE_CATALOG, TABLE_SCHEMA, and TABLE_NAME.

adSchemaIndexes

The **adSchemaIndexes** *QueryType* identifies the indexes defined in the catalog that are owned by a given user. This *QueryType* is supported by the Microsoft OLE DB Provider for AS/400 and VSAM and the Microsoft OLE DB Provider for DB2.

The rowset returned by an **adSchemaIndexes** *QueryType* contains the columns listed in the following table.

Column name	Type indicator	Description
TABLE_CATALOG	DBTYPE_WSTR	Catalog name. NULL if the provider does not support catalogs.
TABLE_SCHEMA	DBTYPE_WSTR	Unqualified schema name. NULL if the provider does not support schemas.
TABLE_NAME	DBTYPE_WSTR	Table name.
INDEX_CATALOG	DBTYPE_WSTR	Catalog name. NULL if the provider does not support catalogs.
INDEX_SCHEMA	DBTYPE_WSTR	Unqualified schema name. NULL if the provider does not support schemas.
INDEX_NAME	DBTYPE_WSTR	Index name.
PRIMARY_KEY	DBTYPE_BOOL	Whether the index represents the primary key on the table. NULL if this is not known.
UNIQUE	DBTYPE_BOOL	Whether index keys must be unique. One of the following: VARIANT_TRUE: The index keys must be unique. VARIANT_FALSE: Duplicate keys are allowed.
CLUSTERED	DBTYPE_BOOL	Whether an index is clustered. One of the following: VARIANT_TRUE: The leaf nodes of the index contain full rows, not bookmarks. This is a way to represent a table clustered by key value. VARIANT_FALSE: The leaf nodes of the index contain bookmarks of the base table rows whose key value matches the key value of the index entry.
TYPE	DBTYPE_UI2	The type of the index. One of the following: DBPROPVAL_IT_BTREE: The index is a B+-tree. DBPROPVAL_IT_HASH: The index is a hash file using, for example, linear or extensible hashing. DBPROPVAL_IT_CONTENT: The index is a content index. DBPROPVAL_IT_OTHER: The index is some other type of index.
FILL_FACTOR	DBTYPE_I4	For a B+-tree index, this property represents the storage utilization factor of page nodes during the creation of the index. The value is an integer from 1 to 100 representing the percentage of use of an index node. For a linear hash index, this property represents the storage utilization of the entire hash structure (the ratio of used area to total allocated area) before a file structure expansion occurs.

INITIAL_SIZE	DBTYPE_I4	The total amount of bytes allocated to this structure at creation time.
NULLS	DBTYPE_I4	Whether null keys are allowed. One of the following: DBPROPVAL_IN_DISALLOWNULL: The index does not allow entries where the key columns are NULL. If the consumer attempts to insert an index entry with a NULL key, then the provider returns an error. DBPROPVAL_IN_IGNORENULL: The index does not insert entries containing NULL keys. If the consumer attempts to insert an index entry with a NULL key, then the provider ignores that entry and no error code is returned. DBPROPVAL_IN_IGNOREANYNULL: The index does not insert entries where some column key has a NULL value. For an index having a multicolumn search key, if the consumer inserts an index entry with NULL value in some column of the search key, then the provider ignores that entry and no error code is returned.
SORT_BOOKMARKS	DBTYPE_BOOL	How the index treats repeated keys. One of the following: VARIANT_TRUE: The index sorts repeated keys by bookmark. VARIANT_FALSE: The index does not sort repeated keys by bookmark.
AUTO_UPDATE	DBTYPE_BOOL	Whether the index is maintained automatically when changes are made to the corresponding base table. One of the following: VARIANT_TRUE: The index is automatically maintained. VARIANT_FALSE: The index must be maintained by the consumer through explicit calls to **IRowsetChange**. Ensuring consistency of the index as a result of updates to the associated base table is the responsibility of the consumer.
NULL_COLLATION	DBTYPE_I4	How NULLs are collated in the index. One of the following: DBPROPVAL_NC_END: NULLs are collated at the end of the list, regardless of the collation order. DBPROPVAL_NC_START: NULLs are collated at the start of the list, regardless of the collation order. DBPROPVAL_NC_HIGH: NULLs are collated at the high end of the list. DBPROPVAL_NC_LOW: NULLs are collated at the low end of the list.
ORDINAL_POSITION	DBTYPE_UI4	Ordinal position of the column in the index, starting with one.
COLUMN_NAME	DBTYPE_WSTR	Column name. This column, together with the COLUMN_GUID and COLUMN_PROPID columns, forms the column ID. One or more of these columns will be NULL depending on which elements of the DBID structure the provider uses.
COLUMN_GUID	DBTYPE_GUID	Column GUID.
COLUMN_PROPID	DBTYPE_UI4	Column property ID.
COLLATION	DBTYPE_I2	One of the following: DB_COLLATION_ASC: The sort sequence for the column is ascending. DB_COLLATION_DESC: The sort sequence for the column is descending. NULL: A column sort sequence is not supported.
CARDINALITY	DBTYPE_I4	Number of unique values in the index.
PAGES	DBTYPE_I4	Number of pages used to store the index.
FILTER_CONDITION	DBTYPE_WSTR	The WHERE clause identifying the filtering restriction.

The default sort order for the **adSchemaIndexes** rowset is UNIQUE, TYPE, INDEX_CATALOG, INDEX_SCHEMA, INDEX_NAME, and ORDINAL_POSITION.

adSchemaPrimaryKeys

The **adSchemaPrimaryKeys** *QueryType* identifies the primary key columns defined in the catalog by a given user. This *QueryType* is supported by the Microsoft OLE DB Provider for DB2.

The rowset returned by an **adSchemaPrimaryKeys** *QueryType* contains the columns listed in the following table.

Column name	Type indicator	Description
TABLE_CATALOG	DBTYPE_WSTR	Catalog name in which the table is defined. NULL if the provider does not support catalogs.
TABLE_SCHEMA	DBTYPE_WSTR	Unqualified schema name in which the table is defined. NULL if the provider does not support schemas.
TABLE_NAME	DBTYPE_WSTR	Table name.
COLUMN_NAME	DBTYPE_WSTR	Primary key column name. This column, together with the COLUMN_GUID and COLUMN_PROPID columns, forms the column ID. One or more of these columns will be NULL depending on which elements of the DBID structure the provider uses.
COLUMN_GUID	DBTYPE_GUID	Primary key column GUID.
COLUMN_PROPID	DBTYPE_UI4	Primary key column property ID.
ORDINAL	DBTYPE_UI4	The order of the column names (and GUIDs and property IDs) in the key.
PK_NAME	DBTYPE_WSTR	Primary key name. NULL if the provider does not support primary key constraints.

The default sort order for the **adSchemaPrimaryKeys** rowset is UNIQUE, TABLE_CATALOG, TABLE_SCHEMA, and TABLE_NAME.

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adSchemaProcedures

The **adSchemaProcedures** *QueryType* identifies information about the columns of rowsets returned by procedures. This *QueryType* is supported by the Microsoft OLE DB Provider for DB2.

The rowset returned by an **adSchemaProcedures** *QueryType* contains the columns listed in the following table.

Column name	Type indicator	Description
PROCEDURE_CATALOG	DBTYPE_WSTR	Catalog name. NULL if the provider does not support catalogs.
PROCEDURE_SCHEMA	DBTYPE_WSTR	Unqualified schema name. NULL if the provider does not support schemas.
PROCEDURE_NAME	DBTYPE_WSTR	Table name.
COLUMN_NAME	DBTYPE_WSTR	The name of the column; this might not be unique. If this cannot be determined, a NULL is returned. This column, together with the COLUMN_GUID and COLUMN_PROPID columns, forms the column ID. One or more of these columns will be NULL depending on which elements of the DBID structure the provider uses. If possible, the resulting column ID should be persistent. However, some providers do not support persistent identifiers for columns. The column ID of a base table should be invariant under views.
COLUMN_GUID	DBTYPE_GUID	Column GUID.
COLUMN_PROPID	DBTYPE_UI4	Column property ID.
ROWSET_NUMBER	DBTYPE_UI4	Number of the rowset containing the column. This is greater than one only if the procedure returns multiple rowsets.
ORDINAL_POSITION	DBTYPE_UI4	The ordinal of the column. Columns are numbered starting from one. NULL if there is no stable ordinal value for the column.

IS_NULLABLE	DBTYPE_BOOL	VARIANT_TRUE: The column might be nullable. VARIANT_FALSE: The column is known not to be nullable.
DATA_TYPE	DBTYPE_UI2	The indicator of the column's data type. If the data type of the column varies from row to row, this must be DBTYPE_VARIANT.
TYPE_GUID	DBTYPE_GUID	The GUID of the column's data type.
CHARACTER_MAXIMUM_LENGTH	DBTYPE_UI4	The maximum possible length of a value in the column. For character, binary, or bit columns, this is one of the following: The maximum length of the column in characters, bytes, or bits, respectively, if one is defined. For example, a CHAR(5) column in an SQL table has a maximum length of five (5). The maximum length of the data type in characters, bytes, or bits, respectively, if the column does not have a defined length. Zero (0) if neither the column nor the data type has a defined maximum length. NULL for all other types of columns.
CHARACTER_OCTET_LENGTH	DBTYPE_UI4	Maximum length in octets (bytes) of the column, if the type of the column is character or binary. A value of zero means the column has no maximum length. NULL for all other types of columns.
NUMERIC_PRECISION	DBTYPE_UI2	If the column's data type is numeric, this is the maximum precision of the column. The precision of columns with a data type of DBTYPE_DECIMAL or DBTYPE_NUMERIC depends on the definition of the column. If the column's data type is not numeric, this is NULL.
NUMERIC_SCALE	DBTYPE_I2	If column's type indicator is DBTYPE_DECIMAL or DBTYPE_NUMERIC, this is the number of digits to the right of the decimal point. Otherwise, this is NULL.
DESCRIPTION	DBTYPE_WSTR	Human-readable description of the column. For example, the description for a column named Name in the Employee table might be "Employee name."

The default sort order for the **adSchemaProcedures** rowset is PROCEDURE_CATALOG, PROCEDURE_SCHEMA, and PROCEDURE_NAME.

adSchemaProcedureParameters

The **adSchemaProcedureParameters** *QueryType* identifies information about the parameters and return codes of procedures. This *QueryType* is supported by the Microsoft OLE DB Provider for DB2.

The rowset returned by an **adSchemaProcedureParameters** *QueryType* contains the columns listed in the following table.

Column name	Type indicator	Description
PROCEDURE_CATALOG	DBTYPE_WSTR	Catalog name. NULL if the provider does not support catalogs.
PROCEDURE_SCHEMA	DBTYPE_WSTR	Unqualified schema name. NULL if the provider does not support schemas.
PROCEDURE_NAME	DBTYPE_WSTR	Table name.
PARAMETER_NAME	DBTYPE_WSTR	Parameter name. NULL if the parameter is not named.
ORDINAL_POSITION	DBTYPE_UI2	If the parameter is an input, input/output, or output parameter, this is the one-based ordinal position of the parameter in the procedure call. If the parameter is the return value, this is zero.
PARAMETER_TYPE	DBTYPE_UI2	One of the following: DBPARAMTYPE_INPUT—The parameter is an input parameter. DBPARAMTYPE_INPUTOUTPUT—The parameter is an input/output parameter. DBPARAMTYPE_OUTPUT—The parameter is an output parameter. DBPARAMTYPE_RETURNVALUE—The parameter is a procedure return value. If the provider cannot determine the parameter type, this is NULL.
PARAMETER_HASDEFAULT	DBTYPE_BOOL	VARIANT_TRUE: The parameter has a default value. VARIANT_FALSE: The parameter does not have a default value or it is unknown whether the parameter has a default value.
PARAMETER_DEFAULT	DBTYPE_WSTR	Default value of the parameter. If the default value is the NULL value, PARAMETER_HASDEFAULT is VARIANT_TRUE, and the PARAMETER_DEFAULT value is a NULL value.
IS_NULLABLE	DBTYPE_BOOL	VARIANT_TRUE: The parameter might be nullable. VARIANT_FALSE: The parameter is not nullable.
DATA_TYPE	DBTYPE_UI2	The indicator of the parameter’s data type.

CHARACTER_MAXIMUM_LENGTH	DBTYPE_UI4	The maximum possible length of a value in the parameter. For character, binary, or bit columns, this is one of the following: The maximum length of the parameter in characters, bytes, or bits, respectively, if one is defined. For example, a CHAR(5) column in an SQL table has a maximum length of five (5). The maximum length of the data type in characters, bytes, or bits, respectively, if the parameter does not have a defined length. Zero (0) if neither the parameter nor the data type has a defined maximum length. NULL for all other types of parameters.
CHARACTER_OCTET_LENGTH	DBTYPE_UI4	Maximum length in octets (bytes) of the parameter, if the type of the parameter is character or binary. A value of zero means the parameter has no maximum length. NULL for all other types of parameter.
NUMERIC_PRECISION	DBTYPE_UI2	If the parameter's data type is numeric, this is the maximum precision of the parameter. The precision of parameters with a data type of DBTYPE_DECIMAL or DBTYPE_NUMERIC depends on the definition of the parameters. If the parameter's data type is not numeric, this is NULL.
NUMERIC_SCALE	DBTYPE_I2	If parameter's type indicator is DBTYPE_DECIMAL or DBTYPE_NUMERIC, this is the number of digits to the right of the decimal point. Otherwise, this is NULL.
DESCRIPTION	DBTYPE_WSTR	Human-readable description of the parameter. For example, the description for a parameter named Name in a procedure that adds a new employee might be "Employee name."
TYPE_NAME	DBTYPE_WSTR	Provider-specific data type name.
LOCAL_TYPE_NAME	DBTYPE_WSTR	Localized version of TYPE_NAME. NULL is returned if a localized name is not supported by the data provider.

The default sort order for the **adSchemaProcedureParameters** rowset is PROCEDURE_CATALOG, PROCEDURE_SCHEMA, and PROCEDURE_NAME.

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adSchemaProviderTypes

The **adSchemaProviderTypes** *QueryType* identifies the data types supported by the data provider. This *QueryType* is supported by the Microsoft OLE DB Provider for AS/400 and VSAM and the Microsoft OLE DB Provider for DB2.

The rowset returned by an **adSchemaProviderType** *QueryType* contains the columns listed in the following table.

Column name	Type indicator	Description
TYPE_NAME	DBTYPE_WSTR	Provider-specific data type name.
DATA_TYPE	DBTYPE_UI2	The indicator of the data type.
COLUMN_SIZE	DBTYPE_UI4	The length of a non-numeric column or parameter refers to either the maximum or the defined length for this type by the provider. For character data, this is the maximum or defined length in characters. If the data type is numeric, this is the upper bound on the maximum precision of the data type.
LITERAL_PREFIX	DBTYPE_WSTR	Character or characters used to prefix a literal of this type in a text command.

LITERAL_SUFFIX	DBTYPE_WSTR	Character or characters used to suffix a literal of this type in a text command.
CREATE_PARAMS	DBTYPE_WSTR	The creation parameters are specified by the consumer when creating a column of this data type. For example, the SQL data type DECIMAL needs a precision and a scale. In this case, the creation parameters might be the string "precision,scale". In a text command, to create a DECIMAL column with a precision of 10 and a scale of 2, the value of the TYPE_NAME column might be DECIMAL() and the complete type specification would be DECIMAL(10,2). The creation parameters appear as a comma-separated list of values, in the order they are to be supplied, with no surrounding parentheses. If a creation parameter is length, maximum length, precision, or scale, "length", "max length", "precision", and "scale" should be used, respectively. If the creation parameters are some other value, it is provider-specific what text is used to describe the creation parameter. If the data type requires creation parameters, "()" generally appears in the type name. This indicates the position at which to insert the creation parameters. If the type name does not include "()", the creation parameters are enclosed in parentheses and appended to the end of the data type name.
IS_NULLABLE	DBTYPE_BOOL	VARIANT_TRUE: The data type is nullable. VARIANT_FALSE: The data type is not nullable. NULL: It is not known whether the data type is nullable.
CASE_SENSITIVE	DBTYPE_BOOL	VARIANT_TRUE: The data type is a character type and is case-sensitive. VARIANT_FALSE: The data type is not a character type or is not case-sensitive.
SEARCHABLE	DBTYPE_UI4	If the provider supports **ICommandText**, then this column is an integer indicating the searchability of a data type, otherwise this column is NULL. One of the following: DB_UNSEARCHABLE: The data type cannot be used in a WHERE clause. DB_LIKE_ONLY: The data type can be used in a WHERE clause only with the LIKE predicate. DB_ALL_EXCEPT_LIKE: The data type can be used in a WHERE clause with all comparison operators except LIKE. DB_SEARCHABLE: The data type can be used in a WHERE clause with any comparison operator.

UNSIGNED_ATTRIBUTE	DBTYPE_BOOL	VARIANT_TRUE: The data type is unsigned. VARIANT_FALSE: The data type is signed. NULL: Not applicable to data type.
FIXED_PREC_SCALE	DBTYPE_BOOL	VARIANT_TRUE: The data type has a fixed precision and scale. VARIANT_FALSE: The data type does not have a fixed precision and scale.
AUTO_UNIQUE_VALUE	DBTYPE_BOOL	VARIANT_TRUE: Values of this type can be auto-incrementing. VARIANT_FALSE: Values of this type cannot be auto-incrementing.
LOCAL_TYPE_NAME	DBTYPE_WSTR	Localized version of TYPE_NAME. NULL is returned if a localized name is not supported by the data provider.

MINIMUM_SCALE	DBTYPE_I2	If the type indicator is DBTYPE_DECIMAL or DBTYPE_NUMERIC, this is the minimum number of digits allowed to the right of the decimal point. Otherwise, this is NULL.
MAXIMUM_SCALE	DBTYPE_I2	If the type indicator is DBTYPE_DECIMAL or DBTYPE_NUMERIC, this is the maximum number of digits allowed to the right of the decimal point. Otherwise, this is NULL.
GUID	DBTYPE_GUID	The GUID of the type. All types supported by a provider are described in a type library, so each type has a corresponding GUID.
TYPELIB	DBTYPE_WSTR	The type library containing the description of this type. All types supported by a provider are described in one or more type libraries.
VERSION	DBTYPE_WSTR	The version of the type definition. Providers may wish to version type definitions. Different providers may use different version schemes, such as a timestamp or number (integer or float). NULL if not supported.

IS_LONG	DBTYPE_BOOL	VARIANT_TRUE: The data type is a BLOB that contains very long data; the definition of very long data is provider-specific. VARIANT_FALSE: The data type is a BLOB that does not contain very long data or is not a BLOB. This value determines the setting of the DBCOLUMNFLAGS_ISLONG flag returned by **GetColumnInfo** in **IColumnsInfo** and **GetParameterInfo** in **ICommandWithParameters**. For more information, see **GetColumnInfo** and **GetParameterInfo**.
BEST_MATCH	DBTYPE_BOOL	VARIANT_TRUE: The data type is the best match between all data types in the data source and the OLE DB data type indicated by the value in the DATA_TYPE column. VARIANT_FALSE: The data type is not the best match. For each set of rows in which the value of the DATA_TYPE column is the same, the BEST_MATCH column is set to VARIANT_TRUE in only one row.

The default sort order for the **adSchemaProviderTypes** rowset is DATA_TYPE.

adSchemaTables

The **adSchemaTables** *QueryType* identifies the tables defined in the catalog that are accessible to a given user. This *QueryType* is supported by the Microsoft OLE DB Provider for AS/400 and VSAM and the Microsoft OLE DB Provider for DB2.

The rowset returned by an **adSchemaTables** *QueryType* contains the columns listed in the following table.

Column name	Type indicator	Description
TABLE_CATALOG	DBTYPE_WSTR	Catalog name. NULL if the provider does not support catalogs.
TABLE_SCHEMA	DBTYPE_WSTR	Unqualified Schema Name. NULL if the provider does not support schemas.
TABLE_NAME	DBTYPE_WSTR	Table name.
TABLE_TYPE	DBTYPE_WSTR	Table type. One of the following or a provider-specific value. "ALIAS" "TABLE" "SYNONYM" "SYSTEM TABLE" "VIEW" "GLOBAL TEMPORARY" "LOCAL TEMPORARY"
TABLE_GUID	DBTYPE_GUID	GUID that uniquely identifies the table. Providers that do not use GUIDs to identify tables should return NULL in this column.
DESCRIPTION	DBTYPE_WSTR	Human-readable description of the table.

The default sort order for the **adSchemaTables** rowset is TABLE_TYPE, TABLE_CATALOG, TABLE_SCHEMA, and TABLE_NAME.

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OriginalValue Property (ADO)

The **OriginalValue** property on a **Field** object indicates the value of a **Field** that existed in the record before any changes were made. This property returns a Variant.

```
oldValue = currentfield.OriginalValue
```

Remarks

The **OriginalValue** property is used to return the original field value for a field from the current record.

In immediate update mode (the provider writes changes to the underlying data source once the **Update** method is called), the **OriginalValue** property returns the field value that existed prior to any changes (that is, since the last **Update** method call). This is the same value that the **CancelUpdate** method uses to replace the **Value** property.

In batch update mode (the provider caches multiple changes and writes them to the underlying data source only when the **UpdateBatch** method is called), the **OriginalValue** property returns the field value that existed prior to any changes (that is, since the last **UpdateBatch** method call). This is the same value that the **CancelBatch** method uses to replace the **Value** property. When this property is used with the **UnderlyingValue** property, you can resolve conflicts that arise from batch updates.

Precision Property (ADO)

The **Precision** property on a **Field** object indicates the degree of precision for Numeric values for numeric **Field** objects. This property returns a byte value indicating the maximum number of digits used to represent numeric values in a **Field** object.

```
numericPrecision = currentfield.Precision
```

Remarks

The **Precision** property is used to return the precision of a numeric field object.

The byte value that the **Precision** property will return is dependent on the data type of the **Field** object. The value for the ActiveX® Data Objects (ADO) data type of the **Field** object can be one of the enumerated values for **DataTypeEnum** as listed in the following table.

Enumeration	Value	Description
adEmpty	0	This data type indicates that no value was specified (DBTYPE_EMPTY).
adSmallInt	2	This data type indicates a 2-byte (16-bit) signed integer (DBTYPE_I2).
adInteger	3	This data type indicates a 4-byte (32-bit) signed integer (DBTYPE_I4).
adSingle	4	This data type indicates a 4-byte (32-bit) single precision IEEE floating point number (DBTYPE_R4).
adDouble	5	This data type indicates an 8-byte (64-bit) double precision IEEE floating point number (DBTYPE_R8).
adCurrency	6	A data type indicates a currency value (DBTYPE_CY). Currency is a fixed-point number with 4 digits to the right of the decimal point. It is stored in an 8-byte signed integer scaled by 10,000. This data type is not supported by the Microsoft® OLE DB Provider for AS/400 and VSAM or the Microsoft OLE DB Provider for DB2.
adDate	7	This data type indicates a date value stored as a Double, the whole part of which is the number of days since December 30, 1899, and the fractional part of which is the fraction of a day. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBSTR	8	This data type indicates a null-terminated Unicode character string (DBTYPE_BSTR). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adIDispatch	9	This data type indicates a pointer to an IDispatch interface on an OLE object (DBTYPE_IDISPATCH). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adError	10	This data type indicates a 32-bit error code (DBTYPE_ERROR). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBoolean	11	This data type indicates a Boolean value (DBTYPE_BOOL). This data type is not supported by the OLE DB Provider for AS/400 and VSAM.
adVariant	12	This data type indicates an automation variant (DBTYPE_VARIANT). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adIUnknown	13	This data type indicates a pointer to an IUnknown interface on an OLE object (DBTYPE_IUNKNOWN). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adDecimal	14	This data type indicates numeric data with a fixed precision and scale (DBTYPE_DECIMAL).
adTinyInt	16	This data type indicates a single-byte (8-bit) signed integer (DBTYPE_I1). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adUnsignedTinyInt	17	This data type indicates a single-byte (8-bit) unsigned integer (DBTYPE_UI1). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adUnsignedSmallInt	18	This data type indicates a 2-byte (16-bit) unsigned integer (DBTYPE_UI2). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.

adUnsignedInt	19	This data type indicates a 4-byte (32-bit) unsigned integer (DBTYPE_UI4). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBigInt	20	This data type indicates an 8-byte (64-bit) signed integer (DBTYPE_I8). This data type is not supported by the OLE DB Provider for AS/400 and VSAM.
adUnsignedBigInt	21	This data type indicates an 8-byte (64-bit) unsigned integer (DBTYPE_UI8). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adGUID	72	This data type indicates a globally unique identifier or GUID (DBTYPE_GUID). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBinary	128	This data type indicates fixed-length binary data (DBTYPE_BYTES).
adChar	129	This data type indicates a character string value (DBTYPE_STR).
adWChar	130	This data type indicates a null-terminated Unicode character string (DBTYPE_WSTR). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adNumeric	131	This data type indicates numeric data where the precision and scale are exactly as specified (DBTYPE_NUMERIC).
adUserDefined	132	This data type indicates user-defined data (DBTYPE_UDT). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adDBDate	133	This data type indicates an OLE DB date structure (DBTYPE_DATE).
adDBTime	134	This data type indicates an OLE DB time structure (DBTYPE_TIME).
adDBTimeStamp	135	This data type indicates an OLE DB timestamp structure (DBTYPE_TIMESTAMP).
adVarChar	200	This data type indicates variable-length character data (DBTYPE_STR).
adLongVarChar	201	This data type indicates a long string value.
adVarWChar	202	This data type indicates a Unicode string value. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adLongVarWChar	203	This data type indicates a long Unicode string value. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adVarBinary	204	This data type indicates variable-length binary data (DBTYPE_BYTES).
adLongVarBinary	205	This data type indicates a long binary value.

Note that the **Precision** property returns values that differ from the precision of the host data type for the ActiveX® Data Objects (ADO) data types as listed in the following table.

ADO data type	**Comments**
adSmallInt	The precision on the host is 4, but the OLE DB Provider returns a precision of 5.
adInteger	The precision on the host is 8, but the OLE DB Provider returns a precision of 10.

adSingle	The precision on the host is 9, but the OLE DB Provider returns a precision of 7.
adDouble	The precision on the host is 17, but the OLE DB Provider returns a precision of 15.

Provider Property (ADO)

The **Provider** property on a **Connection** object indicates the name of the provider. This property sets or returns a String value.

```
oldProvider = currentConnection.Provider
currentConnection.Provider = "SNAOLEDB"
```

Remarks

The **Provider** property is used to set or return the name of the provider for the connection. This property can also be set by the contents of **ConnectionString** property or the **ConnectionString** argument of the **Open** method. However, specifying a provider in more than one place while calling the **Open** method can have unpredictable results. If no provider is specified, the property will default to MSDASQL (Microsoft® OLE DB Provider for ODBC).

The Microsoft OLE DB Provider for AS/400 and VSAM requires "SNAOLEDB" as the **Provider** property string.

The Microsoft OLE DB Provider for DB2 requires "DB2OLEDB" as the **Provider** property string.

The **Provider** property is read/write when the connection is closed and read-only when it is open. The setting does not take effect until either the **Connection** object is opened or the **Properties** collection of the **Connection** object is accessed. If the setting is invalid, an error occurs.

Refresh Method (ADO)

The **Refresh** method on a **Collection** object updates the objects in a collection to reflect objects available from and specific to the OLE DB provider.

```
collection.Refresh
```

Parameters

None.

Remarks

This method is only supported on the **Field**s and **Properties** collections under the Microsoft® OLE DB Provider for AS/400 and VSAM.

The **Refresh** method accomplishes different tasks depending on the collection object on which it is called.

Using the **Refresh** method on the **Field**s collection has no visible effect. To retrieve changes from the underlying database structure, either the **Requery** method must be used or, if the **Recordset** object does not support bookmarks, the **MoveFirst** method must be used.

Using the **Refresh** method on a **Properties** collection of some objects populates the collection with the dynamic properties the provider exposes. These properties provide information about features specific to the provider beyond the built-in properties ActiveX® Data Objects (ADO) supports. The OLE DB Data Provider for AS/400 and VSAM does not support any provider-specific properties.

Requery Method (ADO)

The **Requery** method on a **Recordset** object updates the data in a **Recordset** object by re-executing the query on which the object is based.

```
recordset.Requery
```

Parameters

None.

Remarks

The **Requery** method is used to refresh the entire contents of a **Recordset** object from the data source by reissuing the original command and retrieving the data a second time. Calling this method is equivalent to calling the **Close** and **Open** methods in succession. If you are editing the current record or adding a new record, an error occurs.

While the **Recordset** object is open, the properties that define the nature of the cursor (**CursorType**, **LockType**, **MaxRecords**, and other properties) are read-only. Thus, the **Requery** method can only refresh the current cursor. To change any of the cursor properties and view the results, the **Close** method must be used so that the properties become read/write again. You can then change the property settings and call the **Open** method to reopen the cursor.

Save Method (ADO)

The **Save** method on a **Recordset** object saves the Recordset in a file or Stream object.

```
recordset.Save Destination, Persistent Format
```

Parameters

Destination

This optional parameter specifies a Variant representing the complete path name of the file where the **Recordset** is to be saved, or a reference to a **Stream** object.

Persistent Format

This optional parameter specifies a Long integer value representing a **PersistFormatEnum** value that specifies the format in which the **Recordset** is to be saved (XML or ADTG). The default value is **adPersistADTG**.

The **PersistFormatEnum** value can be one of the constants listed in the following table.

Enumeration	Value	Description
adPersistADTG	0	This value indicates Microsoft Advanced Data TableGram (ADTG) format.
adPersistXML	1	This value indicates Extensible Markup Language (XML) format.

Remarks

The **Save** method can only be invoked on an open **Recordset**. Use the **Open** method to later restore the **Recordset** from *Destination*.

When using the Microsoft® OLE DB Provider for AS/400 and VSAM and the Filter property is in effect for the **Recordset**, then only the rows accessible under the filter are saved.

The first time you save the **Recordset**, it is optional to specify *Destination*. If the *Destination* parameter is omitted, a new file will be created with a name set to the value of the Source Property of the **Recordset**. See the topic Source Property on a Recordset Object (ADO) for more information.

The *Destination* parameter should be omitted when you subsequently call **Save** after the first save, or a run-time error will occur. If you subsequently call **Save** with a new *Destination*, the **Recordset** is saved to the new destination. However, the new destination and the original destination will both be open.

Save does not close the **Recordset** or *Destination*, so you can continue to work with the **Recordset** and save your most recent changes. *Destination* remains open until the **Recordset** is closed, during which time other applications can read but not write to *Destination*.

For reasons of security, the **Save** method permits only the use of low and custom security settings from a script executed by Microsoft Internet Explorer. For a more detailed explanation of security issues, see "ADO and RDS Security Issues in Microsoft Internet Explorer" found in the ActiveX® Data Objects (ADO) Technical Articles of the Microsoft Data Access Technical Articles.

If the **Save** method is called while an asynchronous **Recordset** fetch, execute, or update operation is in progress, then **Save** waits until the asynchronous operation is complete.

Records are saved beginning with the first row of the **Recordset**. When the **Save** method is finished, the current row position is moved to the first row of the **Recordset**.

For best results, set the CursorLocation Property property to **adUseClient** with **Save**. If your provider does not support all of the features necessary to save **Recordset** objects, the Cursor Service will provide these features.

When a **Recordset** is persisted with the **CursorLocation** property set to **adUseServer**, the update capability for the **Recordset** is limited. Typically, only single-table updates, insertions, and deletions are allowed (dependent on features supported by the provider). The **Resync** method is also unavailable in this configuration.

Note that saving a **Recordset** with **Fields** of type **adVariant**, **adIDispatch**, or **adIUnknown** is not supported by ADO and can cause unpredictable results.

Because the *Destination* parameter can accept any object that supports the OLE DB IStream interface, a **Recordset** can be saved directly to the ASP Response object. For more information, see the XML Recordset Persistence Scenario in the *ADO Programmer's Reference*.

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Sort Property (ADO)

The **Sort** property on a **Recordset** object indicates that a recordset should be sorted.

```
Recordset.Sort BSTR Criteria
```

Parameters

Criteria

This parameter specifies the criteria used for sorting the **Recordset** object. This **Sort** property contains a comma-delimited list of column names and a direction specifier (ascending or descending) to be used for sorting records in a **Recordset** object. The direction specifier is a string (ASC or DESC). When a direction is not specified, the direction defaults to ascending.

An example of a **Sort** property criteria is as follows:

"LastName ASC, FirstName DESC, Initial"

Remarks

The **Sort** property is not supported by the OLE DB Provider for DB2 or the ODBC Driver for DB2.

The **Sort** property is used with an open **Recordset** object based on an AS/400 physical file. The **Sort** property allows the user to indicate which logical view to apply to an AS/400 physical file. The logical view must be a valid index specified in the description of the AS/400 physical file. The logical view is provided by the AS/400 logical file. The Microsoft® OLE DB Provider for AS/400 and VSAM responds to a **Sort** request by first closing the open physical file, and then opening the logical file that points back to the data in the physical file.

The **Recordset Sort** property is only supported on AS/400 hosts. If the user opens a **Recordset** object based on an AS/400 logical file, then there is likely no need to use **Recordset.Sort**. For performance reasons, applications should be written to open the AS/400 logical file first, because the overhead is so much greater when opening a physical file first.

If the CursorLocation Property property is set to **adUseClient** (use the client cursor engine), the **Sort** property will work if MDAC 2.0 or later is installed but will not work properly with earlier versions of ADO.

Source Property on an Error Object (ADO)

The **Source** property on an **Error** object indicates the name of the object or application that originally generated an error. This property returns a String value that indicates the name of an object or application.

```
errorSource = currentError.Source
```

Remarks

The **Source** property on an **Error** object is used to determine the name of the object or application that originally generated an error. This could be the object's class name or programmatic ID.

For errors in ADO, the property value will be **ADODB.***ObjectName*, where *ObjectName* is the name of the object that triggered the error. For ADOX and ADO MD, the value will be **ADOX.***ObjectName* and **ADOMD.***ObjectName,* respectively.

Based on the error documentation from the **Source**, Number Property (ADO), and Description Property (ADO) for **Error** objects, you can write code that will handle the error appropriately.

The **Source** property is read-only for **Error** objects.

Source Property on a Recordset Object (ADO)

The **Source** property on a **Recordset** object indicates the data source for the Recordset object. This property sets a String value or **Command** object reference or returns only a String value that indicates the source of the **Recordset**.

```
currentSource = currentRecordset.Source
recordset.Source = newSource
```

Remarks

The **Source** property on a Recordset is used to specify a data source for a **Recordset** object.

Using the Microsoft® OLE DB Provider for AS/400 and VSAM, the **Source** property can be either a **Command** object variable or a table name.

Using the Microsoft OLE DB Provider for DB2, the Source property can be one of the following: a **Command** object variable, an SQL statement, or a stored procedure. If the **Source** property is an SQL statement or a stored procedure, you can optimize performance by passing the appropriate *Options* argument with the **Open** method call.

If you set the **Source** property to a **Command** object, the **ActiveConnection** property of the **Recordset** object will inherit the value of the **ActiveConnection** property for the specified **Command** object. However, reading the **Source** property does not return a **Command** object; instead, it returns the **CommandText** property of the **Command** object to which you set the **Source** property.

The **Source** property is read/write for closed **Recordset** objects and read-only for open **Recordset** objects.

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State Property (ADO)

The **State** property on a **Connection**, **Command**, or **Recordset** object describes the current state of an object. This property sets or returns a Long value.

```
oldState = currentConnection.State
currentConnection.State = adStateClosed
```

Remarks

The **State** property is used to set or return the current state of an object. The value of the **State** property can be one of the enumerated values listed in the following table.

Enumeration	Value	Description
adStateClosed	0	This value indicates that the object is closed. This is the default value.
adStateOpen	1	This value indicates that the object is open.

The **State** property can be used to determine the current state of a given object at any time.

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Status Property (ADO)

The **Status** property on a **Recordset** object indicates the status of the current record with respect to batch updates or other bulk operations. This property returns a Long value.

```
oldStatus = currentRecordset.Status
```

Remarks

The **Status** property is used to return the current status of a recordset object at any time. The value of the **Status** property returns a sum of the **RecordStatusEnum** enumerated values listed in the following table.

Enumeration	Value	Description
adRecOK	0	This value indicates that the recordset object was successfully updated.
adRecNew	0x1	This value indicates that the recordset object is new.
adRecModified	0x2	This value indicates that the recordset object was modified.
adRecDeleted	0x4	This value indicates that the recordset object was deleted.
adRecUnmodified	0x8	This value indicates that the recordset object was not modified.
adRecInvalid	0x10	This value indicates that the recordset object was not saved because its bookmark is invalid.
adRecMultipleChanges	0x40	This value indicates that the recordset object was not saved because it would have affected multiple records.
adRecPendingChanges	0x80	This value indicates that the recordset object was not saved because it refers to a pending insert.
adRecCanceled	0x100	This value indicates that the recordset object was not saved because the operation was canceled.
adRecCantRelease	0x400	This value indicates that the new recordset object was not saved because of existing record locks.
adRecConcurencyViolation	0x800	This value indicates that the recordset object was not saved because optimistic concurrency was in use.
adRecIntegrityViolation	0x1000	This value indicates that the recordset object was not saved because the user violated integrity constraints.
adRecMaxChangesExceeded	0x2000	This value indicates that the recordset object was not saved because there were too many pending changes.
adRecObjectOpen	0x4000	This value indicates that the recordset object was not saved because of a conflict with an open storage object.
adRecOutOfMemory	0x8000	This value indicates that the recordset object was not saved because the computer has run out of memory.
adRecPermissionDenied	0x10000	This value indicates that the recordset object was not saved because the user has insufficient permissions.
adRecSchemaViolation	0x20000	This value indicates that the recordset object was not saved because it violates the structure of the underlying database.
adRecDBDeleted	0x40000	This value indicates that the recordset object has already been deleted from the data source.

Use the **Status** property to see what changes are pending for records modified during batch updating. You can also use the **Status** property to view the status of records that fail during bulk operations such as when you call the **Resync**, **UpdateBatch**, or **CancelBatch** methods on a recordset object, or set the **Filter** property on a recordset object to an array of bookmarks. With this property, you can determine how a given record failed and resolve it accordingly.

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Supports Method (ADO)

The **Supports** method on a **Recordset** object determines whether a specified **Recordset** object supports a particular type of feature.

```
boolean = recordset.Supports ( CursorOptions )
```

Parameters

CursorOptions

This parameter specifies a Long expression that consists of one or more of the **CursorOptionEnum** values indicating which feature is being queried.

The **CursorOptionEnum** value can be one of the constants listed in the table following the Parameters section.

Values for CursorOptions

Enumeration	Value	Description
adAddNew	0x1000400	This value indicates whether the **AddNew** method can be used to add new records.
adApproxPosition	0x4000	This value indicates whether the **AbsolutePosition** and **AbsolutePage** properties can read and set.
adBookMark	0x2000	This value indicates whether the **Bookmark** property can be used to access specific records.
adDelete	0x1000800	This value indicates whether the **Delete** method can be used to delete records.
adFind	0x80000	This value indicates whether the **Find** method can be used to locate a row in a **Recordset**.
adHoldRecords	0x100	This value indicates whether you can retrieve more records or change the next retrieve position without committing all pending changes.
adIndex	0x100000	This value indicates whether the **Index** property can be name an index.
adMovePrevious	0x200	This value indicates whether the **MoveFirst** and **MovePrevious** methods, and **Move** or **GetRows** methods can be used to move the current record position backward without requiring bookmarks.
adNotify	0x40000	This value indicates that the underlying data provider supports notifications (which determines whether **Recordset** events are supported).
adResync	0x20000	This value indicates whether the recordset cursor can be updated with the data visible in the underlying database using the **Resync** method.
adSeek	0x200000	This value indicates whether the **Seek** method can be used to locate a row in a **Recordset**.
adUpdate	0x1008000	This value indicates whether the **Update** method can be used to modify existing data.
adUpdateBatch	0x10000	This value indicates whether batch updating can be used on the recordset (the **UpdateBatch** and **CancelBatch** methods) to transmit changes to the provider in groups.

Return Values

Returns a Boolean value that indicates whether all of the features identified by the *CursorOptions* argument are supported by the provider.

Remarks

The **Supports** method is used to determine what types of features (methods and properties) a **Recordset** object supports. If the **Recordset** object supports the features whose corresponding constants are in *CursorOptions*, the **Supports** method returns **True**. Otherwise, it returns **False**.

Although the **Supports** method may return **True** for a given feature, it does not guarantee that the OLE DB Provider can make the feature available under all circumstances. The **Supports** method simply returns whether the provider can support the specified function assuming certain conditions are met. For example, the **Supports** method may indicate that a **Recordset** object supports updates even though the cursor is based on a multi-table join, some columns of which are not updatable.

Type Property (ADO)

The **Type** property on a **Field** object indicates the operational type or data type for **Field** or **Property** objects. This property sets or returns a **DataTypeEnum** value.

```
datatype = currentfield.Type
```

Remarks

The **Type** property is used to return the data type of a numeric field object.

The value returned by the **Type** property on a **Field** object can be one of the enumerated values for **DataTypeEnum** listed in the following table.

Enumeration	Value	Description
adEmpty	0	This data type indicates that no value was specified (DBTYPE_EMPTY).
adSmallInt	2	This data type indicates a 2-byte (16-bit) signed integer (DBTYPE_I2).
adInteger	3	This data type indicates a 4-byte (32bit) signed integer (DBTYPE_I4).
adSingle	4	This data type indicates a 4-byte (32-bit) single-precision IEEE floating-point number (DBTYPE_R4).
adDouble	5	This data type indicates an 8-byte (64-bit) double-precision IEEE floating-point number (DBTYPE_R8).
adCurrency	6	A data type indicates a currency value (DBTYPE_CY). Currency is a fixed-point number with four digits to the right of the decimal point. It is stored in an 8-byte signed integer scaled by 10,000. This data type is not supported by the Microsoft® OLE DB Provider for AS/400 and VSAM or the Microsoft OLE DB Provider for DB2.
adDate	7	This data type indicates a date value stored as a Double, the whole part of which is the number of days since December 30, 1899, and the fractional part of which is the fraction of a day. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBSTR	8	This data type indicates a null-terminated Unicode character string (DBTYPE_BSTR). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adIDispatch	9	This data type indicates a pointer to an **IDispatch** interface on an OLE object (DBTYPE_IDISPATCH). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adError	10	This data type indicates a 32-bit error code (DBTYPE_ERROR). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBoolean	11	This data type indicates a Boolean value (DBTYPE_BOOL). This data type is not supported by the OLE DB Provider for AS/400 and VSAM.
adVariant	12	This data type indicates an Automation variant (DBTYPE_VARIANT). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adIUnknown	13	This data type indicates a pointer to an **IUnknown** interface on an OLE object (DBTYPE_IUNKNOWN). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adDecimal	14	This data type indicates numeric data with a fixed precision and scale (DBTYPE_DECIMAL).
adTinyInt	16	This data type indicates a single-byte (8-bit) signed integer (DBTYPE_I1). This data type is not supported by the OLE DB Provider.
adUnsignedTinyInt	17	This data type indicates a single-byte (8-bit) unsigned integer (DBTYPE_UI1). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adUnsignedSmallInt	18	This data type indicates a 2-byte (16-bit) unsigned integer (DBTYPE_UI2). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adUnsignedInt	19	This data type indicates a 4-byte (32-bit) unsigned integer (DBTYPE_UI4). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.

adBigInt	20	This data type indicates an 8-byte (64-bit) signed integer (DBTYPE_I8). This data type is not supported by the OLE DB Provider for AS/400 and VSAM.
adUnsignedBigInt	21	This data type indicates an 8-byte (64-bit) unsigned integer (DBTYPE_UI8). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adGUID	72	This data type indicates a globally unique identifier or GUID (DBTYPE_GUID). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adBinary	128	This data type indicates fixed-length binary data (DBTYPE_BYTES).
adChar	129	This data type indicates a character string value (DBTYPE_STR).
adWChar	130	This data type indicates a null-terminated Unicode character string (DBTYPE_WSTR). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adNumeric	131	This data type indicates numeric data where the precision and scale are exactly as specified (DBTYPE_NUMERIC).
adUserDefined	132	This data type indicates user-defined data (DBTYPE_UDT). This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adDBDate	133	This data type indicates an OLE DB date structure (DBTYPE_DATE).
adDBTime	134	This data type indicates an OLE DB time structure (DBTYPE_TIME).
adDBTimeStamp	135	This data type indicates an OLE DB timestamp structure (DBTYPE_TIMESTAMP).
adVarChar	200	This data type indicates variable-length character data (DBTYPE_STR).
adLongVarChar	201	This data type indicates a long string value.
adVarWChar	202	This data type indicates a Unicode string value. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adLongVarWChar	203	This data type indicates a long Unicode string value. This data type is not supported by the OLE DB Provider for AS/400 and VSAM or the OLE DB Provider for DB2.
adVarBinary	204	This data type indicates variable-length binary data (DBTYPE_BYTES).
adLongVarBinary	205	This data type indicates a long binary value.

The corresponding OLE DB type indicator is shown in parentheses in the description column of the above table. For more information on OLE DB data types, see the *OLE DB 2.0 Programmer's Reference*.

UnderlyingValue Property (ADO)

The **UnderlyingValue** property on a **Field** object indicates the **Field** object's current value in the database. This property returns a Variant.

```
actualValue = currentfield.UnderlyingValue
```

Remarks

The **UnderlyingValue** property is used to return the current field value from the database. The field value in the **UnderlyingValue** property is the value that is visible to your transaction and may be the result of a recent update by another transaction. This may differ from the **OriginalValue** property, which reflects the value that was originally returned to the **Recordset**.

This is similar to the affect of calling the **Resync** method, however the **UnderlyingValue** property returns only the value for a specific field from the current record. This is the same value that the **Resync** method uses to replace the **Value** property.

When this property is used with the **OriginalValue** property, you can resolve conflicts that arise from batch updates.

Update Method (ADO)

The **Update** method on a **Recordset** object saves any changes you make to the current record of a **Recordset** object.

```
recordset.Update Fields, Values
```

Parameters

Fields
This optional parameter specifies a Variant representing a single name or a Variant array representing names or ordinal positions of the field or fields you wish to modify.

Values
This optional parameter specifies a Variant representing a single value or a Variant array representing values for the field or fields in the new record.

Remarks

The **Update** method is used to save any changes you make to the current record of a **Recordset** object since calling the **AddNew** method or since changing any field values in an existing record. The **Recordset** object must support updates for the **Update** method to be used successfully.

To set field values, do one of the following:

- Assign values to a **Field** object's **Value** property and call the **Update** method.
- Pass a field name and a value as arguments with the **Update** call.
- Pass an array of field names and an array of values with the **Update** call.

When arrays of fields and values are used, there must be an equal number of elements in both arrays. Also, the order of field names must match the order of field values. If the number and order of fields and values do not match, an error occurs.

If the **Recordset** object supports batch updating, then multiple changes to one or more records can be cached locally when the **UpdateBatch** method is called. If you are editing the current record or adding a new record when the **UpdateBatch** method is called, ActiveX® Data Objects (ADO) will automatically call the **Update** method to save any pending changes to the current record before transmitting the batched changes to the OLE DB Provider.

If you move from the record you are adding or editing before calling the **Update** method, ADO will automatically call **Update** to save the changes. The **CancelUpdate** method must be called if you want to cancel any changes made to the current record or to discard a newly added record.

The current record remains current after the **Update** method is called.

UpdateBatch Method (ADO)

The **UpdateBatch** method on a **Recordset** object writes all pending batch updates to the host.

```
recordset.UpdateBatch AffectedRecords
```

Parameters

AffectedRecords

This optional parameter specifies an **AffectEnum** value that determines how many records the **UpdateBatch** method will affect.

The **AffectEnum** value can be one of the constants listed in the following table.

Enumeration	**Value**	**Description**
adAffectCurrent	1	This value writes pending changes only for the current record.
adAffectGroup	2	This value writes pending changes for the records that satisfy the current Filter property setting. You must set the **Filter** property to one of the valid predefined constants to use this option.
adAffectAll	3	This value writes pending changes for all the records in the **Recordset** object, including any hidden by the current **Filter** property setting. This value is the default.

Remarks

The **UpdateBatch** method is used when modifying a **Recordset** object in batch update mode to transmit all changes made in a **Recordset** object to the underlying database.

If the **Recordset** object supports batch updating, then multiple changes to one or more records can be cached locally until the **UpdateBatch** method is called. If you are editing the current record or adding a new record when the **UpdateBatch** method is called, ADO will automatically call the **Update** method to save any pending changes to the current record before transmitting the batched changes to the provider.

If the attempt to transmit changes fails because of a conflict with the underlying data (for example, a record has already been deleted by another user), the provider returns warnings to the **Errors** collection but does not halt program execution. A run-time error occurs only if there are conflicts on all the requested records. Use the **Filter** property (**adFilterAffectedRecords**) and the **Status** property to locate records with conflicts.

To cancel all pending batch updates, use the **CancelBatch** method.

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Value Property (ADO)

The **Value** property on a **Field** object indicates the value assigned to a **Field** or **Property** object. This property sets or returns a Variant value. The default value depends on the **Type** property of the **Field** object.

```
oldValue = currentfield.Value
currentField.Value = newValue
```

Remarks

The **Value** property is used to set or return data from **Field** objects or to set or return property settings with **Property** objects. Whether the **Value** property is read/write or read-only depends upon numerous factors. For a **Field** object, this includes whether the **Recordset** was opened as read-only or read/write.

ActiveX® Data Objects (ADO) allows setting and returning long binary data with the **Value** property from the database.

Version Property (ADO)

The **Version** property on a **Connection** object indicates the ActiveX® Data Objects (ADO) version number. This property returns a String value.

```
versionADO = currentConnection.Version
```

Remarks

The **Version** property is used to return the version number of the ADO implementation. The version of the provider will be available as a dynamic property in the **Properties** collection.

Network Integration Programmer's Reference

This section of Microsoft® Host Integration Server 2004 Help describes the objects, methods, properties, controls, and other interfaces that enable you to integrate Host Integration Server network technologies into your application.

For API references and other technical information about SNADIS drivers, see the SNADIS Drivers Programmer's Reference section of the SDK.

For general information about programming for network integration, see the Network Integration Programmer's Guide section of the SDK.

For sample code illustrating network integration, see Network Integration Samples.

This section contains:

- APPC Programmer's Reference
- CPI-C Programmer's Reference
- LUA Programmer's Reference
- 3270 Emulator Programmer's Reference
- SNA Internationalization Programmer's Reference
- SNA Print Server Data Filter Programmer's Reference

APPC Programmer's Reference

This section of Microsoft® Host Integration Server 2004 Help provides information about the verbs, extensions, and return codes that make up the APPC programming interface.

For general information about programming for APPC, see the APPC Programmer's Guide section of the SDK.

For sample code using APPC, see APPC Samples.

This section contains:

- APPC Management Verbs
- APPC TP Verbs
- APPC Conversation Verbs
- APPC Extensions for the Windows Environment
- Host Integration Server 2004 Enhancements to the Windows Environment
- Common Service Verbs
- CSV Extensions for the Windows Environment
- Common APPC Return Codes
- Common CSV Return Codes
-

APPC Management Verbs

This section describes the Advanced Program-to-Program Communications (APPC) management verbs. The management verbs enable you to establish APPC LU 6.2 session limits, obtain configuration information and current operating values for the SNA node, and activate or deactivate sessions. The description of each verb provides:

- A definition of the verb.
- The structure defining the verb control block (VCB) used by the verb. The structure is contained in the WINAPPC.H file. The length of each VCB field is in bytes. Fields beginning with reserv (for example, reserv2) are reserved.
- The parameters (VCB fields) supplied to and returned by APPC. A description of each parameter is provided, along with its possible values and other information.
- The conversation state(s) in which the verb can be issued.
- The state(s) to which the conversation can change upon return from the verb. Conditions that do not cause a state change are not noted. For example, parameter checks and state checks do not cause a state change.
- Additional information describing the verb.

Most parameters supplied to and returned by APPC are hexadecimal values. To simplify coding, these values are represented by meaningful symbolic constants, which are established by **#define** statements in the WINAPPC.H header file. For example, the **opcode** (operation code) member of the **mc_send_data** structure used by the **MC_SEND_DATA** verb is the hexadecimal value represented by the symbolic constant AP_M_SEND_DATA. Use only the symbolic constants when writing transaction programs (TPs).

This section contains:

- ACTIVATE_SESSION
- CNOS
- DEACTIVATE_SESSION
- DISPLAY

ACTIVATE_SESSION

The **ACTIVATE_SESSION** verb requests Microsoft® Host Integration Server to activate a session between the local logical unit (LU) and a specified partner LU, using a specified mode. This verb completes either when the specified session has become active or when it has failed.

The following structure describes the verb control block used by the **ACTIVATE_SESSION** verb.

```
typedef struct activate_session {
    unsigned short  opcode;
    unsigned char   reserv2[2];
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   reserv3[8];
    unsigned char   lu_alias[8];
    unsigned char   plu_alias[8];
    unsigned char   mode_name[8];
    unsigned char   fqplu_name[17];
    unsigned char   polarity;
    unsigned char   session_id[8];
    unsigned long   conv_group_id;
    unsigned char   reserv4[1];
    unsigned char   type;
    HANDLE          deactivation_event;
    unsigned short* p_deactivation_status;
    unsigned char   reserv5[10];
} ACTIVATE_SESSION;
```

Members

opcode

Supplied parameter. Specifies the verb operation code, AP_ACTIVATE_SESSION.

reserv2

A reserved field.

primary_rc

Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc

Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

reserv3

A reserved field.

lu_alias

Supplied parameter. Provides the 8-byte ASCII name used locally for the LU. If the default local LU is to be used, fill this parameter with spaces.

plu_alias

Supplied parameter. Provides the 8-byte ASCII name used locally for the partner LU. If the default remote LU is to be used, fill this parameter with spaces. If the partner LU is to be specified with the **fqplu_name** parameter, fill this parameter with binary zeros.

mode_name

Supplied parameter. Specifies the EBCDIC (type A) mode name.

fqplu_name

Supplied parameter. Provides the partner LU name in EBCDIC (type A) when no **plu_alias** name is defined at the local node and the partner LU is located at a different node. This parameter is ignored if **plu_alias** is specified.

polarity

Supplied parameter. Specifies the polarity for the session. The possible values are:

AP_POL_EITHER

If AP_POL_EITHER is set, ACTIVATE_SESSION activates a first speaker session if available; otherwise a bidder session is activated.

AP_POL_FIRST_SPEAKER

If AP_POL_FIRST_SPEAKER is set, ACTIVATE_SESSION only succeeds if a session of the requested polarity is available.

AP_POL_BIDDER

If AP_POL_BIDDER is set, ACTIVATE_SESSION only succeeds if a session of the requested polarity is available.

session_id
Returned parameter. Provides the 8-byte identifier of the activate session.

conv_group_id
Returned parameter. Provides the conversation group identifier. This parameter can be specified on **ALLOCATE** and **MC_ALLOCATE** verbs to start conversations on this particular session.

reserv4
A reserved field.

type
Supplied parameter. Specifies the type of activation. Possible values are:

AP_ACT_ACTIVE

If AP_ACT_ACTIVE is specified, then Host Integration Server will attempt to start the required session (by sending the BIND or INIT-SELF).

AP_ACT_PASSIVE

If AP_ACT_PASSIVE is specified, then Host Integration Server will not attempt to start the session and the verb will complete when the partner has started the session.

deactivation_event
Supplied parameter. Provides an event handle that APPC is to signal when the session is deactivated. The event handle should be obtained by calling either the **CreateEvent** or **OpenEvent** Win32® function.

p_deactivation_status
Returned parameter. A pointer to a value that is set when the deactivation event is signaled to provide completion status. The following values can be returned.

AP_SESSION_DEACTIVATED

AP_COMM_SUBSYSTEM_ABENDED

reserv5
A reserved field.

Return Codes

AP_OK
Primary return code; the verb executed successfully. The secondary return code indicates the polarity of the established session. The following values can be returned.

AP_POL_FIRST_SPEAKER

AP_POL_BIDDER

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_INVALID_LU_ALIAS

Secondary return code; APPC cannot find the specified **lu_alias** among those defined.

AP_INVALID_PLU_ALIAS

Secondary return code; APPC did not recognize the specified **plu_alias**.

AP_INVALID_MODE_NAME

Secondary return code; APPC did not recognize the specified **mode_name**.

AP_INVALID_FQPLU_NAME

Secondary return code; APPC did not recognize the specified **fqplu_name**.

AP_INVALID_POLARITY

Secondary return code; APPC did not recognize the specified **polarity**.

AP_INVALID_TYPE

Secondary return code; APPC did not recognize the specified **type**.

AP_ACTIVATION_FAIL_NO_RETRY
Primary return code; the session could not be activated because of a condition that requires action (such as a configuration mismatch or a session protocol error).
AP_ACTIVATION_FAIL_RETRY
Primary return code; the session could not be activated because of a temporary condition (such as a link failure).
AP_SESSION_LIMITS_EXCEEDED
Primary return code; the session could not be activated because the session limits have been exceeded.
AP_SESSION_LIMITS_CLOSED
Primary return code; the session could not be activated because the session limits are closed (that is, zero).
AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions occurred:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (local area network error occurred).
- The SnaBase at the TP's computer encountered an ABEND.
- The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

Remarks

This verb supports both active and passive activation.

The active form of this verb results in Host Integration Server trying to initiate the session (by sending a BIND for independent LUs or an INIT-SELF for dependent LUs). The active form of this verb will also result in the following behavior:

- If the connection to the partner LU is inactive and is configured as on-demand, the Node will attempt to start the connection.
- If dynamic partnering is being used, the Node will set up the LU-LU/MODE partnership.
- If CNOS has not run, the Node will start CNOS (but will not change any of the session limits).

The passive form does not attempt to start the session, but completes when the LU is started by a BIND from its partner LU. For independent LUs, multiple passive **ACTIVATE_SESSION** verbs can be queued up for the same LU-LU/MODE, and complete in turn as new sessions are started.

This verb also includes a deactivation event, which is posted when the session is deactivated by any method other than a **DEACTIVATE_SESSION** verb (for example, an unsolicited UNBIND from its partner LU results in this event being posted).

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CNOS

The **CNOS** (Change Number of Sessions) verb establishes APPC LU 6.2 session limits.

The following structure describes the verb control block used by the **CNOS** verb.

```
typedef struct cnos {
    unsigned short  opcode;
    unsigned char   reserv2[2];
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   key[8];
    unsigned char   lu_alias[8];
    unsigned char   plu_alias[8];
    unsigned char   fqplu_name[17];
    unsigned char   reserv3;
    unsigned char   mode_name[8];
    unsigned int    mode_name_select:1;
    unsigned int    set_negotiable:1;
    unsigned int    reserv4:6;
    unsigned int    reserv5:8;
    unsigned short  plu_mode_sess_lim;
    unsigned short  min_conwinners_source;
    unsigned short  min_conwinners_target;
    unsigned short  auto_act;
    unsigned int    drain_target:1;
    unsigned int    drain_source:1;
    unsigned int    responsible:1;
    unsigned int    reserv6:5;
    unsigned int    reserv7:8;
} CNOS;
```

Members

opcode

Supplied parameter. Specifies the verb operation code, AP_CNOS.

reserv2

A reserved field.

primary_rc

Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc

Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

key

Supplied parameter. Specifies either the master or service key in ASCII, if the keylock feature has been secured.

lu_alias

Supplied parameter. Provides the 8-byte ASCII name used locally for the LU.

plu_alias

Supplied parameter. Provides the 8-byte ASCII name used locally for the partner LU.

fqplu_name

Supplied parameter. Provides the partner logical unit (LU) name in EBCDIC (type A) when no **plu_alias** name is defined at the local node and the partner LU is located at a different node.

mode_name

Supplied parameter. Specifies the EBCDIC (type A) mode name to be used when the value of **mode_name_select** is AP_ONE.

mode_name_select

Supplied parameter. Specifies the mode name select for which your program is setting or resetting the session limits and contention-winner polarities. Allowed values are AP_ALL or AP_ONE.

set_negotiable

Supplied parameter. Specifies whether APPC is to change the current setting for the maximum negotiable session limit. Allowed values are AP_YES and AP_NO.

reserv4

A 6-bit reserved field.

reserv5
An 8-bit reserved field.
plu_mode_sess_lim
Supplied parameter. Specifies the session limit when the value for **set_negotiable** is YES. Allowed values are 0 to 32767.
min_conwinners_source
Supplied parameter. Specifies the number of sessions of which the LU is guaranteed to be the contention winner. Allowed values are 0 to 32767.
min_conwinners_target
Supplied parameter. Specifies the minimum number of sessions of which the target LU is guaranteed to be the contention winner. Allowed values are 0 to 32767.
auto_act
Supplied parameter. Specifies the number of the local LU's contention-winner sessions for APPC to activate automatically. Allowed values are 0 to 32767. See the Remarks section of this topic before using this parameter.
drain_target
Supplied parameter. Specifies whether the target LU can drain its waiting (outbound) allocation requests. Allowed values are AP_YES and AP_NO.
drain_source
Supplied parameter. Specifies whether the source LU can drain its waiting (outbound) allocation requests. Allowed values are AP_YES and AP_NO.
responsible
Supplied parameter. Specifies which LU is responsible for deactivating the sessions as a result of resetting the session limit for parallel-session connections. Allowed values are AP_SOURCE and AP_TARGET.
reserv6
A 5-bit reserved field.
reserv7
An 8-bit reserved field.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_CNOS_ACCEPTED

Secondary return code; APPC accepts the session limits and responsibility as specified.

AP_CNOS_NEGOTIATED

Secondary return code; APPC accepts the session limits and responsibility as negotiable by the partner LU. Values that can be negotiated are:

plu_mode_session_limit

min_conwinners_source

min_conwinners_target

responsible

drain_target

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after ALLOCATE or MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CNOS_LOCAL_RACE_REJECT
Primary return code; APPC is currently processing a **CNOS** verb issued by a local LU.
AP_CNOS_PARTNER_LU_REJECT

Primary return code; the partner LU rejected a **CNOS** request from the local LU.

AP_CNOS_MODE_CLOSED

Secondary return code; the local LU cannot negotiate a nonzero session limit because the local maximum session limit at the partner LU is zero.

AP_CNOS_MODE_NAME_REJECT

Secondary return code; the partner LU does not recognize the specified mode name.

AP_CNOS_COMMAND_RACE_REJECT

Secondary return code; the local LU is currently processing a **CNOS** verb issued by the partner LU.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the PU 2.1 node has been broken (a local area network error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_INVALID_KEY
Primary return code; the supplied key was incorrect.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_ALL_MODE_MUST_RESET

Secondary return code; APPC does not permit a nonzero session limit when the **mode_name_select** parameter indicates AP_ALL.

AP_AUTOACT_EXCEEDS_SESSLIM

Secondary return code; on the **CNOS** verb, the value for **auto_act** is greater than the value for **plu_mode_sess_lim**.

AP_BAD_LU_ALIAS

Secondary return code; APPC cannot find the specified **lu_alias** among those defined.

AP_BAD_PARTNER_LU_ALIAS

Secondary return code; APPC did not recognize the supplied **plu_alias**.

AP_BAD_SNASVCMG_LIMITS

Secondary return code; your program specified invalid settings for **plu_mode_sess_lim**, **min_conwinners_source**, or **min_conwinners_target** when **mode_name** was supplied.

AP_CHANGE_SRC_DRAINS

Secondary return code; APPC does not permit **mode_name_select** (ONE) and **drain_source** (YES) when **drain_source** (NO) is currently in effect for the specified mode.

AP_CNOS_IMPLICIT_PARALLEL

Secondary return code; APPC does not permit a program to change the session limit for a mode other than the SNASVCMG mode for the implicit partner template when the template specifies parallel sessions. (The term "template" is used because many of the actual values are yet to be filled in.)

AP_CPSVCMG_MODE_NOT_ALLOWED

Secondary return code; the mode named CPSVCMG cannot be specified as the **mode_name** on the deactivate session verb.

AP_EXCEEDS_MAX_ALLOWED

Secondary return code; your program issued a **CNOS** verb, specifying a **plu_mode_sess_lim** number and **set_negotiable** (AP_NO).

AP_MIN_GT_TOTAL

Secondary return code; the sum of **min_conwinners_source** and **min_conwinners_target** specifies a number greater than **plu_mode_sess_lim**.

AP_MODE_CLOSED

Secondary return code; the local LU cannot negotiate a nonzero session limit because the local maximum session limit at the partner LU is zero.

AP_RESET_SNA_DRAINS

Secondary return code; SNASVCMG does not support the drain parameter values.

AP_SINGLE_NOT_SRC_RESP

Secondary return code; for a single-session **CNOS** verb, APPC permits only the local (source) LU to be responsible for deactivating sessions.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

AP_CANT_RAISE_LIMITS

Secondary return code; APPC does not permit setting session limits to a nonzero value unless the limits currently are zero.

AP_LU_DETACHED

Secondary return code; a command has reset the definition of the local LU before **CNOS** tried to specify the LU.

AP_SNASVCMG_RESET_NOT_ALLOWED

Secondary return code; your local program attempted to issue the **CNOS** verb for the mode named SNASVCMG, specifying a session limit of zero.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC verb from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

CNOS identifies an LU by alias alone. If the same local LU alias is used multiple times in a domain (for backup or other purposes) and that LU alias is specified through **CNOS**, the verb can flow to a different LU than the one intended.

If CNOS is not issued to set the mode session limit before a program issues its first APPC ALLOCATE, MC_ALLOCATE, SEND_CONVERSATION, or MC_SEND_CONVERSATION, or Common Programming Interface for Communications (CPI-C) Allocate call for a given partner LU and mode, APPC will internally generate a session limit using the value from the mode definition.

When setting the limits for a parallel-session connection, the two LUs negotiate the mode session limits, drain settings, and responsibility values. APPC updates these parameters in **CNOS** to reflect the settings agreed to by both LUs during negotiation. Your program can issue DISPLAY to obtain the negotiated values for the mode session limit.

No **CNOS** negotiation occurs when setting the limits for a single session (that is, the two LUs do not negotiate drain settings or responsibility values). Therefore, coordinate the mode definition parameter settings between partner LUs using a single-session connection by defining a single session mode at each node.

As part of setting up the initial limits, **CNOS** also sets the guaranteed (that is, the minimum) number of contention-winner and contention-loser sessions and sets the automatic activation count for the source LU’s contention-winner sessions. The action of **CNOS** normally affects only the group of sessions with the specified mode name between the source LU and the target LU. Alternatively, one **CNOS** can reset the session limits of all modes for a partner LU.

APPC enforces the new mode session limit and the contention-winner polarities until one side or the other changes them by issuing a subsequent **CNOS** verb. The **CNOS** transaction is invisible at the target LU's API, regardless of which LU is the target. The results of the **CNOS** transaction can be obtained using **DISPLAY**.

This section contains:

- Setting a Session Limit to Zero

Setting a Session Limit to Zero

After **CNOS** raises the session limit above zero, it can reset the limit to zero only. It cannot set the session limit to a value that is not zero, and it cannot redistribute the number of sessions allocated as the contention winners and losers. Therefore, your program cannot change the mode session limits if the two logical units (LUs) have already set the limits to a nonzero value, regardless of which LU initiated the **CNOS** transaction.

A program can change the session limits from a nonzero value, as long as the program first changes the session limit to zero. For example, if the session limit is 8, a program can change it to 6 by first issuing **CNOS** and changing the session limit to zero, and then issuing **CNOS** again and setting the session limit to 6.

APPC can activate one or more LU-LU sessions with the specified mode name as a result of initializing the session limit. You cannot use **CNOS** to activate sessions between two LUs on the same server. APPC deactivates all LU-LU sessions for the specified mode name (or for all mode names for a partner LU) as a result of resetting the session limit to zero. APPC deactivates each session as it becomes free and does not interrupt active conversations.

A separate value, the maximum negotiable session limit, is used in **CNOS** negotiations. If the **set_negotiable** value is AP_YES, the mode session limit value given in this **CNOS** verb also sets the maximum negotiable session limit.

The **lu_alias** and **plu_alias** parameters are 8-byte ASCII character strings. If the name is fewer than eight bytes, it must be padded on the right with ASCII spaces.

You can specify the SNA-defined mode name SNASVCMG for **mode_name**. Use this mode only in a **CNOS** transaction when the source LU and the target LU use parallel user sessions. However, when resetting the session limits to zero for the SNASVCMG PU 2.1 node, the session limits of all other modes between the two LUs must be reset first. The PU 2.1 mode name is a type A EBCDIC character string. A mode name consisting of all spaces is supported. The SNA-defined mode name CPSVCMG is not allowed.

When specifying **plu_mode_sess_lim**, if the mode session limit is currently greater than zero, the value of this parameter must be zero. **CNOS** can raise the limit above zero, but the next **CNOS** must set the value to zero. A single **CNOS** cannot change the mode session limit from one nonzero number to another.

When raising the mode session limit above zero for a parallel-session connection, the target LU can negotiate its parameter to a value greater than zero and less than the specified session limit. The specified or negotiated limit then becomes the new mode session limit and is returned in this field.

The value specified for this parameter must be greater than or equal to the sum of the values specified in the **CNOS min_conwinners_source** and **min_conwinners_target** parameters.

Do not reset the SNASVCMG session limit to zero until all other mode session limits between the two LUs are reset to zero and the count of active sessions for all modes (except SNASVCMG) for the partner LU is zero.

The mode session limit should be large enough to accommodate all active conversations in the mode for all TPs.

For **min_conwinners_source** and **min_conwinners_target**, the sum of both parameters cannot exceed the mode session limit. For single-session connections, these parameters specify the desired contention-winner sessions for the target and source LUs. For the SNASVCMG mode name (with a mode session limit of 2 or 1), the specified minimum number of contention-winner sessions for the target LU must be 1. For the source LU, with a mode session limit of 2, the number must be 1; with a mode session limit of 1, the number must be 0. APPC uses these parameters only when the mode session limit is set to a nonzero value.

APPC uses auto_act only when the mode session limit is set to a nonzero value. If the value is greater than the min_conwinners_source value, APPC uses the new minimum number of contention winners for the source LU as the autoactivation limit.

> **Caution** The **auto_act** parameter can conflict with the on-demand definition of a connection. Autoactivations by either peer partner can re-establish sessions and connections, possibly resulting in a thrashing situation. Therefore, avoid specifying autoactivation between peer PU 2.1 nodes using on-demand connections.

Whether an LU deactivates a session immediately after the current conversation or after all queued conversations are complete depends on the **drain_source** and **drain_target** parameters.

If an LU is to drain its waiting (outbound) allocation requests, it continues to allocate conversations to active sessions. The responsible LU deactivates a session only when the conversation allocated to the session is deallocated and no request is waiting for allocation to any session with the specified mode name between the two LUs. The allocation of a waiting request takes precedence over the deactivation of a session.

If an LU is not to drain its waiting (outbound) allocation requests, the responsible LU deactivates a session as soon as the conversation allocated to the session is deallocated. If no conversation is allocated to the session, the responsible LU deactivates the session immediately. However, this verb does not force deallocation of active conversations.

The **responsible** and **mode_name_select** parameters are interrelated as follows:

- APPC ignores the **responsible** parameter for mode names for which the session limit is currently zero if this **CNOS** verb specifies **mode_name_select** (AP_ALL).
- If CNOS specifies **mode_name_select** (AP_ONE) with a mode session limit of zero, and the current session limit for that mode name is already zero, the **responsible** parameter must specify the same LU (SOURCE or TARGET) that is currently responsible for deactivating sessions. APPC uses this parameter only when **CNOS** specifies a mode session limit of zero.

For parallel-session connections, the **drain_source** and **mode_name_select** parameters are interrelated as follows:

- If **CNOS** specifies **mode_name_select** (AP_ALL) and **drain_source** (AP_YES), APPC ignores **drain_source** for those mode names for which the session limit is currently zero.
- If **CNOS** specifies **mode_name_select** (AP_ALL) and **drain_source** (AP_NO), APPC accepts **drain_source** for all mode names. APPC ends draining for any mode currently draining its requests.
- If **CNOS** specifies **mode_name_select** (AP_ONE), and **drain_source** (AP_YES) is currently in effect, **drain_source** (AP_NO) directs APPC to end the draining at the source LU for requests for the specified mode name.
- If **CNOS** specifies **mode_name_select** (AP_ONE) and **drain_source** (AP_NO) is currently in effect, your program must specify **drain_source** (AP_NO) again.

For parallel-session connections, the **drain_target** parameter and the **mode_name_select** parameter are interrelated as follows:

- If **CNOS** specifies **mode_name_select** (AP_ALL) and **drain_target** (AP_YES), APPC ignores **drain_target** for the mode names for which the session limit is currently zero.
- If **CNOS** specifies **mode_name_select** (AP_ALL) and **drain_target** (AP_NO), APPC accepts **drain_target** for all mode names, regardless of the current session limit. Any draining of waiting (outbound) allocation requests at the target LU is ended.
- If **CNOS** specifies **mode_name_select** (AP_ONE) and **drain_target** (AP_YES) is currently in effect, **drain_target** (AP_NO) ends the target LU's draining.
- If **CNOS** specifies **mode_name_select** (AP_ONE) and **drain_target** (AP_YES), and **drain_target** (AP_NO) is currently in effect, the target LU can either accept **drain_target** (AP_YES) or negotiate the parameter to AP_NO. After the target LU accepts the **drain_target** (AP_YES) parameter, it can drain any remaining waiting (outbound) allocation requests.

DEACTIVATE_SESSION

The **DEACTIVATE_SESSION** verb requests Microsoft® Host Integration Server to deactivate a particular session between the local logical unit (LU) and a specified partner LU, or all sessions on a particular mode.

The following structure describes the verb control block used by the **DEACTIVATE_SESSION** verb.

```
typedef struct deactivate_session {
    unsigned short  opcode;
    unsigned char   reserv2[2];
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   reserv3[8];
    unsigned char   lu_alias[8];
    unsigned char   session_id[8];
    unsigned char   plu_alias[8];
    unsigned char   mode_name[8];
    unsigned char   type;
    unsigned char   reserv4[3];
    unsigned short  sense_data;
    unsigned char   fqplu_name[17];
    unsigned char   reserv5[19];
} DEACTIVATE_SESSION;
```

Members

opcode
  Supplied parameter. Specifies the verb operation code, AP_DEACTIVATE_SESSION.
reserv2
  A reserved field.
primary_rc
  Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
  Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
reserv3
  A reserved field.
lu_alias
  Supplied parameter. Provides the 8-byte ASCII name used locally for the LU.
session_id
  Supplied parameter. Provides the 8-byte identifier of the session to deactivate (returned on the **ACTIVATE_SESSION** verb). If this field is set to 8 binary zeros, Host Integration Server deactivates all sessions for the partner LU and mode.
plu_alias
  Supplied parameter. Provides the 8-byte ASCII name used locally for the partner LU. If the default remote LU is to be used, fill this parameter with spaces. If the partner LU is to be specified with the **fqplu_name** parameter, fill this parameter with binary zeros.
mode_name
  Supplied parameter. Specifies the EBCDIC (type A) mode name.
type
  Supplied parameter. Specifies the type of deactivation. Possible values are:

  AP_DEACT_CLEANUP

  Deactivate the session immediately, without waiting for sessions to end.

  AP_DEACT_NORMAL

  Do not deactivate the session until all conversations using the session have ended.

sense_data
  Returned parameter. Specifies the deactivation sense data for the session.
reserv4
  A reserved field.
fqplu_name

Supplied parameter. Provides the partner LU name in EBCDIC (type A) when no **plu_alias** name is defined at the local node and the partner LU is located at a different node. This parameter is ignored if **plu_alias** is specified.

reserv5

A reserved field.

Return Codes

AP_OK

Primary return code; the verb executed successfully. The secondary return code indicates the polarity of the established session. The following values can be returned.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error, specified by one of the following secondary return codes:

AP_INVALID_LU_ALIAS

Secondary return code; APPC cannot find the specified **lu_alias** among those defined.

AP_INVALID_PLU_ALIAS

Secondary return code; APPC did not recognize the specified **plu_alias**.

AP_INVALID_SESSION_ID

Secondary return code; APPC did not recognize the specified **session_id**.

AP_INVALID_MODE_NAME

Secondary return code; APPC did not recognize the specified **mode_name**.

AP_INVALID_FQPLU_NAME

Secondary return code; APPC did not recognize the specified **fqplu_name**.

AP_INVALID_TYPE

Secondary return code; APPC did not recognize the specified **type**.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions occurred:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a local area network error occurred).
- The SnaBase at the TP's computer encountered an ABEND.
- The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_THREAD_BLOCKING

Primary return code; the calling thread is already in a blocking call.

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DISPLAY

The **DISPLAY** verb returns configuration information and current operating values for the SNA node.

It is recommended that you use the GetAppcConfig Windows® extension function to obtain system configuration information relating to APPC LUs. Users of 5250 emulators, in particular, should use the **GetAPPCConfig** Windows extension.

> **Note** Because of the nature of client/server architecture, the implementation of the **DISPLAY** verb on Microsoft® Host Integration Server 2004 contains important differences from the IBM Extended Services for OS/2 version 1.0 (IBM ES for OS/2 version 1.0) on which it was based.
>
> **Note** For applications that use the APPC **DISPLAY** verb in IBM ES for OS/2 version 1.0 compatibility mode and that do not use the Host Integration Server extensions for enumerating all active servers and connections, Host Integration Server will randomly choose a default **DISPLAY** connection, unless a specific default **DISPLAY** connection has been configured in SNA Manager. This connection is used as the basis for all **DISPLAY** requests. For information about specifying the default **DISPLAY** connection, see Microsoft Host Integration Server 2004 Help.

The following structure describes the verb control block used by the **DISPLAY** verb.

```
struct display {
    unsigned short  opcode;
    unsigned char   reserv2[2];
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned long   init_sect_len;
    unsigned long   buffer_len;
    unsigned char FAR * buffer_ptr;
    unsigned long  num_sections;
    unsigned long  display_len;
    unsigned long  area_needed;
    unsigned char  sna_global_info;
    unsigned char  lu62_info;
    unsigned char  am_info;
    unsigned char  tp_info;
    unsigned char  sess_info;
    unsigned char  link_info;
    unsigned char  lu_0_3_info;
    unsigned char  gw_info;
    unsigned char  x25_physical_link_info;
    unsigned char  sys_def_info;
    unsigned char  adapter_info;
    unsigned char  lu_def_info;
    unsigned char  plu_def_info;
    unsigned char  mode_def_info;
    unsigned char  link_def_info;
    unsigned char  ms_info;
    struct sna_global_info_sect FAR * sna_global_info_ptr;
    struct lu62_info_sect FAR * lu62_info_ptr;
    struct am_info_sect FAR * am_info_ptr;
    struct tp_info_sect FAR * tp_info_ptr;
    struct sess_info_sect FAR * sess_info_ptr;
    struct link_info_sect FAR * link_info_ptr;
    struct lu_0_3_info_sect FAR * lu_0_3_info_ptr;
    struct gw_info_sect FAR * gw_info_ptr;
    struct x25_physical_link_info_sect FAR * x25_physical_link_info_ptr;
    struct sys_def_info_sect FAR * sys_def_info_ptr;
    struct adapter_info_sect FAR * adapter_info_ptr;
    struct lu_def_info_sect FAR * lu_def_info_ptr;
    struct plu_def_info_sect FAR * plu_def_info_ptr;
    struct mode_def_info_sect FAR * mode_def_info_ptr;
    struct link_def_info_sect FAR * link_def_info_ptr;
    struct ms_info_sect FAR * ms_info_ptr;
} DISPLAY;
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_DISPLAY.

reserv2
A reserved field, this value must be set to NULL.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

init_sect_len
Supplied parameter. Specifies the number of bytes in the initial section of the VCB, up to the beginning of information pointers. This parameter and the **num_sections** parameter must be set to specific values depending on the format being requested. See the notes below for details.

buffer_len
Supplied parameter. Specifies the length (0 to 65535 bytes) of the passed display data buffer.

buffer_ptr
Supplied parameter. Provides the address of the display data buffer that will contain the requested information.

num_sections
Supplied parameter. Specifies the maximum number of information sections that can be returned by the verb. This parameter and the **init_sect_len** parameter must be set to specific values depending on the format being requested. See the notes below for details.

display_len
Returned parameter. Provides the total number of bytes used that are returned into the display data buffer.

area_needed
Returned parameter. Provides the total number of bytes needed for all of the displayed data.

sna_global_info
Supplied parameter. Specifies if global information is requested. Allowed values are AP_YES and AP_NO.

lu62_info
Supplied parameter. Specifies if information on all active LUs, their partners, and their modes is requested. Allowed values are AP_YES and AP_NO.

am_info
Supplied parameter. Specifies if Attach Manager information on the defined TP is requested. Allowed values are AP_YES and AP_NO.

Note This option is not supported by Host Integration Server and this parameter must be set to AP_NO.

tp_info
Supplied parameter. Specifies if information on the active TPs and any active conversations is requested. Allowed values are AP_YES and AP_NO.

Note This option is not supported by Host Integration Server and this parameter must be set to AP_NO.

sess_info
Supplied parameter. Specifies if information on sessions is requested. Allowed values are AP_YES and AP_NO.

link_info
Supplied parameter. Specifies if information on the active SNA logical lines is requested. Allowed values are AP_YES and AP_NO.

lu_0_3_info
Supplied parameter. Specifies if information on logical units type 0, 1, 2, and 3 is requested. Allowed values are AP_YES and AP_NO.

gw_info
Supplied parameter. Specifies if information on the SNA gateway is requested. Allowed values are AP_YES and AP_NO.

x25_physical_link_info
Supplied parameter. Specifies if X.25 information is required. Allowed values are AP_YES and AP_NO.

Note This option is not supported by Host Integration Server and this parameter must be set to AP_NO.

sys_def_info
Supplied parameter. Specifies if information about the default LU, node names, and default parameters for inbound and outbound implicit partners is requested. Allowed values are AP_YES and AP_NO.

adapter_info
Supplied parameter. Specifies if information about the configured communications adapters is requested. Allowed values are

AP_YES and AP_NO. This parameter must be set to AP_NO when NS/2 format is requested.

lu_def_info

Supplied parameter. Specifies if information about the defined LUs is requested. Allowed values are AP_YES and AP_NO.

plu_def_info

Supplied parameter. Specifies if information about the defined partner LUs is requested. Allowed values are AP_YES and AP_NO.

mode_def_info

Supplied parameter. Specifies if information about the defined nodes is requested. Allowed values are AP_YES and AP_NO.

link_def_info

Supplied parameter. Specifies if information about the defined logical links is requested. Allowed values are AP_YES and AP_NO.

ms_info

Supplied parameter. Specifies if information about management services is requested. Allowed values are AP_YES and AP_NO. This parameter must be set to AP_NO when NS/2 format is requested.

sna_global_info_ptr

Returned parameter. Indicates the address of the beginning of SNA global information in the data buffer.

lu62_info_ptr

Returned parameter. Indicates the address of the beginning of LU 6.2 information in the data buffer.

am_info_ptr

Returned parameter. Indicates the address of the beginning of the Attach Manager information in the data buffer.

Note This option is not supported by Host Integration Server.

tp_info_ptr

Returned parameter. Indicates the address of the beginning of TP information in the data buffer.

Note This option is not supported by Host Integration Server.

sess_info_ptr

Returned parameter. Indicates the address of the beginning of session information in the data buffer.

link_info_ptr

Returned parameter. Indicates the address of the beginning of link information in the data buffer.

lu_0_3_info_ptr

Returned parameter. Indicates the address of the beginning of LU information in the data buffer.

gw_info_ptr

Returned parameter. Indicates the address of the beginning of gateway information in the data buffer.

x25_physical_link_info_ptr

Returned parameter. Indicates the address of the beginning of X.25 information in the data buffer.

Note This option is not supported by Host Integration Server.

sys_def_info_ptr

Returned parameter. Indicates the address of the beginning of system default information in the data buffer.

adapter_info_ptr

Returned parameter. Indicates the address of the beginning of adapter information in the data buffer.

lu_def_info_ptr

Returned parameter. Indicates the address of the beginning of local LU definition information in the data buffer.

plu_def_info_ptr

Returned parameter. Indicates the address of the beginning of partner LU definition information in the data buffer.

mode_def_info_ptr

Returned parameter. Indicates the address of the beginning of mode definition information in the data buffer.

link_def_info_ptr

Returned parameter. Indicates the address of the beginning of link definition information in the data buffer.

ms_info_ptr

Returned parameter. Indicates the address of the beginning of management services information in the data buffer.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_DISPLAY_INVALID_CONSTANT

Secondary return code; the value supplied for NUM_SECTIONS or INIT_SEC_LEN is invalid.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_DISPLAY_INFO_EXCEEDS_LEN

Secondary return code; the returned **DISPLAY** information did not fit in the buffer.

AP_INVALID_DATA_SEGMENT

Secondary return code; the segment containing the data buffer is too small for the specified data length.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation has encountered an ABEND.
- The connection between the TP and the node type 2.1 has been broken (a LAN error).
- The SnaBase at the TP's computer has encountered an ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

DISPLAY identifies an LU by alias alone. If the same local LU alias is used multiple times in a domain (for backup or other purposes) and that LU alias is specified through **DISPLAY**, the verb can flow to a different LU than the one intended.

For the **DISPLAY** verb to return successfully, a specific connection must be defined in the SNA Manager program **Display Verb** dialog box. IBM originally defined the **DISPLAY** verb with the IBM OS/2 Extended Edition product which assumed a single connection. However, because Host Integration Server supports multiple connections, the specific connection associated with the **DISPLAY** verb must be configured.

The **DISPLAY** verb requires a user-supplied buffer for the return of system information. If the buffer is not large enough, APPC returns the AP_DISPLAY_INFO_EXCEEDS_LEN return code, along with the size actually needed at the time of the request (in the **area_needed** parameter). One possible strategy for the use of this verb follows:

- If the **buffer_len** value is less than the **area_needed** value returned by APPC, and the required length is less than 64 kilobytes (KB), then increase the size of the display buffer to equal or greater than the **area_needed** value.
- If the **area_needed** value is greater than 64KB, you can choose to request each information section individually. Or, you can take the following steps:
    1. Process the information sections with complete information, whose total number displayed equals the total actual number.
    2. Choose a subset of the information sections you requested that contains incomplete information, and reissue the verb requesting those information sections.
    3. Repeat steps a and b as needed.

    Note If an individual information section is greater than 64 KB, then you cannot get all of the requested information from APPC.

The **DISPLAY** verb should not be executed from different threads of the same process, since it is not thread-safe.

The **DISPLAY** verb returns AP_DISPLAY_INVALID_CONSTANT if the following values are not set for the supplied parameters for **init_sect_len** and **num_sections**:

	NS/2 format	IBM EE format	NS/2 format (Windows 2000 only)	IBM EE format (Windows 2000 only)
init_sect_len	50	44	52	48

num_sections	16	9	16	9

The AP_DISPLAY_INVALID_CONSTANT is also returned when the following parameters are not set properly:

- **reserv2** must be set to NULL.
- **am_info** must be set to AP_NO.
- **tp_info** must be set to AP_NO.
- **adapter_info** must be set to AP_NO if NS/2 format is requested.
- **ms_info** must be set to AP_NO if NS/2 format is requested.

This section contains:

- Host Integration Server Extensions
- Differences by Information Type

Host Integration Server Extensions

The Host Integration Server **DISPLAY** verb is compatible with the IBM ES for OS/2 version 1.0 **DISPLAY** verb. However, since IBM ES for OS/2 version 1.0 is a single-server system and Host Integration Server supports multiple-server systems, the **DISPLAY** verb has been extended to allow the user to target a specific server running Host Integration Server by which the **DISPLAY** verb will be processed.

To direct a **DISPLAY** verb at a particular server running Host Integration Server, place the ASCII string CSEXTNID, followed by the computer name of the server running Host Integration Server at the start of the buffer pointed to by **buffer_ptr**. The computer name is a 32-byte ASCII string and can be zero or padded with spaces.

Because the local node identifier is configured on a per-node basis for IBM ES for OS/2 version 1.0 and can be different for each connection in Host Integration Server, Host Integration Server also allows you to specify an optional connection name. This is an 8-byte ASCII string, which is placed after the 32-byte computer name. Again, the string can be zero or padded with spaces. The following example illustrates the CSEXTNID extension:

```
csextnid computername 00000000000000000000 name
```

If you do not specify a connection name, Host Integration Server returns information about the first connection configured for the Host Integration Server system.

If you do not specify a computer name, Host Integration Server will randomly choose a default **DISPLAY** computer and connection, unless a specific default **DISPLAY** connection has been configured on the server. These parameters can be configured with the SNA Manager or the Host Integration Server Administrator Client when using Host Integration Server 2004. **DISPLAY** will behave as if you specified the connection and the computer name of the server that owns the verb. For additional information about using default LUs, see Microsoft Host Integration Server 2004 Help.

Host Integration Server also allows you to use **DISPLAY** to return a list of active servers. To do so, place the string CSEXTNIDCSLISTND in the **DISPLAY** buffer and set the supplied parameters **sna_global_info**, **lu62_info**, and so on, to AP_NO. The information is returned in the **DISPLAY** buffer in the following format:

```
#activenodes             - 2 bytes
  node_name 1            - 8 bytes
  box_name 1             - 32 bytes
  .
  node_name m
  box_name m
```

In the current version of Host Integration Server, **node_name** is always SNASERVR and **box_name** is the computer name of the server.

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Differences by Information Type

Differences in the implementation of the **DISPLAY** verb between Host Integration Server and IBM ES for OS/2 are described in this section by information type. For each information type, there is a topic that describes:

- The information defined by IBM ES for OS/2 version 1.0.
- The information returned by Host Integration Server 2004.

Note Host Integration Server does not support all of the information types supported by IBM ES for OS/2 version 1.0. If an information type is not listed in this section, it is not supported by Host Integration Server.

This section contains:

- SNA Global Information
- LU 6.2 Information
- Session Information
- Active Link Information
- LU 0 to 3 Information
- System Default Information
- LU 6.2 Definition Information
- Partner Definition Information
- Mode Definition Information
- Link Definition Information
- Management Services Information

SNA Global Information

SNA global information is defined or returned as described here.

Defined by IBM ES for OS/2 version 1.0

Information on SNA global information is provided in the **sna_global_info_sect** structure as defined below.

```
typedef struct sna_global_info_sect {
    unsigned char version;
    unsigned char release;
    unsigned char net_name[8];
    unsigned char pu_name[8];
    unsigned char node_id[4];
    type_product_set_id product_set_id;
    unsigned char alias_cp_name[8];
    unsigned char node_type;
    unsigned char cp_nau_addr;
    unsigned char corr_serv_disk;
    unsigned char reserved;
    unsigned char appc_version;
    unsigned char appc_release;
    unsigned char appc_fixlevel;
} SNA_GLOBAL_INFO_SECT;
```

Members

version
  Communications Manager Extended Edition version number.
release
  Communications Manager Extended Edition release number.
net_name
  Network name, first part of fully qualified control program (CP) name, in EBCDIC (type A).
pu_name
  PU name, second part of fully qualified CP name, in EBCDIC (type A).
node_id
  4-byte hexadecimal exchange identifier.
product_set_id
  Computer product data.
alias_cp_name
  Node name (local name for CP) in ASCII.
node_type
  AP_NN, AP_EN, or AP_LEN.
cp_nau_addr
  CP NAU address where 0 means not used (an independent LU). Other legal values are 1 to 254.
corr_serv_disk
  Last four digits of corrective service disk number.
reserved
  Reserved field.
appc_version
  APPC version number.
appc_release
  APPC release number.
appc_fixlevel
  APPC patch number.

Returned by Host Integration Server

Information on SNA global information is provided in the **sna_global_info_sect** structure defined below.

```
typedef struct sna_global_info_sect {
    unsigned char version;
    unsigned char release;
    unsigned char net_name[8];
```

```
      unsigned char pu_name[8];
      unsigned char node_id[4];
      type_product_set_id product_set_id;
      unsigned char alias_cp_name[8];
      unsigned char node_type;
      unsigned char cp_nau_addr;
      unsigned char corr_serv_disk;
      unsigned char reserved;
      unsigned char appc_version;
      unsigned char appc_release;
      unsigned char appc_fixlevel;
  } SNA_GLOBAL_INFO_SECT;
```

Members

version
Major operating system (OS) version number. release
  Minor OS version number.
net_name
  Node network name in EBCDIC (type A).
pu_name
  PU name in EBCDIC (type A) associated with connection.
node_id
  Node identifier to send.
product_set_id
  Set to EBCDIC zeros.
alias_cp_name
  Node name, local name for the control program (CP), in ASCII.
node_type
  Set to AP_LEN.
cp_nau_addr
  CP NAU address where 0 means not used (an independent LU). Other legal values are 1 to 254.
corr_serv_disk
  Reserved field set to zero.
reserved
  Reserved field set to zero.›
appc_version
  Host Integration Server major version number.
appc_release
  Host Integration Server minor version number.
appc_fixlevel
  Host Integration Server patch number.

Remarks

Host Integration Server returns **version** and **release** as the major and minor OS version numbers from **GetVersion**. Because Host Integration Server 2004 has no information on the computer type, serial number, and manufacturer, **product_set_id** is set to EBCDIC zeros.

Host Integration Server does not support APPN node types, so the node type is returned as 1 (an AP_LEN node), and not 2 or 3 (AP_NN or AP_EN nodes), as defined by IBM ES for OS/2 version 1.0.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

LU 6.2 Information

Information on LUs is provided in the **lu62_info_sect** structure as defined below.

```
typedef struct lu62_info_sect {
    unsigned long  lu62_init_sect_len;
    unsigned short num_lu62s;
    unsigned short total_lu62s;
} LU62_INFO_SECT;
```

Members

lu62_init_sect_len
  Structure length.
num_lu62s
  Number of configured LUs displayed.
total_lu62s
  Total number of configured LUs.

For each configured LU, an **lu62_overlay** structure is provided as defined below.

```
typedef struct lu62_overlay {
    unsigned long  lu62_entry_len;
    unsigned long  lu62_overlay_len;
    unsigned char  lu_name[8];
    unsigned char  lu_alias[8];
    unsigned short num_plus;
    unsigned char  fqlu_name[17];
    unsigned char  default_lu;
    unsigned char  reserv3;
    unsigned char  lu_local_addr;
    unsigned short lu_sess_lim;
    unsigned char  max_tps;
    unsigned char  lu_type;
} LU62_OVERLAY;
```

Members

lu62_entry_len
  Size of this LU entry.
lu62_overlay_len
  This value contains **sizeof(**struct **lu62_overlay)**–**sizeof(lu62_entry_len)**.
lu_name
  LU name (EBCDIC type A).
lu_alias
  LU alias (ASCII).
num_plus
  Number of partner LUs.
fqlu_name
  Fully qualified LU name (EBCDIC type A).
default_lu
  For local LU group, an LU equal to the **default_lu** is used if none is specified. Legal values are AP_NO and AP_YES.

  On Host Integration Server, there is no concept of a default local LU. Therefore, the **default_lu** flag, which is set to AP_YES for the node in IBM ES for OS/2 version 1.0, is set to AP_NO for Host Integration Server.

lu_local_addr
  NAU address, 0–254.
lu_sess_lim
  Configured session limit, 0–255.
max_tps
  Maximum number of TPs, 1–255.
lu_type

Always LU type 6.2.

For each configured LU, a **plu_62_overlay** structure for the partner LU is provided as defined below.

```
typedef struct plu62_overlay {
    unsigned long  plu62_entry_len;
    unsigned long  plu62_overlay_len;
    unsigned char  plu_alias[8];
    unsigned short num_modes;
    unsigned char  plu_un_name[8];
    unsigned char  fqplu_name[17];
    unsigned char  reserv3;
    unsigned char  plu_sess_lim;
    unsigned char  dlc_name[8];
    unsigned char  adapter_num;
    unsigned char  dest_addr_len;
    unsigned char  dest_addr[32];
    unsigned int   par_sess_supp:1;
    unsigned int   reserv4:7;
    unsigned int   def_already_ver:1;
    unsigned int   def_conv_sec:1;
    unsigned int   def_sess_sec:1;
    unsigned int   reserv5:5;
    unsigned int   act_already_ver:1;
    unsigned int   act_conv_sec:1;
    unsigned int   reserv6:6;
    unsigned int   implicit_part:1;
    unsigned int   reserv7:7;
} PLU62_OVERLAY;
```

Members

plu62_entry_len
  Size of this partner LU entry.

plu62_overlay_len
  This value contains **sizeof(**struct **plu62_overlay)**–**sizeof(plu62_entry_len)**.

plu_alias
  Partner LU alias (ASCII).

num_modes
  Number of modes.

plu_un_name
  Partner LU uninterpreted name (EBCDIC).

fqplu_name
  Fully qualified partner LU name (EBCDIC type A).

reserv3
  Reserved field set to zero.›

plu_sess_lim
  Partner LU session limit, 0–255.

dlc_name
  DLC name (ASCII).

adapter_num
  DLC adapter number.

dest_addr_len
  Length of destination adapter address.

dest_addr
  Destination adapter address.

par_sess_supp
  Bit 15 of a bitfield specifying parallel sessions. Valid values are AP_NOT_SUPPORTED and AP_SUPPORTED.

reserv4
  Bits 8–14 of a bitfield specifying a reserved field set to zero.

def_already_ver
  Bit 7 of a bitfield specifying whether the configured already verified option is supported. Valid values are AP_NOT_SUPPORTED and AP_SUPPORTED.

def_conv_sec

Bit 6 of a bitfield specifying whether the configured conversation security option is supported. Valid values are AP_NOT_SUPPORTED and AP_SUPPORTED.

def_sess_sec

Bit 5 of a bitfield specifying whether the configured session security option is supported. Valid values are AP_NOT_SUPPORTED and AP_SUPPORTED.

reserv5

Bits 0–4 of a bitfield specifying a reserved field set to zero.

act_already_ver

Bit 15 of a bitfield specifying whether the active already verified option is supported. Valid values are AP_NOT_SUPPORTED and AP_SUPPORTED.

act_conv_sec

Bit 14 of a bitfield specifying whether the active conversation security option is supported. Valid values are AP_NOT_SUPPORTED and AP_SUPPORTED.

reserv6

Bits 8–13 of a bitfield specifying a reserved field set to zero.

implicit_part

Bit 7 of a bitfield specifying whether this is an implicit partner. Valid values are AP_NO and AP_YES.

For partner LU group, **implicit_part** indicates the partner LU group was configured as an implicit primary logical unit (PLU).

reserv7

Bits 0–6 of a bitfield specifying a reserved field set to zero.

Remarks

Host Integration Server returns information on all the configured LU 6.2s in the system, including the implicit PLU and all instances of implicit modes. IBM ES for OS/2 version 1.0 only returns information on those that are in use or have been in use.

For partner LU group, **implicit_part** indicates the partner LU group was configured as an implicit primary logical unit (PLU).

For mode group, **implicit_mode** bitfield returned in the **mode_overlay** structure indicates the mode group was configured as an implicit mode.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Session Information

Information on session information is provided in the **sess_info_sect** structure as defined below.

```
typedef struct sess_info_sect {
    unsigned long  sess_sect_len;
    unsigned short num_sessions;
    unsigned short total_sessions;
} SESS_INFO_SECT;
```

Members

sess_sect_len
The length of the initial session information section, including this parameter, up to the first session group. The length does not include any previous information sections.
num_sessions
The number of session groups returned by the **DISPLAY** verb into your program's buffer. This is the number of times the session group is repeated.
total_sessions
The total number of session groups. This number is the same as the number returned in the **num_sessions** member except when APPC has more information about session groups than it can place in the supplied buffer, in which case this number is larger.

For each session group, a **sess_overlay** structure for the session is provided as defined below.

```
typedef struct sess_overlay {
    unsigned long  sess_entry_len;
    unsigned long  reserv3;
    unsigned char  sess_id[8];
    unsigned long  conv_id[8];
    unsigned char  lu_alias[8];
    unsigned char  plu_alias[8];
    unsigned char  mode_name[8];
    unsigned short send_ru_size;
    unsigned short rcv_ru_size;
    unsigned short send_pacing_size;
    unsigned short rcv_pacing_size;
    unsigned char  link_id[12];
    unsigned char  daf;
    unsigned char  oaf;
    unsigned char  odai;
    unsigned char  sess_type;
    unsigned char  conn_type;
    unsigned char  reserv4;
    FPCID_OVERLAY  fpcid;
    unsigned char  cgid[4];
    unsigned char  fqlu_name[17];
    unsigned char  fqplu_name[17];
    unsigned char  pacing_type;
    unsigned char  reserv5;
 } SESS_OVERLAY;
```

Defined by IBM ES for OS/2 version 1.0

Members

sess_entry_len
Size of this session group entry.
sess_id
The internal identifier of the session for which this information is displayed.
conv_id
The unique four-byte ID of the conversation currently using this session.
lu_alias
LU alias (ASCII).

plu_alias
Partner LU alias (ASCII).
mode_name
The name of the mode (EBCDIC).
send_ru_size
The maximum RU size used on this session and this **mode_name** for sending RUs.
rcv_ru_size
The maximum RU size used on this session and this **mode_name** for receiving RUs.
send_pacing_size
The size of the send pacing window on this session.
rcv_pacing_size
The size of the receive pacing window on this session.
link_id
Name of local logical link station.
daf
The destination address field for this session.
oaf
The origin address field for this session.
odai
The origin destination address indicator field for this session.
sess_type
The type of the session. The session type can be one of the following:

SSCP_PU_SESSION

This session is between a workstation physical unit and a host system services control point. This type of session exists if the local node contains a dependent LU, or if the session has been solicited in order to send alerts to the host.

SSCP_LU_SESSION

This session is between a dependent LU and a host system services control point.

LU_LU _SESSION

This session is between two LUs.

conn_type
Indicates whether the session activation protocol follows the rules for an independent LU or a dependent LU. The connection type can be one of the following:

AP_HOST_SESSION

For dependent LU protocols, the workstation LU is defined as dependent at the host, the host LU sends the session activation request (BIND), and each workstation LU can support only one session at a time.

AP_PEER_SESSION

For independent LU protocols, an LU can send a BIND, and can have multiple sessions to different partners, or parallel sessions to the same partner LU.

fq_pc_id
Fully qualified procedure correlation identifier of the session.
cgid
Unique identifier for the conversation group of the session.
fqlu_name
The fully-qualified LU name in EBCDIC (type A).
fqplu_name
The fully-qualified partner LU name in EBCDIC (type A).
pacing_type
The pacing type can be one of the following:

AP_FIXED

Fixed pacing.

AP_ADAPTIVE

Adaptive pacing.

Returned by Host Integration Server

Members

sess_entry_len
Size of this session group entry.

sess_id
The internal identifier of the session for which this information is displayed.

conv_id
The unique four-byte ID of the conversation currently using this session.

lu_alias
LU alias (ASCII).

plu_alias
Partner LU alias (ASCII).

mode_name
The name of the mode (EBCDIC).

mode_name
The name of the mode (EBCDIC).

send_ru_size
The maximum RU size used on this session and this **mode_name** for sending RUs.

rcv_ru_size
The maximum RU size used on this session and this **mode_name** for receiving RUs.

send_pacing_size
The size of the send pacing window on this session.

rcv_pacing_size
The size of the receive pacing window on this session.

link_id
Connection name.

daf
The destination address field for this session.

oaf
The origin address field for this session.

odai
The origin destination address indicator field for this session.

sess_type
The type of the session. The session type can be one of the following:

SSCP_PU_SESSION

This session is between a workstation physical unit and a host system services control point. This value is never returned by Host Integration Server.

SSCP_LU_SESSION

This session is between a dependent LU and a host system services control point.

LU_LU _SESSION

This session is between two LUs.

conn_type
Indicates whether the session activation protocol follows the rules for an independent LU or a dependent LU. The connection type can be one of the following:

AP_HOST_SESSION

For dependent LU protocols, the workstation LU is defined as dependent at the host, the host LU sends the session activation request (BIND), and each workstation LU can support only one session at a time.

AP_PEER_SESSION

For independent LU protocols, an LU can send a BIND, and can have multiple sessions to different partners, or parallel sessions to the same partner LU.

AP_BOTH_SESSION

Connections can support both Dependent and Independent LUs.

fq_pc_id

Set to zero.

cgid

Set to zero.

type_of_pacing

The pacing type can be one of the following:

AP_FIXED

Fixed pacing.

AP_ADAPTIVE

Adaptive pacing. This value is never returned by Host Integration Server.

Active Link Information

Active link information is provided in the **link_info_sect** structure as defined below.

```
typedef struct link_info_sect {
    unsigned long  link_init_sect_len;
    unsigned short num_links;
    unsigned short total_links;
} LINK_INFO_SECT;
```

Members

link_init_sect_len
The length of the initial active link information section, including this parameter, up to the first link overlay group. The length does not include any previous information sections.

num_links
The number of active links returned by the **DISPLAY** verb into your program's buffer. This is the number of times the link overlay group is repeated.

total_links
The total number of active links. This number is the same as the number returned in the **num_links** member except when APPC has more information about active links than it can place in the supplied buffer, in which case this number is larger.

For each active link, a **link_overlay** structure for the active link is provided as defined below.

```
typedef struct link_overlay {
    unsigned long  link_entry_len;
    unsigned char  link_id[12];
    unsigned long  dlc_name[8];
    unsigned char  adapter_num;
    unsigned char  dest_addr_len;
    unsigned char  dest_addr[32];
    unsigned char  inbound_outbound;
    unsigned char  state;
    unsigned char  deact_link_flag;
    unsigned char  reserv3;
    unsigned short num_sessions;
    unsigned short ru_size;
    unsigned short reserv4;
    unsigned char  adj_fq_cp_name[17];
    unsigned char  adj_node_type;
    unsigned char  reserv5;
    unsigned char  cp_cp_sess_spt;
    unsigned char  conn_type;
    unsigned char  ls_role;
    unsigned char  line_type;
    unsigned char  tg_number;
    unsigned long  eff_capacity;
    unsigned char  conn_cost;
    unsigned char  byte_cost;
    unsigned char  propagation_delay;
    unsigned char  user_def_1;
    unsigned char  user_def_2;
    unsigned char  user_def_3;
    unsigned char  security;
    unsigned char  reserv6;
 } LINK_OVERLAY;
```

Defined by IBM ES for OS/2 version 1.0

Members

link_entry_len
Size of this link entry.

link_id
Local logical link station name (EBCDIC).

dlc_name
Data link control (DLC) name set to one of the following:

ETHERAND

IBMTRNET

IBMPCNET

SDLC

TWINAX (Not supported by Host Integration Server 2004)

X25DLC

adapter_num
Adapter number used by this link to connect to the adjacent node.
dest_addr_len
Length of the destination adapter address.
dest_addr
The destination adapter address.
inbound_outbound
The direction of the link. Values can be:

AP_OUTBOUND

The link is outbound.

AP_INBOUND

The link is inbound.

state
The state of the link. The link state can be one of the following:

AP_CONALS_PND

The process to bring up the link has started but XID negotiation has not started.

AP_XID_PND

XID negotiation is in process.

AP_CONTACT_PND

XID negotiation has been completed but the final response from the DLC has not been received.

AP_CONTACTED

The link is fully functioning.

AP_DISC_PND

A request to disconnect the link has been issued to the DLC.

AP_DISC_RQ

The operator has requested that the link be disconnected.

deact_link_flag
Deactivate logical link.
reserv3
A reserved field.
num_sessions
Number of active sessions.
ru_size
RU size.
reserv4
A reserved field.
adj_fq_cp_name
Fully qualified **cp_name** in adjacent node.
adj_node_type
The adjacent node type (NN, EN, or LEN).

cp_cp_sess_spt
  Specifies whether the link supports CP-CP sessions.
conn_type
  Indicates whether the session activation protocol follows the rules for an independent LU or a dependent LU. The connection type can be one of the following:

AP_HOST_SESSION

For dependent LU protocols, the workstation LU is defined as dependent at the host, the host LU sends the session activation request (BIND), and each workstation LU can support only one session at a time.

AP_PEER_SESSION

For independent LU protocols, an LU can send a BIND, and can have multiple sessions to different partners, or parallel sessions to the same partner LU.

AP_BOTH_SESSION

Connections can support both Dependent and Independent LUs.
ls_role
  Specifies the link station role.
line_type
  The line type.
tg_number
  Transmission group number.
eff_capacity
  Highest bit rate transmission effective capacity supported.
conn_cost
  Relative cost per connection time using this link.
byte_cost
  Relative cost of transmitting a byte over link.
propagation_delay
  Indicates amount of time for signal to travel length of link. Set to one of the following:

AP_PROP_DELAY_MINIMUM

AP_PROP_DELAY_LAN

AP_PROP_DELAY_TELEPHONE

AP_PROP_DELAY_PKT_SWITCHED_NET

AP_PROP_DELAY_SATELLITE

AP_PROP_DELAY_MAXIMUM

user_def_1
  User-defined TG characteristics.
user_def_2
  User-defined TG characteristics.
user_def_3
  User-defined TG characteristics.
security
  The security value for this link. Set to one of the following:

AP_SEC_NONSECURE

AP_SEC_PUBLIC_SWITCHED_NETWORK

AP_SEC_UNDERGROUND_CABLE

AP_SEC_SECURE_CONDUIT

AP_SEC_GUARDED_CONDUIT

AP_SEC_ENCRYPTED

AP_SEC_GUARDED_RADIATION

reserv6
  A reserved field.

Returned by Host Integration Server

Members

link_entry_len
Size of this link entry.

link_id
Connection name.

dlc_name
DLC name set to one of the following:

IBMTRNET

SDLC

X25DLC

adapter_num
Adapter number used by this link to connect to the adjacent node. Always set to zero.

dest_addr_len
Length of the destination adapter address.

dest_addr
The destination adapter address.

inbound_outbound
The direction of the link. Values can be:

AP_OUTBOUND

The link is outbound.

AP_INBOUND

The link is inbound.

state
The state of the link. The link state can be one of the following:

AP_CONALS_PND

The process to bring up the link has started but XID negotiation has not started.

AP_XID_PND

XID negotiation is in process.

AP_CONTACT_PND

XID negotiation has been completed but the final response from the DLC has not been received.

AP_CONTACTED

The link is fully functioning.

AP_DISC_PND

A request to disconnect the link has been issued to the DLC.

AP_DISC_RQ

The operator has requested that the link be disconnected.

deact_link_flag
Deactivate logical link.

num_sessions
Number of active sessions.

ru_size
RU size.

adj_fq_cp_name
Fully qualified **cp_name** in adjacent node. Always set to EBCDIC spaces.

adj_node_type
The adjacent node type. Always set to AP_LEN.

cp_cp_sess_spt

Specifies whether the link supports CP-CP sessions. Always set to AP_NO.

conn_type

Indicates whether the session activation protocol follows the rules for an independent LU or a dependent LU. The connection type can be one of the following:

AP_HOST_SESSION

For dependent LU protocols, the workstation LU is defined as dependent at the host, the host LU sends the session activation request (BIND), and each workstation LU can support only one session at a time.

AP_PEER_SESSION

For independent LU protocols, an LU can send a BIND, and can have multiple sessions to different partners, or parallel sessions to the same partner LU.

ls_role

Specifies the link station role.

line_type

The line type.

tg_number

Transmission group number. Always set to zero.

effective_capacity

Highest bit rate transmission effective capacity supported. Always set to zero.

conn_cost

Relative cost per connection time using this link. Always set to zero.

byte_cost

Relative cost of transmitting a byte over link. Always set to zero.

propagation_delay

Indicates amount of time for signal to travel length of link. This parameter is always set to AP_PROP_DELAY_MAXIMUM.

user_def_1

User-defined TG characteristics. Always set to zero.

user_def_2

User-defined TG characteristics. Always set to zero.

user_def_3

User-defined TG characteristics. Always set to zero.

security

The security value for this link. Always set to AP_SEC_NONSECURE.

LU 0 to 3 Information

LU 0 to 3 information is provided in the **lu_0_3_info_sect** structure as defined below.

```
typedef struct lu_0_3_info_sect {
    unsigned long  lu_0_3_init_sect_len;
    unsigned short num_lu_0_3s;
} LU_0_3_ INFO_SECT;
```

Members

lu_0_3_init_sect_len
The length of the initial LU 0 to 3 information section, including this parameter, up to the first link overlay group. The length does not include any previous information sections.
num_lu_0_3s
The number of LU groups. This is the number of times the lu_0_3 overlay group is repeated.

For each configured LU, an **lu_0_3_overlay** structure for the LU is provided as defined below.

```
typedef struct lu_0_3_overlay {
    unsigned long  lu_0_3_entry_len;
    unsigned char  access_type;
    unsigned char  lu_type;
    unsigned char  lu_daf;
    unsigned char  lu_short_name;
    unsigned char  lu_long_name[8];
    unsigned char  session_id[8];
    unsigned long  dlc_name[8];
    unsigned char  adapter_num;
    unsigned char  dest_addr_len;
    unsigned char  dest_addr[32];
    unsigned char  sscp_lu_sess_state;
    unsigned char  lu_lu_sess_state;
    unsigned char  link_id[12];
 } LU_0_3_OVERLAY;
```

Defined by IBM ES for OS/2 version 1.0

Members

lu_0_3_entry_len
Size of this LU entry.
access_type
The access type (AP_3270 or AP_LUA).
lu_type
The LU type (AP_LU0, AP_LU1, AP_LU2, or AP_LU3).
lu_daf
The network addressable unit of the LU for which the information is displayed.
lu_short_name
The 1-byte LU short name (ASCII).
lu_long_name
The 8-byte ASCII LU long name.
session_id
The LU-LU session ID.
dlc_name
DLC name set to one of the following:

ETHERAND

IBMTRNET

IBMPCNET

SDLC

TWINAX (Not supported by Host Integration Server 2004)

X25DLC

adapter_num
The DLC adapter number for host link.
dest_addr_len
Length of the destination adapter address.
dest_addr
The destination adapter address.
sscp_lu_sess_state
Specifies the state of the SSCP-LU session.
lu_lu_sess_state
Specifies the state of the LU-LU session. The state can be one of the following:

AP_NOT_BOUND

The LU-LU session is not bound.

AP_BOUND

The LU-LU session is bound.

AP_BINDING

The LU-LU session is in the process of binding.

AP_UNBINDING

The LU-LU session is in the process of unbinding.

link_id
Name of local logical link station being used.

Returned by Host Integration Server

Members

lu_0_3_entry_len
Size of this LU entry.
access_type
The access type (AP_3270 or AP_LUA).
lu_type
The LU type (AP_LU0, AP_LU1, AP_LU2, or AP_LU3).
lu_daf
The network addressable unit of the LU for which the information is displayed.
lu_short_name
The 1 byte ASCII LU short name.
lu_long_name
The 8 byte ASCII LU long name.
session_id
The LU-LU session ID.
dlc_name
DLC name set to one of the following:

IBMTRNET

SDLC

TWINAX (Not supported by Host Integration Server 2004)

X25DLC

adapter_num
The DLC adapter number for host link. Always set to zero.
dest_addr_len
Length of the destination adapter address.
dest_addr
The destination adapter address.
sscp_lu_sess_state

Specifies the state of the SSCP-LU session.

lu_lu_sess_state

Specifies the state of the LU-LU session. The state can be one of the following:

AP_NOT_BOUND

The LU-LU session is not bound.

AP_BOUND

The LU-LU session is bound.

AP_BINDING

The LU-LU session is in the process of binding.

AP_UNBINDING

The LU-LU session is in the process of unbinding.

link_id

Name of connection.

System Default Information

System default information is defined or returned as described here.

Defined by IBM ES for OS/2 version 1.0

Members

default_mode_name
  Mode name used for undefined mode name is sent or received.
default_local_lu_name
  Alias or local default LU.
implicit_partner_lu_support
  Indicates if implicit partner LU support is enabled.
maximum_held_alerts
  Number of alerts that will be held by NS/2 if there is no active link to a focal point.
default_tp_conversation_security_rqd
  Specifies if conversation security is used for default TPs.
maximum_mc_ll_send_size
  Maximum length of a logical record used on a mapped conversation for sending data to either the inbound or outbound implicit remote LU.
directory_for_inbound_attaches
  Name of OS/2 directory used by Attach Manager.
default_tp_operation
  Set to one of the following:

QUEUED_OPERATOR_STARTED

QUEUED_OPERATOR_PRELOADED

QUEUED_AM_STARTED

NONQUEUED_AM_STARTED

default_tp_program_type
  Set to one of the following:

BACKGROUND

FULL_SCREEN

PRESENTATION_MANAGER

VIO_WINDOWABLE

Returned by Host Integration Server

Members

default_mode_name
  Always set to NULL.
default_local_lu_name
  Always set to spaces.
implicit_partner_lu_support
  Always set to NO.
maximum_held_alerts
  Always set to zero.
default_tp_conversation_security_rqd
  Always set to NO.
maximum_mc_ll_send_size
  Always set to 16384.
directory_for_inbound_attaches
  Always returned * and indicates that the current path should be used.
default_tp_operation
  Always set to QUEUED_AM_STARTED.
default_tp_program_type
  Always set to FULL_SCREEN.

LU 6.2 Definition Information

There are no differences for this information type.

Partner Definition Information

Partner definition information is defined or returned as described here.

Defined by IBM ES for OS/2 version 1.0

Members

maximum_mc_ll_send_size
Maximum length of a logical record used on a mapped conversation for sending data to the partner LU.
number_of_alternate_aliases
Specifies number of alternate aliases configured.

Returned by Host Integration Server

maximum_mc_ll_send_size
Always set to 16384.
number_of_alternate_aliases
Always set to zero.

Mode Definition Information

Mode definition information is defined or returned as described here.

Defined by IBM ES for OS/2 version 1.0

Members

cos_name
  Name of class of service.

Returned by Host Integration Server

Members

cos_name
  Set to EBCDIC spaces.

Link Definition Information

Link definition information is provided in the **link_def_info_sect** structure as defined below.

```
typedef struct link_def_info_sect {
    unsigned long  link_def_init_sect_len;
    unsigned short num_link_def;
    unsigned short total_link_def;
} LINK_DEF_INFO_SECT;
```

Members

link_def_init_sect_len
The length of the initial link definition information section, including this parameter, up to the first link definition overlay group. The length does not include any previous information sections.

num_link_def
The number of link definitions returned by the **DISPLAY** verb into your program's buffer. This is the number of times the link definition overlay is repeated.

total_link_def
The total number of link definitions. This number is the same as the number returned in the **num_link_def** member except when APPC has more information about link definitions than it can place in the supplied buffer, in which case this number is larger.

For each link definition, a **link_def_overlay** structure for the link definition is provided as defined below.

```
typedef struct link_def_overlay {
    unsigned long  link_def_entry_len;
    unsigned char  link_name[8];
    unsigned char  adj_fq_cp_name[17];
    unsigned char  adj_node_type;
    unsigned long  dlc_name[8];
    unsigned char  adapter_num;
    unsigned char  dest_addr_len;
    unsigned char  dest_addr[32];
    unsigned char  preferred_nn_server;
    unsigned char  auto_act_link;
    unsigned char  tg_number;
    unsigned char  lim_res;
    unsigned char  solicit_sscp_session;
    unsigned char  initself;
    unsigned char  bind_support;
    unsigned char  ls_role;
    unsigned char  line_type;
    unsigned long  eff_capacity;
    unsigned char  conn_cost;
    unsigned char  byte_cost;
    unsigned char  propagation_delay;
    unsigned char  user_def_1;
    unsigned char  user_def_2;
    unsigned char  user_def_3;
    unsigned char  security;
    unsigned char  reserv;
 } LINK_OVERLAY;
```

Defined by IBM ES for OS/2 version 1.0

Members

link_def_entry_len
Size of this link definition entry.

link_name
Local logical link station name (EBCDIC).

dlc_name
Data link control (DLC) name set to one of the following:

ETHERAND

IBMTRNET

IBMPCNET

SDLC

TWINAX (Not supported by Host Integration Server 2004)

X25DLC

adj_fq_cp_name
Fully qualified **cp_name** in adjacent node.
adj_node_type
The adjacent node type (AP_ADJACENT_NN, AP_LEARN, or AP_LEN).
adapter_num
DLC adapter number used by this link.
dest_addr_len
Length of the destination adapter address.
dest_addr
The destination adapter address.
cp_cp_sess_spt
Specifies whether the link supports CP-CP sessions.
preferred_nn_server
Indicates if this is the preferred NN server.
auto_act_link
Indicates if the link should be automatically activated.
tg_number
Transmission group number.
lim_res
Indicates if this is a limited resource.
solicit_sscp_session
Indicates whether to solicit an SSCP session.
initself
Indicates if the node supports receiving INIT_SELF over this link.
bind_support
Indicates whether BIND support is available.
ls_role
Specifies the link station role.
line_type
The line type.
eff_capacity
Highest bit rate transmission effective capacity supported.
conn_cost
Relative cost per connection time using this link.
byte_cost
Relative cost of transmitting a byte over link.
propagation_delay
Indicates amount of time for signal to travel length of link. Set to one of the following:

AP_PROP_DELAY_MINIMUM

AP_PROP_DELAY_LAN

AP_PROP_DELAY_TELEPHONE

AP_PROP_DELAY_PKT_SWITCHED_NET

AP_PROP_DELAY_SATELLITE

AP_PROP_DELAY_MAXIMUM

user_def_1
User-defined TG characteristics.
user_def_2
User-defined TG characteristics.

user_def_3
User-defined TG characteristics.
security
The security value for this link. Set to one of the following:

AP_SEC_NONSECURE

AP_SEC_PUBLIC_SWITCHED_NETWORK

AP_SEC_UNDERGROUND_CABLE

AP_SEC_SECURE_CONDUIT

AP_SEC_GUARDED_CONDUIT

AP_SEC_ENCRYPTED

AP_SEC_GUARDED_RADIATION

Returned by Host Integration Server

Members

link_def_entry_len
Size of this link definition entry.
link_name
Local logical link station name (EBCDIC).
dlc_name
Data link control (DLC) name set to one of the following:

IBMTRNET

SDLC

X25DLC

adj_fq_cp_name
Fully qualified **cp_name** in adjacent node. Always set to EBCDIC spaces.
adj_node_type
The adjacent node type. Always set to AP_LEN.
adapter_num
DLC adapter number used by this link. Always set to zero.
dest_addr_len
Length of the destination adapter address.
dest_addr
The destination adapter address.
cp_cp_sess_spt
Specifies whether the link supports CP-CP sessions. Always set to AP_NO.
preferred_nn_server
Indicates if this is the preferred NN server.
auto_act_link
Indicates if the link should be automatically activated.
tg_number
Transmission group number. Always set to zero.
lim_res
Indicates if this is a limited resource.
solicit_sscp_session
Indicates whether to solicit an SSCP session.
initself
Indicates if the node supports receiving INIT_SELF over this link.
bind_support
Indicates whether BIND support is available.
ls_role
Specifies the link station role.
line_type
The line type.
effective_capacity
Highest bit rate transmission effective capacity supported. Always set to zero.

conn_cost
  Relative cost per connection time using this link. Always set to zero.
byte_cost
  Relative cost of transmitting a byte over link. Always set to zero.
propagation_delay
  Indicates amount of time for signal to travel length of link. Set to one of the following: Always set to AP_PROP_DELAY_MAXIMUM.
user_def_1
  User-defined TG characteristics. Always set to zero.
user_def_2
  User-defined TG characteristics. Always set to zero.
user_def_3
  User-defined TG characteristics. Always set to zero.
security
  The security value for this link. Always set to AP_SEC_NONSECURE.

Management Services Information

Information on management services is provided in the **ms_info_sect** structure as defined below.

```
typedef struct ms_info_sect {
    unsigned long  ms_init_sect_len;
    unsigned char  held_mds_mu_alerts;
    unsigned char  held_nmvt_alerts;
    unsigned short num_fps;
    unsigned short total_fps;
    unsigned short num_ms_appls;
    unsigned short total_ms_appls;
    unsigned short num_act_trans;
    unsigned short total_act_trans;
} MS_INFO_SECT;
```

Members

ms_init_sect_len
The length of the initial MS information section, including this parameter, up to the first MS focal point group. The length does not include any previous information sections.

held_mds_mu_alerts
The number of management service MDS alerts being held that will be sent to the management service alert focal point (FP) when one becomes available.

held_nmvt_alerts
The number of management service NMVT alerts being held that will be sent to the management service alert focal point (FP) when one becomes available.

num_fps
The number of management service focal points (MS FPs) for which the information listed under MS Focal Point Group is returned. This is the number of times the information group is repeated.

total_fps
The total number of management service focal points for which APPC has information. This number is the same as the number returned in the **num_fps** member except when APPC has more information about management service focal points than it can place in the supplied buffer, in which case this number is larger.

num_ms_appls
The number of registered MS applications for which the information listed under Registered MS Application Group is returned. This is the number of times the information group is repeated.

total_ms_appls
The total number of registered MS applications for which APPC has information. This number is the same as the number returned in the **num_ms_appls** member except when APPC has more information about registered MS applications than it can place in the supplied buffer, in which case this number is larger.

num_act_trans
The number of MS active transactions for which the information listed under MS Active Transaction Group is returned. This is the number of times the information group is repeated.

total_act_trans
The number or MS active transactions for which APPC has information. This number is the same as the number returned in the **num_act_trans** member except when APPC has more information about registered MS active transactions than it can place in the supplied buffer, in which case this number is larger.

For each local and remote management service focal point group, an **ms_fp_overlay** structure for the focal point group is provided as defined below.

```
typedef struct ms_fp_overlay {
    unsigned long  ms_fp_entry_len;
    unsigned char  ms_appl_name[8];
    unsigned char  ms_category[4];
    unsigned char  fp_fq_cp_name[17];
    unsigned char  bkup_appl_name[8];
    unsigned char  bkup_fp_fq_cp_name[17];
    unsigned char  reserv1;
    unsigned char  fp_type;
    unsigned char  fp_status;
    unsigned char  fp_routing;
} MS_FP_OVERLAY;
```

Members

ms_fp_entry_len
Size of this management service focal point information entry.

ms_appl_name
The management service application name of the current active focal point (EBCDIC).

ms_category
The management service category.

fp_fq_cp_name
The fully qualified control point name of the node on which the current (active) management service focal point is located (EBCDIC). If the local node has no focal point, a value of all EBCDIC space characters (0x40) is returned.

bkup_appl_name
The management service application name of the backup focal point, if one is known (EBCDIC).

bkup_fp_fq_cp_name
The fully qualified control point name of the node on which the backup management service focal point is located, if one is known (EBCDIC). If the local node has no backup focal point, a value of all EBCDIC space characters (0x40) is returned.

fp_type
The type of the focal point for the local management service entry point node. The focal point type depends on how the focal point-end point relationship was established, and on whether the local node is configured as an NN, EN, or LEN node (an EN without CP-CP session support). The type can be one of the following:

AP_EXPLICIT_PRIMARY_FP

The current focal point type is explicit primary.

AP_BACKUP_FP

The current focal point type is backup.

AP_DEFAULT_PRIMARY_FP

The current focal point type is default primary.

AP_DOMAIN_FP

The current focal point type is domain.

AP_HOST_FP

The current focal point type is host.

AP_NO_FP

Currently the local node has no focal point.

fp_status
The status of the management service focal point. The status can be one of the following:

AP_NOT_ACTIVE

The focal point has been acquired, but has since become unavailable.

AP_ACTIVE

The remote focal point has been acquired and is available.

AP_PENDING

A request has been sent to a remote primary or backup focal point to acquire that FP, and its reply has not yet been received.

AP_NEVER_ACTIVE

The focal point has never been acquired, but one or more registered management service applications have requested focal point information.

fp_routing
The routing used to send unsolicited requests to the management service focal point when the local node is an EN. Note that requests from an NN are always sent directly to the focal point.

The routing can be one of the following:

AP_DEFAULT

Unsolicited management service requests destined for the focal point are sent from the EN to its serving NN for forwarding to the focal point.

AP_DIRECT

Unsolicited management service requests destined for the focal point are sent directly to the focal point.

Remarks

When a program registers a management service application name, it can request focal point information. When APPC acquires the focal point, it passes the program the focal point information, which includes the type of routing to use to send unsolicited management service requests to the focal point.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

APPC TP Verbs

This section describes the Advanced Program-to-Program Communications (APPC) transaction program (TP) verbs. The description of each verb provides:

- A definition of the verb.
- The structure defining the verb control block (VCB) used by the verb. The structure is contained in the WINAPPC.H file. The length of each VCB field is in bytes. Fields beginning with reserv (for example, reserv2) are reserved.
- The parameters (VCB fields) supplied to and returned by APPC. A description of each parameter is provided, along with its possible values and other information.
- The conversation state(s) in which the verb can be issued.
- The state(s) to which the conversation can change upon return from the verb. Conditions that do not cause a state change are not noted. For example, parameter checks and state checks do not cause a state change.
- Additional information describing the verb.

Most parameters supplied to and returned by APPC are hexadecimal values. To simplify coding, these values are represented by meaningful symbolic constants, which are established by **#define** statements in the WINAPPC.H header file. For example, the **opcode** (operation code) member of the **mc_send_data** structure used by the **MC_SEND_DATA** verb is the hexadecimal value represented by the symbolic constant AP_M_SEND_DATA. Use only the symbolic constants when writing TPs.

This section contains:

- GET_TP_PROPERTIES
- SET_TP_PROPERTIES
- TP_ENDED
- TP_STARTED

GET_TP_PROPERTIES

The **GET_TP_PROPERTIES** verb returns attributes of the transaction program (TP) and the current transaction.

The following structure describes the verb control block used by the **GET_TP_PROPERTIES** verb.

```
struct get_tp_properties {
    unsigned short  opcode;
    unsigned char   opext;
    unsigned char   reserv2;
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   tp_id[8];
    unsigned char   tp_name[64];
    unsigned char   lu_alias[8];
    unsigned char   luw_id[26];
    unsigned char   fqlu_name[17];
    unsigned char   reserve3[10];
    unsigned char   user_id[10];
    unsigned char   prot_luw_id[26];
    unsigned char   pwd[10];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_GET_TP_PROPERTIES.

opext
Supplied parameter. Specifies the verb operation extension. If the AP_EXTD_VCB bit is set, this indicates that the **get_tp_properties** structure includes the **prot_luw_id** member used for Sync Point support. Otherwise the verb control block ends immediately after the **user_id** member.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

tp_name
Returned parameter. Supplies the TP name of the TP that issued the verb. The name is returned as a 64-byte EBCDIC string, padded on the right with EBCDIC spaces.

lu_alias
Returned parameter. Supplies the alias name assigned to the local LU. It is returned as an 8-byte ASCII string padded on the right with ASCII spaces.

luw_id
Returned parameter. Supplies the unprotected logical unit-of-work identifier for the transaction in which the TP is participating. Several TPs can be involved in a transaction. This identifier, which is assigned on behalf of the TP initiating the transaction, allows the conversation that makes up the transaction to be logically connected.

The **luw_id** can be represented as an **luw_id_overlay** structure with the following fields:

```
typedef struct luw_id_overlay {
unsigned char fqla_name_len;
unsigned char fqla_name[17];
nsigned char instance[6];
unsigned char sequence[2];
} LUW_ID_OVERLAY;
```

luw_id.fqla_name_len

A 1-byte length of the fully qualified LU name for the LU of the originating TP.

luw_id.fqla_name

The fully qualified name of the LU for the originating TP. The name is returned as a 17-byte EBCDIC string, consisting of the NETID, a period, and the LU name. If the length of the name is fewer than 17 bytes, the **instance** and **sequence** numbers follow immediately. (Note that because of this, you should not use the fields of the **luw_id_overlay** structure to access those values. These are provided for compatibility only.)

luw_id.instance

A 6-byte string uniquely generated by the LU for the originating TP.

luw_id.sequence

A 2-byte number that indicates the segment of unit-of-work. (This is always set to 1, if Sync Point is not supported.)

If the **luw_id** length is fewer than 26 bytes, it is padded on the right with EBCDIC spaces.

fqlu_name
Returned parameter. Supplies the fully qualified name of the local LU. The name is returned as a 17-byte EBCDIC string, consisting of the NETID, a period, and the LU name. The name is padded on the right with EBCDIC spaces.

reserve3
A reserved field.

user_id
Supplied parameter. Indicates the **user_id** supplied by the initiating TP in the allocation request. The name is supplied as a 10-byte EBCDIC string, padded on the right with EBCDIC spaces.

prot_luw_id
Returned parameter. Contains the protected logical unit-of-work identifier for the transaction in which the TP is participating, if the conversation was allocated with **synclevel** Sync Point.

Several TPs can be involved in a transaction. This identifier, which is assigned on behalf of the TP initiating the transaction, allows the conversation that makes up the transaction to be logically connected.

The **prot_luw_id** can be represented as an **luw_id_overlay** structure with the following fields:

```
typedef struct luw_id_overlay {
unsigned char fqla_name_len;
unsigned char fqla_name[17];
nsigned char instance[6];
unsigned char sequence[2];
} LUW_ID_OVERLAY;
```

luw_id.fqla_name_len

A 1-byte length of the fully qualified LU name for the LU of the originating TP.

luw_id.fqla_name

The fully qualified name of the LU for the originating TP. The name is returned as a 17-byte EBCDIC string, consisting of the NETID, a period, and the LU name. If the length of the name is fewer than 17 bytes, the **instance** and **sequence** numbers follow immediately. (Note that because of this, you should not use the fields of the **luw_id_overlay** structure to access those values. These are provided for compatibility only).

luw_id.instance

A 6-byte string uniquely generated by the LU for the originating TP.

luw_id.sequence

A 2-byte number that indicates the segment of unit-of-work. (This is always set to 1, if Sync Point is not supported.)

If the **prot_luw_id** length is fewer than 26 bytes, it is padded on the right with EBCDIC spaces.

pwd
Supplied parameter. Contains the password of the **user_id** of the initiating TP in the allocation request. The password is supplied as a 10-byte EBCDIC string, padded on the right with EBCDIC spaces.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_TP_BUSY

Primary return code; the local TP has issued a call to APPC while APPC was processing another call for the same TP. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **tp_id**.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

This verb relates to the TP rather than a specification conversation, so the TP can issue the verb in any state. There is no state change.

The **luw_id** member contains fields for **fqla_name_len** (the length of the fully qualified LU name of the LU originating the TP), **fqla_name** (the fully qualified name of the LU originating the TP), **instance** (generated uniquely by the LU originating the TP), and **sequence** (always set to 1 and indicating the segment of unit-of-work).

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SET_TP_PROPERTIES

The **SET_TP_PROPERTIES** verb enables a transaction program (TP) to set its logical unit-of-work identifiers (LUWIDs) to either an existing value, by providing the LUWIDs, or request that the SNA server generate new ones and use them from then on. When the LUWID is generated by the SNA server, it is guaranteed to be unique. This verb is used only if Sync Point support is enabled.

The following structure describes the verb control block (VCB) used by the **SET_TP_PROPERTIES** verb.

```
struct set_tp_properties {
    unsigned short  opcode;
    unsigned char   opext;
    unsigned char   reserv2;
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   tp_id[8];
    unsigned char   set_prot_id;
    unsigned char   new_prot_id;
    unsigned char   prot_id[26];
    unsigned char   set_unprot_id;
    unsigned char   new_unprot_id;
    unsigned char   unprot_id[26];
    unsigned char   set_user_id;
    unsigned char   reserv3;
    unsigned char   user_id[10];
    unsigned char   reserv4[10];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_SET_TP_PROPERTIES.

opext
Supplied parameter. Specifies the verb operation extension. The AP_EXTD_VCB bit must be set to indicate that the **set_tp_properties** structure requires Sync Point support.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

set_prot_id
Supplied parameter. Indicates whether the **prot_id** member should be modified. Legal values are AP_YES or AP_NO.

new_prot_id
Supplied parameter. Indicates whether Microsoft® Host Integration Server should use the supplied **prot_id** LUWID member or create a new LUWID. Legal values are AP_YES (create a new LUWID) or AP_NO (use the supplied LUWID).

prot_id
This member is the protected logical unit-of-work identifier for the transaction in which the TP is participating. It is ignored if **set_prot_id** is AP_NO. It is a supplied parameter if **new_unprot_id** is AP_NO or a returned parameter if **new_unprot_id** is AP_YES.

Several TPs can be involved in a transaction. This identifier, which is assigned on behalf of the TP initiating the transaction, allows the conversation that makes up the transaction to be logically connected.

The **prot_id** can be represented as an **luw_id_overlay** structure with the following fields:

```
typedef struct luw_id_overlay {
unsigned char fqla_name_len;
unsigned char fqla_name[17];
nsigned char instance[6];
unsigned char sequence[2];
} LUW_ID_OVERLAY;
```

luw_id.fqla_name_len

A 1-byte length of the fully qualified LU name for the LU of the originating TP.

luw_id.fqla_name

The fully qualified name of the LU for the originating TP. The name is returned as a 17-byte EBCDIC string, consisting of the NETID, a period, and the LU name. If the length of the name is fewer than 17 bytes, the **instance** and **sequence** numbers follow immediately. (Note that because of this, you should not use the fields of the **luw_id_overlay** structure to access those values. These are provided for compatibility only).

luw_id.instance

A 6-byte string uniquely generated by the LU for the originating TP.

luw_id.sequence

A 2-byte number that indicates the segment of unit-of-work. (This is always set to 1 if Sync Point is not supported.)

If the **luw_id** length is fewer than 26 bytes, it is padded on the right with EBCDIC spaces.

set_unprot_id
Supplied parameter. Indicates whether the **unprot_id** member should be modified. Legal values are AP_YES or AP_NO.

new_unprot_id
Supplied parameter. Indicates whether Host Integration Server should use the supplied **unprot_id** LUWID member or create a new LUWID. Legal values are AP_YES (create a new LUWID) or AP_NO (use the supplied LUWID).

unprot_id
This member is the unprotected logical unit-of-work identifier for the transaction in which the TP is participating. It is ignored if **set_unprot_id** is AP_NO. It is a supplied parameter if **new_unprot_id** is AP_NO or a returned parameter if **new_unprot_id** is AP_YES.

Several TPs can be involved in a transaction. This identifier, which is assigned on behalf of the TP initiating the transaction, allows the conversation that makes up the transaction to be logically connected.

The **prot_id** can be represented as an **luw_id_overlay** structure with the following fields:

```
typedef struct luw_id_overlay {
unsigned char fqla_name_len;
unsigned char fqla_name[17];
nsigned char instance[6];
unsigned char sequence[2];
} LUW_ID_OVERLAY;
```

luw_id.fqla_name_len

A 1-byte length of the fully qualified LU name for the LU of the originating TP.

luw_id.fqla_name

The fully qualified name of the LU for the originating TP. The name is returned as a 17-byte EBCDIC string, consisting of the NETID, a period, and the LU name. If the length of the name is fewer than 17 bytes, the **instance** and **sequence** numbers follow immediately. (Note that because of this, you should not use the fields of the **luw_id_overlay** structure to access those values. These are provided for compatibility only.)

luw_id.instance

A 6-byte string uniquely generated by the LU for the originating TP.

luw_id.sequence

A 2-byte number that indicates the segment of unit-of-work. (This is always set to 1 if Sync Point is not supported.)

If the **luw_id** length is fewer than 26 bytes, it is padded on the right with EBCDIC spaces.

set_user_id
Supplied parameter. Indicates whether the **user_id** member should be modified. Legal values are AP_YES or AP_NO.

reserve3
A reserved field.

user_id
Supplied parameter. Indicates the **user_id** that should be used by the initiating TP in the allocation request. The name is a 10-byte EBCDIC string, padded on the right with EBCDIC spaces. This parameter is ignored if **set_user_id** is AP_NO.

reserve4
A reserved field.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_TP_BUSY
Primary return code; the local TP has issued a call to APPC while APPC was processing another call for the same TP. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **tp_id**.
AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

This verb relates to the TP rather than a specification conversation, so the TP can issue the verb in any state. There is no state change.

The **prot_id** and **unprot_id** members contain fields for **fqla_name_len** (the length of the fully qualified LU name of the LU originating the TP), **fqla_name** (the fully qualified name of the LU originating the TP), **instance** (generated uniquely by the LU originating the TP), and **sequence** (always set to 1 and indicating the segment of unit-of-work).

It is the responsibility of the application (the Sync Point support component) to transmit the new LUWID PS header to the partner Sync Point support when the protected LUWID is changed. Similarly, when the new LUWID PS header is received, the application must inform the LU by issuing a **SET_TP_PROPERTIES** verb.

TP_ENDED

The **TP_ENDED** verb is issued by both the invoking and invoked transaction program (TP), and notifies APPC that the TP is ending.

For the Microsoft® Windows® version 3.*x* system, it is recommended that you use the WinAsyncAPPC function rather than the blocking version of this call.

The following structure describes the verb control block (VCB) used by the **TP_ENDED** verb.

```
struct tp_ended {
    unsigned short  opcode;
    unsigned char   opext;
    unsigned char   reserv2;
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   tp_id[8];
    unsigned char   type;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_TP_ENDED.
opext
Supplied parameter. Specifies the verb operation extension. This field is not used by the **TP_ENDED** verb.
reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.
type
Supplied parameter. Specifies the type of termination to be performed. The following are allowed values:

- AP_HARD indicates that all active verbs for the TP are terminated; the session(s) being used by the conversation(s) are ended. Both the local TP and the partner TP can receive conversation failure return codes (AP_DEALLOC_ABEND for mapped conversations and AP_DEALLOC_ABEND_PROG for basic conversations).
- AP_SOFT indicates that the TP waits for all active verbs to complete; the session being used by the conversation remains active.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_TP_ID

Secondary return code; APPC did not recognize the **tp_id** as an assigned TP identifier.

AP_BAD_TYPE

Secondary return code; the specified **type** value was not recognized by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.

- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_TP_BUSY
Primary return code; the local TP has issued a call to APPC while APPC was processing another call for the same TP. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **tp_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

In response to **TP_ENDED**, APPC frees the resources used by the TP. After this verb executes, the TP identifier is no longer valid; the TP cannot issue any more APPC conversation verbs.

The conversation can be in any state when the TP issues this verb.

If the conversation is in SEND state, **TP_ENDED** performs the function of DEALLOCATE or MC_DEALLOCATE with **dealloc_type** set to AP_FLUSH.

If the conversation is in a state other than RESET or SEND, **TP_ENDED** performs the function of **DEALLOCATE** or **MC_DEALLOCATE** with **dealloc_type** set to AP_ABEND (for a mapped conversation) or AP_ABEND_PROG (for a basic conversation).

After successful execution (**primary_rc** is AP_OK), there is no APPC state.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

TP_STARTED

The **TP_STARTED** verb is issued by the invoking transaction program (TP), and notifies APPC that the TP is starting.

For the Microsoft® Windows® version 3.*x* system, it is recommended that you use the WinAsyncAPPC function rather than the blocking version of this call.

The following structure describes the verb control block used by the **TP_STARTED** verb.

```
struct tp_started {
    unsigned short  opcode;
    unsigned char   opext;
    unsigned char   reserv2;
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   lu_alias[8];
    unsigned char   tp_id[8];
    unsigned char   tp_name[64];
    unsigned char   syncpoint_rqd;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_TP_STARTED.

opext
Supplied parameter. Specifies the verb operation extension. If the AP_EXTD_VCB bit is set, this indicates that the **tp_started** structure includes the **syncpoint_rqd** member used for Sync Point support. Otherwise, the verb control block ends immediately after the **tp_name** member.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

lu_alias
Supplied parameter. Specifies the alias by which the local LU is known to the local TP.

The name must match an LU alias established during configuration. APPC checks the LU alias against the current Host Integration Server configuration file. Due to the client/server architecture used by Host Integration Server, however, this parameter is not validated until an ALLOCATE or MC_ALLOCATE is performed.

This parameter is an 8-byte ASCII character string. It can consist of the following ASCII characters:

- Uppercase letters
- Numerals from 0 through 9
- Spaces
- Special characters $, #, % and @

The first character of this string cannot be a space.

If the value of this parameter is fewer than eight bytes in length, pad it on the right with ASCII spaces (0x20).

To use an LU from the default LU pool, set this field to eight hexadecimal zeros. For more information, see Default LUs.

tp_id
Returned parameter. Identifies the newly established TP.

tp_name
Supplied parameter. Specifies the name of the local TP.

Under the Host Integration Server implementation of APPC, this parameter is ignored when issued by **TP_STARTED**. However, this parameter is required if the program runs under the IBM ES for OS/2 version 1.0 implementation of APPC.

This parameter is a 64-byte EBCDIC character string and is case-sensitive. The **tp_name** parameter can consist of the following EDCDIC characters:

- Uppercase and lowercase letters
- Numerals from 0 through 9
- Special characters $, #, @, and period (.)

If the TP name is fewer than 64 bytes in length, use EBCDIC spaces (0x40) to pad it on the right.

The SNA convention for a service TP name is up to four characters. The first character is a hexadecimal byte between 0x00 and 0x3F.

syncpoint_rqd
This optional parameter is only applicable if the AP_EXTD_VCB bit is set in the **opext** parameter and Sync Point services are required.

- AP_YES if Sync Point is required.
- AP_NO if Sync Point is not required.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_TP_BUSY
Primary return code; the local TP has issued a call to APPC while APPC was processing another call for the same TP.
AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.
AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

In response to **TP_STARTED**, APPC generates a TP identifier for the invoking TP. This identifier is a required parameter for subsequent APPC verbs issued by the invoking TP.

This must be the first APPC verb issued by the invoking TP. Consequently, no prior APPC state exists.

If the verb executes successfully (**primary_rc** is AP_OK), the state changes to RESET.

This section contains:

- Default LUs

Default LUs

Any LU can be configured to be in a pool of default local LUs available for use by invoking transaction programs (TPs).

For a user or group who will be using TPs, 5250 emulators, and/or APPC applications, you can assign a default local APPC LU and a default remote APPC LU. If the invoking TP specifies the LU alias that it uses (in TP_STARTED), that LU alias must match a local APPC LU alias on the supporting SNA server. If the invoking TP leaves the LU alias blank in **TP_STARTED**, one of two methods for designating a default LU must be carried out on the supporting SNA server:

- Assign a default local APPC LU to the user or group that starts the invoking TP (that is, the user or group logged on at the system from which **TP_STARTED** is issued).

  —or—

- Designate one or more LUs as members of the default outgoing local APPC LU pool. The SNA server first attempts to determine the default local APPC LU of the associated user or group, then attempts to assign an available LU from the default outgoing local APPC LU pool; if these attempts fail, the SNA server rejects the request.

In AS/400 environments, the ability to assign default APPC LUs to users or groups is especially useful because it gives the administrator centralized control over these LU assignments. In such environments, for each user or group, assign both a default local APPC LU and a default remote APPC LU. Assigning a default local APPC LU for each user fulfills the normal AS/400 procedure of assigning local LUs on a per-user basis. Assigning a default remote APPC LU is equivalent to assigning a default AS/400 for the user to connect to, since the remote LU designates the AS/400. By making these assignments, the administrator can centrally control the default AS/400 that a 5250 emulator user connects to.

For more information, see Microsoft Host Integration Server 2004 Help.

APPC Conversation Verbs

This section describes the Advanced Program-to-Program Communications (APPC) conversation verbs. The description of each verb provides:

- A definition of the verb.
- The structure defining the verb control block (VCB) used by the verb. The structure is contained in the WINAPPC.H file. The length of each VCB field is in bytes. Fields beginning with reserv (for example, reserv2) are reserved.
- The parameters (VCB fields) supplied to and returned by APPC. A description of each parameter is provided, along with its possible values and other information.
- The conversation state(s) in which the verb can be issued.
- The state(s) to which the conversation can change upon return from the verb. Conditions that do not cause a state change are not noted. For example, parameter checks and state checks do not cause a state change.
- Additional information describing the verb.

Mapped conversation verbs are preceded by an **MC_** designator. For example, the mapped conversation verb **MC_ALLOCATE** corresponds to the basic conversation verb **ALLOCATE**.

Most parameters supplied to and returned by APPC are hexadecimal values. To simplify coding, these values are represented by meaningful symbolic constants, which are established by **#define** statements in the WINAPPC.H header file. For example, the **opcode** (operation code) member of the **mc_send_data** structure used by the **MC_SEND_DATA** verb is the hexadecimal value represented by the symbolic constant AP_M_SEND_DATA. Use only the symbolic constants when writing transaction programs (TPs).

This section contains:

- ALLOCATE
- CONFIRM
- CONFIRMED
- DEALLOCATE
- FLUSH
- GET_ATTRIBUTES
- GET_LU_STATUS
- GET_STATE
- GET_TYPE
- MC_ALLOCATE
- MC_CONFIRM
- MC_CONFIRMED
- MC_DEALLOCATE
- MC_FLUSH
- MC_GET_ATTRIBUTES
- MC_POST_ON_RECEIPT
- MC_PREPARE_TO_RECEIVE
- MC_RECEIVE_AND_POST
- MC_RECEIVE_AND_WAIT
- MC_RECEIVE_IMMEDIATE
- MC_RECEIVE_LOG_DATA
- MC_REQUEST_TO_SEND
- MC_SEND_CONVERSATION
- MC_SEND_DATA
- MC_SEND_ERROR
- MC_TEST_RTS
- MC_TEST_RTS_AND_POST
- POST_ON_RECEIPT
- PREPARE_TO_RECEIVE
- RECEIVE_ALLOCATE

- RECEIVE_AND_POST
- RECEIVE_AND_WAIT
- RECEIVE_IMMEDIATE
- RECEIVE_LOG_DATA
- REQUEST_TO_SEND
- SEND_CONVERSATION
- SEND_DATA
- SEND_ERROR
- TEST_RTS
- TEST_RTS_AND_POST

ALLOCATE

The **ALLOCATE** verb is issued by the invoking transaction program (TP). It allocates a session between the local logical unit (LU) and partner LU and (in conjunction with RECEIVE_ALLOCATE) establishes a conversation between the invoking TP and the invoked TP. After this verb executes successfully, APPC generates a conversation identifier (**conv_id**). The **conv_id** is a required parameter for all other APPC conversation verbs.

The following structure describes the verb control block used by the **ALLOCATE** verb.

```
struct allocate {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    conv_type;
    unsigned char    synclevel;
    unsigned char    reserv3[2];
    unsigned char    rtn_ctl;
    unsigned char    reserv4;
    unsigned long    conv_group_id;
    unsigned long    sense_data;
    unsigned char    plu_alias[8];
    unsigned char    mode_name[8];
    unsigned char    tp_name[64];
    unsigned char    security;
    unsigned char    reserv5[11];
    unsigned char    pwd[10];
    unsigned char    user_id[10];
    unsigned short   pip_dlen;
    unsigned char FAR * pip_dptr;
    unsigned char    reserv7;
    unsigned char    fqplu_name[17];
    unsigned char    reserv8[8];
    unsigned long    proxy_user;
    unsigned long    proxy_domain;
    unsigned char    reserv9[16];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_ALLOCATE.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION. If the AP_EXTD_VCB bit is set, this indicates that an extended version of the verb control block is used. In this case, the **ALLOCATE** structure includes Sync Point support or privileged proxy feature support.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED.

conv_id
Returned parameter. Identifies the conversation established between the two TPs.

conv_type
Supplied parameter. Used only by **ALLOCATE** to specify the type of conversation to allocate and is either AP_BASIC_CONVERSATION or AP_MAPPED_CONVERSATION.

If **ALLOCATE** establishes a mapped conversation, the local TP must issue basic-conversation verbs and provide its own mapping layer to convert data records to logical records and logical records to data records. The partner TP can issue basic-conversation verbs and provide the mapping layer, or it can use mapped-conversation verbs (if the partner TP is using an implementation of APPC that supports mapped-conversation verbs). For more information, see your IBM SNA manual(s).

synclevel

Supplied parameter. Specifies the synchronization level of the conversation. It determines whether the TPs can request confirmation of receipt of data and confirm receipt of data.

- AP_NONE specifies that confirmation processing will not be used in this conversation.
- AP_CONFIRM_SYNC_LEVEL specifies that the TPs can use confirmation processing in this conversation.
- AP_SYNCPT specifies that TPs can use Sync Point Level 2 confirmation processing in this conversation.

reserv3

A reserved field.

rtn_ctl

Supplied parameter. Specifies when the local LU, acting on a session request from the local TP, should return control to the local TP. For information about sessions, see About Transaction Programs.

- AP_IMMEDIATE specifies that the LU allocates a contention-winner session, if one is immediately available, and returns control to the TP.
- AP_WHEN_SESSION_ALLOCATED specifies that the LU does not return control to the TP until it allocates a session or encounters one of the errors documented in Return Codes in this topic. (If the session limit is zero, the LU returns control immediately.) If a session is not available, the TP waits for one.
- AP_WHEN_SESSION_FREE specifies that the LU allocates a contention-winner or contention-loser session, if one is available or able to be activated, and returns control to the TP. If an error occurs, (as documented in Return Codes in this topic) the call will return immediately with the error in the **primary_rc** and **secondary_rc** fields.
- AP_WHEN_CONWINNER_ALLOCATED specifies that the LU does not return control until it allocates a contention-winner session or encounters one of the errors documented in Return Codes in this topic. (If the session limit is zero, the LU returns control immediately.) If a session is not available, the TP waits for one.
- AP_WHEN_CONV_GROUP_ALLOCATED specifies that the LU does not return control to the TP until it allocates the session specified by **conv_group_id** or encounters one of the errors documented in Return Codes in this topic. If a session is not available, the TP waits for it to become free.

  Note AP_IMMEDIATE is the only value for **rtn_ctl** that never causes a new session to start. For values other than AP_IMMEDIATE, if an appropriate session is not immediately available, Microsoft® Host Integration Server 2004 tries to start one. This causes the on-demand connection to be activated.

reserv4

A reserved field.

conv_group_id

Supplied/returned parameter. Specifies the identifier of the conversation group from which the session should be allocated. The **conv_group_id** is required only if **rtn_ctl** is set to WHEN_CONV_GROUP_ALLOC. When **rtn_ctl** specifies a different value and the **primary_rc** is AP_OK, this is a returned value.

sense_data

Returned parameter. Indicates an allocation error (retry or no-retry) and contains sense data.

plu_alias

Supplied parameter. Specifies the alias by which the partner LU is known to the local TP.

The **plu_alias** must match the name of a partner LU established during configuration.

The parameter is an 8-byte ASCII character string. It can consist of the following ASCII characters:

- Uppercase letters
- Numerals 0 through 9
- Spaces
- Special characters $, #, %, and @

The first character of this string cannot be a space.

If the value of this parameter is fewer than eight bytes, pad it on the right with ASCII spaces (0x20).

If you want to specify the partner LU with the **fqplu_name** parameter, fill this parameter with binary zeros.

For a user or group using TPs, 5250 emulators, and/or APPC applications, the system administrator can assign default local and remote LUs. In this case, the field is left blank or null and the default LUs are accessed when the user or group member starts an APPC program. For more information on default LUs, see Microsoft Host Integration Server 2004 Help.

mode_name

Supplied parameter. Specifies the name of a set of networking characteristics defined during configuration.

The value of **mode_name** must match the name of a mode associated with the partner LU during configuration.

The parameter is an 8-byte EBCDIC character string. It can consist of characters from the type A EBCDIC character set:

- Uppercase letters
- Numerals 0 through 9
- Special characters $, #, and @

The first character in the string must be an uppercase letter or a special character.

Do not use SNASVCMG in a mapped conversation. SNASVCMG is a reserved **mode_name** used internally by APPC. Using this name in a basic conversation is not recommended.

tp_name

Supplied parameter. Specifies the name of the invoked TP. The value of **tp_name** specified by **ALLOCATE** in the invoking TP must match the value of **tp_name** specified by RECEIVE_ALLOCATE in the invoked TP.

The parameter is a 64-byte EBCDIC character string and is case-sensitive. The **tp_name** parameter can consist of the following EBCDIC characters:

- Uppercase and lowercase letters
- Numerals 0 through 9
- Special characters $, #, @, and period (.)

If **tp_name** is fewer than 64 bytes, use EBCDIC spaces (0x40) to pad it on the right.

The SNA convention is that a service TP name can have up to four characters. The first character is a hexadecimal byte between 0x00 and 0x3F. The other characters are from the type AE EBCDIC character set.

security

Supplied parameter. Provides the information that the partner LU requires to validate access to the invoked TP.

Based on the conversation security established for the invoked TP during configuration, use one of the following values:

- AP_NONE for an invoked TP that uses no conversation security.
- AP_PGM for an invoked TP that uses conversation security and thus requires a user identifier and password. Supply this information through the **user_id** and **pwd** parameters.
- AP_PROXY_PGM for an invoked TP with privileged proxy that uses conversation security and thus requires a user identifier and password. Pointers must be set up for **proxy_user** and **proxy_domain** to point to Unicode strings containing the user name and domain name of the user to be impersonated. The application does not need to set the **user_id** and **pwd** fields.
- AP_PROXY_SAME for a TP that has been invoked using privileged proxy with a valid user identifier and password supplied by the proxy, which in turn invokes another TP. Pointers must be set up for **proxy_user** and **proxy_domain** to point to Unicode strings containing the user name and domain name of the user to be impersonated. The application does not need to set the **user_id** and **pwd** fields.

For example, assume that TP A invokes TP B with a valid user identifier and password supplied by the privileged proxy, and TP B in turn invokes TP C. If TP B specifies the value AP_PROXY_SAME, APPC will send the LU for TP C the user identifier from TP A and an already-verified indicator. This indicator tells TP C to not require the password (if TP C is configured to accept an already-verified indicator).

- AP_PROXY_STRONG for an invoked TP with privileged proxy that uses conversation security and thus requires a user identifier and password provided by the privileged proxy mechanism. Pointers must be set up for **proxy_user** and **proxy_domain** to point to Unicode strings containing the user name and domain name of the user to be impersonated. The application does not need to set the **user_id** and **pwd** fields. AP_PROXY_STRONG differs from AP_PROXY_PGM in that AP_PROXY_STRONG does not allow clear-text passwords. If the remote system does not support encrypted passwords (strong conversation security), then this call fails.
- AP_SAME for a TP that has been invoked with a valid user identifier and password, which in turn invokes another TP.

For example, assume that TP A invokes TP B with a valid user identifier and password, and TP B in turn invokes TP C. If TP B specifies the value AP_SAME, APPC will send the LU for TP C the user identifier from TP A and an already-verified indicator. This indicator tells TP C to not require the password (if TP C is configured to accept an already-verified indicator).

When AP_SAME is used in an **ALLOCATE** verb, your application must always provide values for the **user_id** and **pwd** parameters in the verb control block. Depending on the properties negotiated between the SNA server and the peer LU, the **ALLOCATE** verb will send one of three kinds of Attach (FMH-5) messages, in this order of precedence:

1. If the LUs have negotiated "already verified" security, then the Attach sent by the SNA server will not include the contents of the **pwd** parameter field specified in the VCB.
2. If the LUs have negotiated "persistent verification" security, then the Attach sent by the SNA server will include the **pwd** parameter specified in the VCB, but only when the Attach is the first for the specified **user_id** parameter since the start of the LU-LU session, and will omit the **pwd** parameter on all subsequent Attaches (issued by your application or any other application using this LU-LU-mode triplet).
3. If the LUs have not negotiated either of the above, then the Attach sent by the SNA server will omit both the **user_id** and **pwd** parameters on all Attaches.

   Your application cannot tell which mode of security has been negotiated between the LUs, nor can it tell whether the **ALLOCATE** verb it is issuing is the first for that LU-LU-mode triplet. So your application must always set the **user_id** and **pwd** parameter fields in the VCB when **security** is set to AP_SAME.

   For more information on persistent verification and already verified security, see the SNA Formats Guide, section "FM Header 5: Attach (LU 6.2)".

- AP_STRONG for an invoked TP that uses conversation security and thus requires a user identifier and password. Supply this information through the **user_id** and **pwd** parameters. AP_STRONG differs from AP_PGM in that AP_STRONG does not allow clear-text passwords. If the remote system does not support encrypted passwords (strong conversation security), then this call fails.

  If the APPC automatic logon feature is to be used, **security** must be set to AP_PGM. See the Remarks section for details.

reserv5

A reserved field.

pwd

Supplied parameter. Specifies the password associated with **user_id**.

The **pwd** parameter is required only if **security** is set to AP_PGM or AP_SAME. It must match the password for **user_id** that was established during configuration.

The **pwd** parameter is a 10-byte EBCDIC character string and is case-sensitive. It can consist of the following EBCDIC characters:

- Uppercase and lowercase letters
- Numerals 0 through 9
- Special characters $, #, @, and period (.)

If the password is fewer than 10 bytes, use EBCDIC spaces (0x40) to pad it on the right.

If the APPC automatic logon feature is to be used, the **pwd** character string must be hard-coded to MS$SAME. See the Remarks section for details.

user_id

Supplied parameter. Specifies the user identifier required to access the partner TP. It is required only if the security parameter is set to AP_PGM or AP_SAME.

The **user_id** parameter is a 10-byte EBCDIC character string and is case-sensitive. It must match one of the user identifiers configured for the partner TP.

The parameter can consist of the following EBCDIC characters:

- Uppercase and lowercase letters
- Numerals 0 through 9
- Special characters $, #, @, and period (.)

If **user_id** is fewer than 10 bytes, use EBCDIC spaces (0x40) to pad it on the right.

If the APPC automatic logon feature is to be used, the **user_id** character string must be hard-coded to MS$SAME. See the

Remarks section for details.

pip_dlen
Supplied parameter. Specifies the length of the program initialization parameters (PIP) to be passed to the partner TP. The range is from 0 through 32767.
pip_dptr
Supplied parameter. Specifies the address of the buffer containing PIP data. Use this parameter only if **pip_dlen** is greater than zero.

PIP data can consist of initialization parameters or environmental setup information required by a partner TP or remote operating system. The PIP data must follow the general data stream (GDS) format. For more information, see *SNA LU6.2 Reference: Peer Protocols* published by IBM.

For Microsoft Windows® 2000, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

reserv7
A reserved field.
fqplu_name
Supplied parameter. Specifies the fully qualified name of the partner LU. This must match the fully qualified name of the local LU defined in the remote node. The parameter consists of two type A EBCDIC character strings for the NETID and the LU name of the partner LU. The names are separated by an EBCDIC period (.).

This name must be provided if no **plu_alias** is specified. It can consist of the following EBCDIC characters:

- Uppercase letters
- Numerals 0 through 9
- Special characters $, #, and @

If the value of this parameter is fewer than 17 bytes, pad it on the right with EBCDIC spaces (0x40).

reserv8
A reserved field.
proxy_user
Supplied parameter. Specifies a LPWSTR pointing to a Unicode string containing the user name to be impersonated using the privileged proxy feature. This field can only be used when the AP_EXTD_VCB bit is set on the **opext** field, indicating an extended VCB.
proxy_domain
Supplied parameter. Specifies a LPWSTR pointing to a Unicode string containing the domain name of the user to be impersonated using the privileged proxy feature. This field can only be used when the AP_EXTD_VCB bit is set on the **opext** field, indicating an extended VCB.
reserv9
A reserved field.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_UNSUCCESSFUL
Primary return code; the supplied parameter **rtn_ctl** specified immediate (AP_IMMEDIATE) return of control to the TP, and the local LU did not have an available contention-winner session.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_RETURN_CONTROL

Secondary return code; the value specified for **rtn_ctl** was invalid.

AP_BAD_SECURITY

Secondary return code; the value specified for **security** was invalid.

AP_BAD_SYNC_LEVEL

Secondary return code; the value specified for **sync_level** was invalid.

AP_BAD_TP_ID

Secondary return code; the value specified for **tp_id** was invalid.

AP_PIP_LEN_INCORRECT

Secondary return code; the value of **pip_dlen** was greater than 32767.

AP_UNKNOWN_PARTNER_MODE

Secondary return code; the value specified for **mode_name** was invalid.

AP_BAD_PARTNER_LU_ALIAS

Secondary return code; APPC did not recognize the supplied **partner_lu_alias**.

AP_BAD_CONV_TYPE (for a basic conversation)

Secondary return code; the value specified for **conv_type** was invalid.

AP_NO_USE_OF_SNASVCMG (for a mapped conversation)

Secondary return code; SNASVCMG is not a valid value for **mode_name**.

AP_INVALID_DATA_SEGMENT

Secondary return code; the PIP data was longer than the allocated data segment, or the address of the PIP data buffer was wrong.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after **ALLOCATE**.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with **ALLOCATE**, it can indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for system configured with multiple nodes using Host Integration Server, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.

- The local LU is not configured.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.
AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.
AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

ALLOCATE can establish either a basic or mapped conversation.

The conversation state is RESET when the TP issues this verb. After successful execution (**primary_rc** is AP_OK), the state changes to SEND. If the verb does not execute, the state remains unchanged.

Several parameters of **ALLOCATE** are EBCDIC or ASCII strings. A TP can use the common service verb (CSV) CONVERT to translate a string from one character set to the other.

To send the **ALLOCATE** request immediately, the invoking TP can issue FLUSH or CONFIRM immediately after **ALLOCATE**. Otherwise, the **ALLOCATE** request accumulates with other data in the local LU's send buffer until the buffer is full.

By issuing **CONFIRM** after **ALLOCATE**, the invoking TP can immediately determine whether the allocation was successful (if **synclevel** is set to AP_CONFIRM_SYNC_LEVEL).

Normally, the value of the **ALLOCATE** verb's **mode_name** parameter must match the name of a mode configured for the invoked TP's node and associated during configuration with the partner LU.

If one of the modes associated with the partner LU on the invoked TP's node is an implicit mode, the session established between the two LUs will be of the implicit mode when no mode name associated with the partner LU matches the value of **mode_name**.

Host Integration Server supports a feature called password substitution. This is a security feature supported by the latest version of the OS/400 operating system (V3R1) which encrypts any password that flows between two nodes on an Attach message. A password flows on an Attach whenever someone invokes an APPC transaction program specifying a user identifier and password. For example, this happens whenever anyone logs on to an AS/400.

Support for password substitution is indicated by setting bit 5 in byte 23 of the BIND request to 1 (which indicates that password substitution is supported). If the remote system sets this bit in the BIND response, the SNA server automatically encrypts the LU 6.2 conversation security password included in the FMH-5 Attach message. APPC applications using Host Integration Server 2004 automatically take advantage of this feature by setting the security field of the VCB to AP_PGM or AP_STRONG in the **ALLOCATE** request.

If an APPC application wants to force an encrypted password to flow, the application can specify AP_STRONG for the security field in the VCB in the **ALLOCATE** request. This option is implemented as defined in OS/400 V3R1, and is documented in the OS/400 CPIC programmer reference as CM_SECURITY_PROGRAM_STRONG, where the LU 6.2 **pwd** (password) field is encrypted before it flows over the physical network.

The password substitution features is currently only supported by OS/400 V3R1 or later. If the remote system does not support this feature, the SNA server will UNBIND the session with the sense code of 10060006. The two nodes negotiate whether or not they support this feature in the BIND exchange. Host Integration Server sets a bit in the BIND, and also adds some random data on the BIND for encryption. If the remote node supports password substitution, it sets the same bit in the BIND response, and adds some (different) random data for decryption.

Host Integration Server 2004 supports automatic logon for APPC applications. This feature requires specific configuration by the network administrator: The APPC application must be invoked on the LAN side from a client of Host Integration Server 2004. The client must be logged into a Windows 2000 domain, but the client can be running on any operating system supported by the Host Integration Server 2004 APPC APIs.

The client application is coded to use "program" level security, with a special hard-coded APPC user name MS$SAME and password MS$SAME. When this session allocation flows from client to SNA server, the server looks up the host account and password corresponding to the Windows 2000 account under which the client is logged in, and substitutes the host account information into the APPC attach message it sends to the host.

> **Note** It is illegal for the remote node to set the bit specifying password substitution and not add the random data.

According to IBM, there are implementations of LU 6.2 password substitution that do not support password substitution but do echo the password substitution bit back to Host Integration Server 2004, without specifying any random data. When they do this, the SNA server will UNBIND the session with the sense code 10060006.This sense code is interpreted as:

- 1006 = Required field or parameter missing.
- 0006 = A required subfield of a control vector was omitted.

Host Integration Server should also log an Event 17 (APPC session activation failure: BIND negative response sent).

The correct solution is for the failing implementation to be fixed. However, as a short-term workaround, the following Host Integration Server service registry setting can be set:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\snaservr\parameters\NOPWDSUB: REG_SZ: YES

When this parameter is specified in the registry, password substitution support will be disabled.

Several updates have been made to Host Integration Server to allow a privileged APPC application to open an APPC conversation using the Single Sign-On feature on behalf of any defined Windows 2000 user. This is referred to as the privileged proxy feature. An extension has been added to the APPC **ALLOCATE** verb to invoke this feature.

An APPC application becomes privileged by being started in a Windows 2000 user account that is a member of a special Windows 2000 group. When a Host Security Domain is configured, SNA Manager will define a second Windows 2000 group for use with the host security features of Host Integration Server 2004. If the user account under which the actual client is running is a member of this second Windows 2000 group, the client is privileged to initiate an APPC conversation on behalf of any user account defined in the Host Account Cache.

The following illustrates how the privileged proxy feature works:

The Host Integration Server 2004 administrator creates a Host Security Domain called APP. SNA Manager now creates two Windows 2000 groups. The first group is called APP and the second is called APP_PROXY for this example. Users that are assigned to the APP group are enabled for Single Sign-On. Users assigned to the APP_PROXY group are privileged proxies. The administrator adds the Windows 2000 user AppcUser to the APP_PROXY group using the Users button on the Host Security Domain property dialog box in SNA Manager.

The administrator then sets up an APPC application on the Host Integration Server 2004 to run as a Windows 2000 service called APPCAPP and that service has been set up to operate under the AppcUser user account. When APPCAPP runs, it opens an APPC session via an **ALLOCATE** verb using the extended VCB format and specifies the Windows 2000 user name of the desired user, UserA (for example).

The SNA Service sees the session request coming from a connection that is a member of the Host Security Domain APP. The Client/Server interface tells the SNA Service that the actual client is AppcUser.

The SNA Service checks to see if AppcUser is a member of the APP_PROXY group. Because AppcUser is a member of APP_PROXY, the SNA Service inserts the Username/Password for UserA in the APPC Attach (FMH-5) command and sends it off to the partner TP.

In order to support the privileged proxy feature, the APPC application must implement the following program logic:

The APPC application must determine the Windows 2000 user ID and domain name that it wishes to impersonate.

The APPC application must set the following parameters before calling the **ALLOCATE** verb:

Enable the use of the extended **ALLOCATE** verb control block structure by setting the AP_EXTD_VCB flag in the **opext** field.

Set security to AP_PROXY_SAME, AP_PROXY_PGM or AP_PROXY_STRONG.

Set up the pointers for **proxy_user** and **proxy_domain** to point to Unicode strings containing the user name and domain name of the user to be impersonated.

> **Note** The application does not need to set up the **user_id** and **pwd** fields in the **ALLOCATE** VCB.

When the APPC application performs the above steps and issues the **ALLOCATE** verb, the Host Integration Server 2004 server will perform a lookup in the host security domain for the specified Windows 2000 user and set the user ID and password fields in the FMH-5 Attach message sent to the remote system.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to

http://go.microsoft.com/fwlink/?linkid=29507.

CONFIRM

The **CONFIRM** verb sends the contents of the local logical unit's (LU's) send buffer and a confirmation request to the partner transaction program (TP).

The following structure describes the verb control block used by the **CONFIRM** verb.

```
struct confirm {
    unsigned short  opcode;
    unsigned char   opext;
    unsigned char   reserv2;
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   tp_id[8];
    unsigned long   conv_id;
    unsigned char   rts_rcvd;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_CONFIRM.
opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.
reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED.
conv_id
Returned parameter. Identifies the conversation established between the two TPs.
rts_rcvd
Returned parameter. Indicates whether the partner TP issued REQUEST_TO_SEND, which requests the local TP to change the conversation to RECEIVE state.

To change to RECEIVE state operating on Microsoft® Windows® 2000 the local TP can use PREPARE_TO_RECEIVE, RECEIVE_AND_WAIT, or RECEIVE_AND_POST.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_CONFIRM_ON_SYNC_LEVEL_NONE

Secondary return code; the local TP attempted to use **CONFIRM** in a conversation with a synchronization level of AP_NONE. The synchronization level, established by ALLOCATE, must be AP_CONFIRM_SYNC_LEVEL.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_CONFIRM_BAD_STATE

Secondary return code; the conversation was not in SEND state.

AP_CONFIRM_NOT_LL_BDY

Secondary return code; the conversation for the local TP was in SEND state, and the local TP did not finish sending a logical record.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after **ALLOCATE**.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE, AP_CONFIRM_SYNC_LEVEL, or AP_SYNCPT) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer has encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONV_FAILURE_NO_RETRY

Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY

Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED

Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_PURGING

Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued SEND_ERROR with **err_type** set to AP_PROG. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY

Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING

Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND_PROG

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP has encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

AP_DEALLOC_ABEND_SVC

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_SVC.

AP_DEALLOC_ABEND_TIMER

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_TIMER.

AP_SVC_ERROR_PURGING

Primary return code; the partner TP (or partner LU) issued SEND_ERROR with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

Remarks

In response to **CONFIRM**, the partner TP normally issues CONFIRMED to confirm that it has received the data without error. (If the partner TP encounters an error, it issues SEND_ERROR or abnormally deallocates the conversation.)

The TP can issue **CONFIRM** only if the conversation's synchronization level, established by ALLOCATE, is AP_CONFIRM_SYNC_LEVEL.

The conversation must be in SEND state when the TP issues this verb. State changes, summarized in the following table, are based on the value of the **primary_rc**.

primary_rc	New state
AP_OK	No change
AP_ALLOCATION_ERROR	RESET
AP_COMM_SUBSYSTEM_ABENDED AP_COMM_SUBSYSTEM_NOT_LOADED	RESET RESET
AP_CONV_FAILURE_RETRY AP_CONV_FAILURE_NO_RETRY	RESET RESET

AP_DEALLOC_ABEND AP_DEALLOC_ABEND_PROG AP_DEALLOC_ABEND_SVC AP_DEALLOC_ABEND_TIMER	RESET RESET RESET RESET
AP_PROG_ERROR_PURGING AP_SVC_ERROR_PURGING	RECEIVE RECEIVE

CONFIRM waits for a response from the partner TP. A response is generated by one of the following verbs in the partner TP:

- CONFIRMED
- SEND_ERROR
- DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG, AP_ABEND_SVC, or AP_ABEND_TIMER
- TP_ENDED

By issuing **CONFIRM** after ALLOCATE, the invoking TP can immediately determine whether the allocation was successful (if **synclevel** is set to AP_CONFIRM_SYNC_LEVEL).

Normally, the value of the **ALLOCATE** verb's **mode_name** parameter must match the name of a mode configured for the invoked TP's node and associated during configuration with the partner LU.

If one of the modes associated with the partner LU on the invoked TP's node is an implicit mode, the session established between the two LUs will be of the implicit mode when no mode name associated with the partner LU matches the value of **mode_name**. For more information, see Microsoft Host Integration Server 2004 Help.

Several parameters of **ALLOCATE** are EBCDIC or ASCII strings. A TP can use the common service verb (CSV) CONVERT to translate a string from one character set to the other.

To send the **ALLOCATE** request immediately, the invoking TP can issue FLUSH or **CONFIRM** immediately after **ALLOCATE**. Otherwise, the **ALLOCATE** request accumulates with other data in the local LU's send buffer until the buffer is full.

CONFIRMED

The **CONFIRMED** verb responds to a confirmation request from the partner transaction program (TP). It informs the partner TP that the local TP has not detected an error in the received data. Because the TP issuing the confirmation request waits for a confirmation, **CONFIRMED** synchronizes the processing of the two TPs.

The following structure describes the verb control block (VCB) used by the **CONFIRMED** verb.

```
struct confirmed {
    unsigned short  opcode;
    unsigned char   opext;
    unsigned char   reserv2;
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   tp_id[8];
    unsigned long   conv_id;
    unsigned char   rts_rcvd;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_CONFIRMED.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Identifies the conversation established between the two TPs. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

rts_rcvd
Returned parameter. Indicates whether the partner TP issued MC_REQUEST_TO_SEND, which requests the local TP to change the conversation to RECEIVE state.

To change to RECEIVE state the local TP can use MC_PREPARE_TO_RECEIVE, MC_RECEIVE_AND_WAIT, or MC_RECEIVE_AND_POST.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_CONFIRMED_BAD_STATE

Secondary return code; the conversation is not in CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation must be in one of the following states when the TP issues this verb:

- CONFIRM
- CONFIRM_SEND
- CONFIRM_DEALLOCATE

The new state is determined by the old state—the state of the conversation when the local TP issued **CONFIRMED**. The old state is indicated by the value of the **what_rcvd** parameter of the preceding receive verb. The following state changes are possible:

Old state	New state
CONFIRM	RECEIVE
CONFIRM_SEND	SEND
CONFIRM_DEALLOCATE	RESET

Confirmation Requests

A confirmation request is issued by one of the following verbs in the partner TP:

- CONFIRM
- PREPARE_TO_RECEIVE if **ptr_type** is set to AP_SYNC_LEVEL and the conversation's synchronization level (established by ALLOCATE) is AP_CONFIRM_SYNC_LEVEL
- DEALLOCATE if **dealloc_type** is set to AP_SYNC_LEVEL and the conversation's synchronization level (established by **ALLOCATE**) is AP_CONFIRM_SYNC_LEVEL
- SEND_DATA if type is set to AP_SEND_DATA_CONFIRM and the conversation's synchronization level (established by **ALLOCATE**) is AP_CONFIRM_SYNC_LEVEL

A confirmation request is received by the local TP through the **what_rcvd** parameter of one of the following verbs:

- RECEIVE_IMMEDIATE
- RECEIVE_AND_WAIT
- RECEIVE_AND_POST

CONFIRMED is issued by the local TP only if **what_rcvd** contains one of the following values:

- AP_CONFIRM_WHAT_RECEIVED
- AP_CONFIRM_SEND
- AP_CONFIRM_DEALLOCATE

If the **rtn_status** parameter is set to AP_YES, **what_rcvd** can also contain the following values:

- AP_DATA_COMPLETE_CONFIRM
- AP_DATA_COMPLETE_CONFIRM_SEND
- AP_DATA_COMPLETE_CONFIRM_DEALL

For basic conversations, **what_rcvd** can also contain the following values:

- AP_DATA_CONFIRM
- AP_DATA_CONFIRM_SEND
- AP_DATA_CONFIRM_DEALLOCATE

DEALLOCATE

The **DEALLOCATE** verb deallocates a conversation between two transaction programs (TPs).

The following structure describes the verb control block (VCB) used by the **DEALLOCATE** verb.

```
struct deallocate {
    unsigned short       opcode;
    unsigned char        opext;
    unsigned char        reserv2;
    unsigned short       primary_rc;
    unsigned long        secondary_rc;
    unsigned char        tp_id[8];
    unsigned long        conv_id;
    unsigned char        reserv3;
    unsigned char        dealloc_type;
    unsigned short       log_dlen;
    unsigned char FAR *  log_dptr;
    void                 (WINAPI *callback)();
    void                 *correlator;
    unsigned char        reserv6[4];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_DEALLOCATE.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Identifies the conversation established between the two TPs. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

reserv3
A reserved field.

dealloc_type
Supplied parameter. Specifies how to perform the deallocation.

Using one of the following values deallocates the conversation abnormally:

- AP_ABEND_PROG
- AP_ABEND_SVC
- AP_ABEND_TIMER

If the conversation is in SEND state when the local TP issues **DEALLOCATE**, APPC sends the contents of the local logical unit's (LU's) send buffer to the partner TP before deallocating the conversation. If the conversation is in RECEIVE or PENDING_POST state, APPC purges any incoming data before deallocating the conversation.

An application or service TP should specify AP_ABEND_PROG when it encounters an error preventing the successful completion of a transaction.

A service TP should specify AP_ABEND_SVC when it encounters an error caused by its partner service TP (for example, a format error in control information sent by the partner service TP). A service TP should specify AP_ABEND_TIMER when it encounters an error requiring immediate deallocation (for example, an operator ending the program prematurely).

AP_FLUSH sends the contents of the local LU's send buffer to the partner TP before deallocating the conversation. This value is allowed only if the conversation is in SEND state.

AP_SYNC_LEVEL uses the conversation's synchronization level (established by ALLOCATE) to determine how to deallocate the conversation. This value is allowed only if the conversation is in SEND state.

If the synchronization level of the conversation is AP_NONE, APPC sends the contents of the local LU's send buffer to the partner TP before deallocating the conversation.

If the synchronization level is AP_CONFIRM_SYNC_LEVEL, APPC sends the contents of the local LU's send buffer and a confirmation request to the partner TP. Upon receiving confirmation from the partner TP, APPC deallocates the conversation. If, however, the partner TP reports an error, the conversation remains allocated.

log_dlen

Supplied parameter. Specifies the number of bytes of data to be sent to the error log file. The range is from 0 through 32767.

You can set this parameter to a number greater than zero if **dealloc_type** is set to AP_ABEND_PGM, AP_ABEND_SVC, or AP_ABEND_TIMER. Otherwise, this parameter must be zero.

log_dptr

Supplied parameter. Provides the address of the data buffer containing error information. The data is sent to the local error log and to the partner LU.

This parameter is used by **DEALLOCATE** if **log_dlen** is greater than zero.

For Microsoft® Windows® 2000, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

For OS/2, the log data buffer must reside on an unnamed, shared segment, which is allocated by the function **DosAllocSeg** with Flags equal to 1. The log data buffer must fit entirely on the segment.

The TP must format the error data as a GDS error log variable. For more information, see your IBM SNA manual(s).

callback

Supplied parameter. Only present if the AP_EXTD_VCB bit is set in the **opext** member, indicating support for Sync Point. This parameter is the address of a user-supplied callback function. If this field is NULL, no notification will be provided.

The prototype of the callback routine is as follows:

```
void WINAPI callback_proc(
    struct appc_hdr *vcb,
    unsigned char tp_id[8],
    unsigned long conv_id,
    unsigned short type,
    void *correlator
   );
```

The callback procedure can take any name, since the address of the procedure is passed to the APPC DLL. The parameters passed to the function are as follows:

vcb

A pointer to the **DEALLOCATE** verb control block that caused the conversation to be deallocated.

tp_id

The TP identifier of the TP that owned the deallocated conversation.

conv_id

The conversation identifier of the deallocated conversation.

type

The type of the message flow that caused the callback to be invoked. Possible values are:

AP_DATA_FLOW

Normal data flow on the session.

AP_UNBIND

The session was unbound normally.

AP_FAILURE

The session terminated due to an outage.

correlator

This value is the **correlator** specified on the **DEALLOCATE** verb.

correlator
Supplied parameter. Only present if the AP_EXTD_VCB bit is set in the **opext** member, indicating support for the Sync Point API. This **correlator** field allows the TP to specify a value it can use to correlate a call to the callback function with, for example, its own internal data structures. This value is returned to the TP as one of the parameters of the callback routine when it is invoked.

reserv4
A reserved field.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_DEALLOC_BAD_TYPE

Secondary return code; the **dealloc_type** parameter was not set to a valid value.

AP_DEALLOC_LOG_LL_WRONG

Secondary return code; the LL field of the GDS error log variable did not match the actual length of the log data.

AP_INVALID_DATA_SEGMENT

Secondary return code; the error data for the log file was longer than the segment allocated to contain the error data, or the address of the error data buffer was wrong.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_DEALLOC_CONFIRM_BAD_STATE

Secondary return code; the conversation was not in SEND state, and the TP attempted to flush the send buffer and send a confirmation request. This attempt occurred because the value of **dealloc_type** was AP_SYNC_LEVEL and the synchronization level of the conversation was AP_CONFIRM_SYNC_LEVEL.

AP_DEALLOC_FLUSH_BAD_STATE

Secondary return code; the conversation was not in SEND state and the TP attempted to flush the send buffer. This attempt occurred because the value of **dealloc_type** was AP_FLUSH or because the value of **dealloc_type** was AP_SYNC_LEVEL and the synchronization level of the conversation was AP_NONE. In either case, the conversation must be in SEND state.

AP_DEALLOC_NOT_LL_BDY

Secondary return code; the conversation was in SEND state, and the TP did not finish sending a logical record. The **dealloc_type** parameter was set to AP_SYNC_LEVEL or AP_FLUSH.

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_CONV_FAILURE_NO_RETRY

Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY

Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED

Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_PURGING

Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued SEND_ERROR with **err_type** set to AP_PROG. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY

Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING

Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND_PROG

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP has encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

AP_DEALLOC_ABEND_SVC

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_SVC.

AP_DEALLOC_ABEND_TIMER

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_TIMER.

AP_SVC_ERROR_PURGING

Primary return code; the partner TP (or partner LU) issued **SEND_ERROR** with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

Remarks

Depending on the value of the **dealloc_type** parameter, the conversation can be in one of the states indicated in the following table when the TP issues **DEALLOCATE**.

dealloc_type	Allowed state
AP_FLUSH	SEND
AP_SYNC_LEVEL	SEND
AP_ABEND	Any except RESET
AP_ABEND_PROG	Any except RESET
AP_ABEND_SVC	Any except RESET
AP_ABEND_TIMER	Any except RESET

State changes, summarized in the following table, are based on the value of the **primary_rc**.

primary_rc	New state
AP_OK	RESET
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE

Before deallocating the conversation, this verb performs the equivalent of one of the following:

- FLUSH, by sending the contents of the local LU's send buffer to the partner LU (and TP).
- CONFIRM, by sending the contents of the local LU's send buffer and a confirmation request to the partner TP.

After this verb has successfully executed, the conversation identifier is no longer valid.

LU 6.2 Sync Point can use an optimization of the message flows known as implied forget. When the protocol specifies that a FORGET PS header is required, the next data flow on the session implies that a FORGET has been received. In the normal situation, the TP is aware of the next data flow when data is received or sent on one of its Sync Point conversations.

However, it is possible that the last message to flow is caused by the conversation being deallocated. In this case, the TP is unaware when the next data flow on the session occurs. To provide the TP with this notification, the **DEALLOCATE** verb is modified to allow the TP to register a callback function which will be called:

- On the first normal flow transmission (request or response) over the session used by the conversation.
- If the session is unbound before any other data flows.
- If the session is terminated abnormally due to a DLC outage.

The **DEALLOCATE** verb also contains a **correlator** field member that is returned as one of the parameters when the callback function is invoked. The application can use this parameter in any way (for example, as a pointer to a control block within the application).

The TP can use the *type* parameter passed to the callback function to determine whether the message flow indicates an implied forget has been received.

Note that the **DEALLOCATE** verb will probably complete before the callback routine is called. The conversation is considered to be in RESET state and no further verbs can be issued using the conversation identifier. If the application issues a TP_ENDED verb before the next data flow on the session, the callback routine will not be invoked.

Host Integration Server 2004 allows TPs to deallocate conversations immediately after sending data by specifying the **type** parameter on SEND_DATA as AP_SEND_DATA_DEALLOC_*. However, the SEND_DATA verbs do not contain the implied forget callback function. TPs wishing to receive implied forget notification must issue **DEALLOCATE** explicitly.

FLUSH

The **FLUSH** verb sends the contents of the local logical unit's (LU's) send buffer to the partner LU and transaction program (TP). If the send buffer is empty, no action takes place.

The following structure describes the verb control block (VCB) used by the **FLUSH** verb.

```
struct flush {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_FLUSH.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_FLUSH_NOT_SEND_STATE

Secondary return code; the conversation was not in SEND state.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

Data processed by SEND_DATA accumulates in the local LU's send buffer until one of the following happens:

- The local TP issues **FLUSH** (or other verb that flushes the LU's send buffer).
- The buffer is full.

The request generated by ALLOCATE is also buffered.

The conversation must be in SEND state when the TP issues this verb.

There is no state change.

GET_ATTRIBUTES

The **GET_ATTRIBUTES** verb returns the attributes of the conversation.

The following structure describes the verb control block (VCB) used by the **GET_ATTRIBUTES** verb.

```
struct get_attributes {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    reserv3;
    unsigned char    sync_level;
    unsigned char    mode_name[8];
    unsigned char    net_name[8];
    unsigned char    lu_name[8];
    unsigned char    lu_alias[8];
    unsigned char    plu_alias[8];
    unsigned char    plu_un_name[8];
    unsigned char    reserv4[2];
    unsigned char    fqplu_name[17];
    unsigned char    reserv5;
    unsigned char    user_id[10];
    unsigned long    conv_group_id;
    unsigned char    conv_corr_len;
    unsigned char    conv_corr[8];
    unsigned char    reserv6[13];
NOTE: The following fields are present when the high bit of opext is set (opext & AP_EXTD_VCB
) != 0.
    unsigned char    luw_id[26];
    unsigned char    sess_id[8];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_GET_ATTRIBUTES.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local transaction program (TP). The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

sync_level
Returned parameter. Specifies the level of synchronization processing for the conversation. This parameter determines whether the TPs can request confirmation of receipt of data and confirm receipt of data.

- AP_NONE indicates that confirmation processing will not be used in this conversation.
- AP_CONFIRM_SYNC_LEVEL indicates that TPs can use confirmation processing in this conversation.
- AP_SYNCPT indicates that TPs can use Sync Point Level 2 confirmation processing in this conversation.

mode_name
Returned parameter. Specifies the name of a set of networking characteristics. It is a type A EBCDIC character string.
net_name
Returned parameter. Specifies the name of the SNA network containing the local logical unit (LU) used by this TP. It is a type A EBCDIC character string.
lu_name
Returned parameter. Provides the name of the local LU.
lu_alias
Returned parameter. Provides the alias by which the local LU is known to the local TP. It is an ASCII character string.
plu_alias
Returned parameter. Provides the alias by which the partner LU is known to the local TP. It is an ASCII character string.
plu_un_name
Returned parameter. Specifies the uninterpreted name of the partner LU—the name of the partner LU as defined to the system services control point (SSCP). It is a type AE EBCDIC character string. This parameter is returned only if the local LU is dependent.
fqplu_name
Returned parameter. Provides the fully qualified name of the partner LU. It is a type A EBCDIC character string. The field contains the network name, an EBCDIC period, and the partner-LU name.
user_id
Returned parameter. Specifies the user identifier sent by the invoking TP through ALLOCATE to access the invoked TP (if applicable). It is a type AE EBCDIC character string. The field contains the user identifier if the following conditions are true:

- The invoked TP requires conversation security.
- **GET_ATTRIBUTES** was issued by the invoked TP.

Otherwise, the field contains spaces.

conv_group_id
Returned parameter. Specifies the conversation group identifier for the session to which the conversation has been allocated. This is also returned on ALLOCATE and RECEIVE_ALLOCATE.
conv_corr_len
Returned parameter. Specifies the length of the conversation correlator identifier that is returned.
conv_corr
Returned parameter. Specifies the conversation correlator identifier (if any) that the source LU assigns to identify the conversation, which is unique for the source/partner LU pair. It is sent by the source LU on the allocation request.

> **Note** The following fields are present when the high bit of **opext** is set (**opext** & AP_EXTD_VCB) != 0.These fields are only present when using Sync Point Level 2 support.

luw_id
Logical unit-of-work identifier.
sess_id
Session identifier.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation can be in any state except RESET when the TP issues this verb.

There is no state change.

GET_LU_STATUS

The **GET_LU_STATUS** verb returns the status of a particular logical unit (LU). This conversation verb is only available when Sync Point conversations are supported.

The following structure describes the verb control block (VCB) used by the **GET_LU_STATUS** verb.

```
struct get_type {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned char    plu_alias[8];
    unsigned short   active_sess;
    unsigned char    zero_sess;
    unsigned char    reserv3[7];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_GET_LU_STATUS.

opext
This field is unused by the **GET_LU_STATUS** verb.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local transaction program (TP). The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

plu_alias
Supplied parameter. Provides the identifier for the LU about which this TP is inquiring. The value of this parameter was returned by MC_ALLOCATE or ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

active_sess
Returned parameter. Supplies the number of active sessions on this LU.

zero_sess
Returned parameter. Indicates whether a zero session is on this LU. Values are AP_YES or AP_NO.

reserv3
A reserved field.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_LU_ALIAS

Secondary return code; the value of **plu_alias** did not match any LUs assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation can be in any state except RESET when the TP issues this verb.

There is no state change.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

GET_STATE

The **GET_STATE** verb returns the state of a particular conversation.

The following structure describes the verb control block (VCB) used by the **GET_STATE** verb.

```
struct get_state {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    conv_state;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_GET_STATE.

opext
This field is unused by the **GET_STATE** verb.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local transaction program (TP). The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the identifier for the conversation about which this TP is inquiring. The value of this parameter was returned by MC_ALLOCATE or ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

conv_state
Returned parameter. Indicates the state of the conversation. The **conv_state** parameter can be one of the following values:

AP_RESET_STATE

The conversation is in the RESET state.

AP_SEND_STATE

The conversation is in the SEND state.

AP_RECEIVE_STATE

The conversation is in the RECEIVE state.

AP_CONFIRM_STATE

The conversation is in the CONFIRM state.

AP_CONFIRM_SEND_STATE

The conversation is in the CONFIRM_SEND state.

AP_CONFIRM_DEALL_STATE

The conversation is in the CONFIRM_DEALLOCATE state.

AP_PEND_POST_STATE

The conversation has a **POST** verb pending.

AP_PEND_DEALL_STATE

The conversation has a **DEALLOCATE** verb pending.

AP_END_CONV_STATE

The conversation is in the END_CONVERSATION state.

AP_SEND_PENDING_STATE

The conversation is in the SEND_PENDING state.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.
AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation can be in any state when the TP issues this verb.

There is no state change.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

GET_TYPE

The **GET_TYPE** verb returns the conversation type (basic or mapped) of a particular conversation so the transaction program (TP) can decide whether to use basic or mapped conversation verbs.

The following structure describes the verb control block (VCB) used by the **GET_TYPE** verb.

```
struct get_type {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    conv_type;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_GET_TYPE.
opext
This field is unused by the **GET_TYPE** verb.
reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.
conv_id
Supplied parameter. Provides the identifier for the conversation about which this TP is inquiring. The value of this parameter was returned by MC_ALLOCATE or ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.
conv_type
Returned parameter. Supplies the type of conversation, either AP_BASIC_CONVERSATION or AP_MAPPED_CONVERSATION.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY

Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation can be in any state except RESET when the TP issues this verb.

There is no state change.

MC_ALLOCATE

The **MC_ALLOCATE** verb is issued by the invoking transaction program (TP). It allocates a session between the local logical unit (LU) and partner LU and (in conjunction with RECEIVE_ALLOCATE) establishes a conversation between the invoking TP and the invoked TP. After this verb executes successfully, APPC generates a conversation identifier (**conv_id**). The **conv_id** is a required parameter for all other APPC conversation verbs.

The following structure describes the verb control block (VCB) used by the **MC_ALLOCATE** verb.

```
struct mc_allocate {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    reserv3;
    unsigned char    synclevel;
    unsigned char    reserv4[2];
    unsigned char    rtn_ctl;
    unsigned char    reserv5;
    unsigned long    conv_group_id;
    unsigned long    sense_data;
    unsigned char    plu_alias[8];
    unsigned char    mode_name[8];
    unsigned char    tp_name[64];
    unsigned char    security;
    unsigned char    reserv6[11];
    unsigned char    pwd[10];
    unsigned char    user_id[10];
    unsigned short   pip_dlen;
    unsigned char FAR * pip_dptr;
    unsigned char    reserv7;
    unsigned char    fqplu_name[17];
    unsigned char    reserv8[8];
    unsigned long    proxy_user;
    unsigned long    proxy_domain;
    unsigned char    reserv9[16];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code; AP_M_ALLOCATE.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION. If the AP_EXTD_VCB bit is set, this indicates that an extended version of the verb control block is used. In this case, the **MC_ALLOCATE** structure includes Sync Point support or privileged proxy feature support.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED.

conv_id
Returned parameter. Identifies the conversation established between the two TPs.

reserv3
A reserved field.

synclevel

Supplied parameter. Specifies the synchronization level of the conversation. It determines whether the TPs can request confirmation of receipt of data and confirm receipt of data.

- AP_NONE specifies that confirmation processing will not be used in this conversation.
- AP_CONFIRM_SYNC_LEVEL specifies that the TPs can use confirmation processing in this conversation.
- AP_SYNCPT specifies that TPs can use Sync Point Level 2 confirmation processing in this conversation.

reserv4

A reserved field.

reserv5

A reserved field.

rtn_ctl

Supplied parameter. Specifies when the local LU, acting on a session request from the local TP, should return control to the local TP. For information about sessions, see About Transaction Programs.

- AP_IMMEDIATE specifies that the LU allocates a contention-winner session, if one is immediately available, and returns control to the TP.
- AP_WHEN_SESSION_ALLOCATED specifies that the LU does not return control to the TP until it allocates a session or encounters one of the errors documented in Return Codes in this topic. (If the session limit is zero, the LU returns control immediately.) If a session is not available, the TP waits for one.
- AP_WHEN_SESSION_FREE specifies that the LU allocates a contention-winner or contention-loser session, if one is available or able to be activated, and returns control to the TP. If an error occurs, (as documented in Return Codes in this topic) the call will return immediately with the error in the **primary_rc** and **secondary_rc** fields.
- AP_WHEN_CONWINNER_ALLOC specifies that the LU does not return control until it allocates a contention-winner session or encounters one of the errors documented in Return Codes in this topic. (If the session limit is zero, the LU returns control immediately.) If a session is not available, the TP waits for one.
- AP_WHEN_CONV_GROUP_ALLOC specifies that the LU does not return control to the TP until it allocates the session specified by **conv_group_id** or encounters one of the errors documented in Return Codes in this topic. If a session is not available, the TP waits for it to become free.

  Note AP_IMMEDIATE is the only value for **rtn_ctl** that never causes a new session to start. For values other than AP_IMMEDIATE, if an appropriate session is not immediately available, Microsoft® Host Integration Server 2004 tries to start one. This causes the on-demand connection to be activated.

conv_group_id

Supplied/returned parameter. Specifies the identifier of the conversation group from which the session should be allocated. The **conv_group_id** is required only if **rtn_ctl** is set to WHEN_CONV_GROUP_ALLOC. When **rtn_ctl** specifies a different value and the **primary_rc** is AP_OK, this is a returned value.

sense_data

Returned parameter. Indicates an allocation error (retry or no-retry) and contains sense data.

plu_alias

Supplied parameter. Specifies the alias by which the partner LU is known to the local TP.

The **plu_alias** must match the name of a partner LU established during configuration.

The parameter is an 8-byte ASCII character string. It can consist of the following ASCII characters:

- Uppercase letters
- Numerals 0 through 9
- Spaces
- Special characters $, #, %, and @

The first character of this string cannot be a space.

If the value of this parameter is fewer than eight bytes, pad it on the right with ASCII spaces (0x20).

If you want to specify the partner LU with the **fqplu_name** parameter, fill this parameter with binary zeros.

For a user or group using TPs, 5250 emulators, and/or APPC applications, the system administrator can assign default local and remote LUs. In this case, the field is left blank or null and the default LUs are accessed when the user or group member starts an APPC program. For more information on default LUs, see Microsoft Host Integration Server 2004 Help.

mode_name

Supplied parameter. Specifies the name of a set of networking characteristics defined during configuration.

The value of **mode_name** must match the name of a mode associated with the partner LU during configuration.

The parameter is an 8-byte EBCDIC character string. It can consist of characters from the type A EBCDIC character set:

- Uppercase letters
- Numerals 0 through 9
- Special characters $, #, and @

The first character in the string must be an uppercase letter or a special character.

Do not use SNASVCMG in a mapped conversation. SNASVCMG is a reserved **mode_name** used internally by APPC.

tp_name

Supplied parameter. Specifies the name of the invoked TP. The value of **tp_name** specified by **MC_ALLOCATE** in the invoking TP must match the value of **tp_name** specified by RECEIVE_ALLOCATE in the invoked TP.

The parameter is a 64-byte EBCDIC character string and is case-sensitive. The **tp_name** parameter can consist of the following EBCDIC characters:

- Uppercase and lowercase letters
- Numerals 0 through 9
- Special characters $, #, @, and period (.)

If **tp_name** is fewer than 64 bytes, use EBCDIC spaces (0x40) to pad it on the right.

The SNA convention is that a service TP name can have up to four characters. The first character is a hexadecimal byte between 0x00 and 0x3F. The other characters are from the type AE EBCDIC character set.

security

Supplied parameter. Provides the information that the partner LU requires to validate access to the invoked TP. See the section **Possible values for the Security parameter** in this topic.

Reserv6

A reserved field.

pwd

Supplied parameter. Specifies the password associated with **user_id**.

The **pwd** parameter is required only if **security** is set to AP_PGM or AP_SAME. It must match the password for **user_id** that was established during configuration.

The **pwd** parameter is a 10-byte EBCDIC character string and is case-sensitive. It can consist of the following EBCDIC characters:

- Uppercase and lowercase letters
- Numerals 0 through 9
- Special characters $, #, @, and period (.)

If the password is fewer than 10 bytes, use EBCDIC spaces (0x40) to pad it on the right.

If the APPC automatic logon feature is to be used, the **pwd** character string must be hard-coded to MS$SAME. See the Remarks section for details.

user_id

Supplied parameter. Specifies the user identifier required to access the partner TP. It is required only if the security parameter is set to AP_PGM or AP_SAME.

The **user_id** parameter is a 10-byte EBCDIC character string and is case-sensitive. It must match one of the user identifiers configured for the partner TP.

The parameter can consist of the following EBCDIC characters:

- Uppercase and lowercase letters
- Numerals 0 through 9
- Special characters $, #, @, and period (.)

If **user_id** is fewer than 10 bytes, use EBCDIC spaces (0x40) to pad it on the right.

If the APPC automatic logon feature is to be used, the **user_id** character string must be hard-coded to MS$SAME. See the Remarks section for details.

pip_dlen
Supplied parameter. Specifies the length of the program initialization parameters (PIP) to be passed to the partner TP. The range is from 0 through 32767.
pip_dptr
Supplied parameter. Specifies the address of the buffer containing PIP data. Use this parameter only if **pip_dlen** is greater than zero.

PIP data can consist of initialization parameters or environmental setup information required by a partner TP or remote operating system. The PIP data must follow the general data stream (GDS) format. For more information, see your IBM SNA manual(s).

For Microsoft Windows® 2000, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

reserv7
A reserved field.
fqplu_name
Supplied parameter. Specifies the fully qualified name of the partner LU. This must match the fully qualified name of the local LU defined in the remote node. The parameter consists of two type A EBCDIC character strings for the NETID and the LU name of the partner LU. The names are separated by an EBCDIC period (.).

This name must be provided if no **plu_alias** is specified. It can consist of the following EBCDIC characters:

- Uppercase letters
- Numerals 0 through 9
- Special characters $, #, and @

If the value of this parameter is fewer than 17 bytes, pad it on the right with EBCDIC spaces (0x40).

reserv8
A reserved field.
proxy_user
Supplied parameter. Specifies a LPWSTR pointing to a Unicode string containing the user name to be impersonated using the privileged proxy feature. This field can only be used when the AP_EXTD_VCB bit is set on the **opext** field, indicating an extended VCB.
proxy_domain
Supplied parameter. Specifies a LPWSTR pointing to a Unicode string containing the domain name of the user to be impersonated using the privileged proxy feature. This field can only be used when the AP_EXTD_VCB bit is set on the **opext** field, indicating an extended VCB.
reserv9
A reserved field.

Possible values for the Security parameter

Based on the conversation security established for the invoked TP during configuration, use one of the following values:

- AP_NONE for an invoked TP that uses no conversation security.
- AP_PGM for an invoked TP that uses conversation security and thus requires a user identifier and password. Supply this information through the **user_id** and **pwd** parameters.
- AP_PROXY_PGM for an invoked TP with privileged proxy that uses conversation security and thus requires a user identifier and password. Pointers must be set up for **proxy_user** and **proxy_domain** to point to Unicode strings containing the user name and domain name of the user to be impersonated. The application does not need to set the **user_id** and **pwd** fields.
- AP_PROXY_SAME for a TP that has been invoked using privileged proxy with a valid user identifier and password supplied by the proxy, which in turn invokes another TP. Pointers must be set up for **proxy_user** and **proxy_domain** to point to Unicode strings containing the user name and domain name of the user to be impersonated. The application does not need to set the **user_id** and **pwd** fields.

  For example, assume that TP A invokes TP B with a valid user identifier and password supplied by the privileged proxy, and TP B in turn invokes TP C. If TP B specifies the value AP_PROXY_SAME, APPC will send the LU for TP C the user identifier from TP A and an already-verified indicator. This indicator tells TP C to not require the password (if TP C is configured to accept an already-verified indicator).

- AP_PROXY_STRONG for an invoked TP with privileged proxy that uses conversation security and thus requires a user identifier and password provided by the privileged proxy mechanism. Pointers must be set up for **proxy_user** and **proxy_domain** to point to Unicode strings containing the user name and domain name of the user to be impersonated.

The application does not need to set the **user_id** and **pwd** fields. AP_PROXY_STRONG differs from AP_PROXY_PGM in that AP_PROXY_STRONG does not allow clear-text passwords. If the remote system does not support encrypted passwords (strong conversation security), then this call fails.

- AP_SAME for a TP that has been invoked with a valid user identifier and password, which in turn invokes another TP.

  For example, assume that TP A invokes TP B with a valid user identifier and password, and TP B in turn invokes TP C. If TP B specifies the value AP_SAME, APPC will send the LU for TP C the user identifier from TP A and an already-verified indicator. This indicator tells TP C to not require the password (if TP C is configured to accept an already-verified indicator).

  When AP_SAME is used in an **MC_ALLOCATE** verb, your application must always provide values for the **user_id** and **pwd** parameters in the verb control block. Depending on the properties negotiated between Host Integration Server 2004 and the peer LU, the **MC_ALLOCATE** verb will send one of three kinds of Attach (FMH-5) messages, in this order of precedence:

  1. If the LUs have negotiated "already verified" security, then the Attach sent by Host Integration Server 2004 will not include the contents of the **pwd** parameter field specified in the VCB.
  2. If the LUs have negotiated "persistent verification" security, then the Attach sent by Host Integration Server 2004 will include the **pwd** parameter specified in the VCB, but only when the Attach is the first for the specified **user_id** parameter since the start of the LU-LU session, and will omit the **pwd** parameter on all subsequent Attaches (issued by your application or any other application using this LU-LU-mode triplet).
  3. If the LUs have not negotiated either of the above, then the Attach sent by Host Integration Server 2004 will omit both the **user_id** and **pwd** parameters on all Attaches.

     Your application cannot tell which mode of security has been negotiated between the LUs, nor can it tell whether the **MC_ALLOCATE** verb it is issuing is the first for that LU-LU-mode triplet. So your application must always set the **user_id** and **pwd** parameter fields in the VCB when **security** is set to AP_SAME.

     For more information on persistent verification and already verified security, see the SNA Formats Guide, section "FM Header 5: Attach (LU 6.2)".

- AP_STRONG for an invoked TP that uses conversation security and thus requires a user identifier and password. Supply this information through the **user_id** and **pwd** parameters. AP_STRONG differs from AP_PGM in that AP_STRONG does not allow clear-text passwords. If the remote system does not support encrypted passwords (strong conversation security), then this call fails.

  If the APPC automatic logon feature is to be used, **security** must be set to AP_PGM. See the Remarks section for details.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_UNSUCCESSFUL
Primary return code; the supplied parameter **rtn_ctl** specified immediate (AP_IMMEDIATE) return of control to the TP, and the local LU did not have an available contention-winner session.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_RETURN_CONTROL

Secondary return code; the value specified for **rtn_ctl** was invalid.

AP_BAD_SECURITY

Secondary return code; the value specified for **security** was invalid.

AP_BAD_SYNC_LEVEL

Secondary return code; the value specified for **sync_level** was invalid.

AP_BAD_TP_ID

Secondary return code; the value specified for **tp_id** was invalid.

AP_PIP_LEN_INCORRECT

Secondary return code; the value of **pip_dlen** was greater than 32767.

AP_UNKNOWN_PARTNER_MODE

Secondary return code; the value specified for **mode_name** was invalid.

AP_BAD_PARTNER_LU_ALIAS

Secondary return code; APPC did not recognize the supplied **partner_lu_alias**.

AP_NO_USE_OF_SNASVCMG

Secondary return code; SNASVCMG is not a valid value for **mode_name**.

AP_INVALID_DATA_SEGMENT

Secondary return code; the PIP data was longer than the allocated data segment, or the address of the PIP data buffer was wrong.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after **MC_ALLOCATE**.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with **MC_ALLOCATE**, it can indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **MC_ALLOCATE** request.

When **MC_ALLOCATE** produces this return code for a Host Integration Server 2004 system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY

Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
  Primary return code; the calling thread is already in a blocking call.
AP_UNEXPECTED_DOS_ERROR
  Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

MC_ALLOCATE establishes a mapped conversation.

The conversation state is RESET when the TP issues this verb. After successful execution (**primary_rc** is AP_OK), the state changes to SEND. If the verb does not execute, the state remains unchanged.

Several parameters of **MC_ALLOCATE** are EBCDIC or ASCII strings. A TP can use the CSV CONVERT to translate a string from one character set to the other.

To send the **MC_ALLOCATE** request immediately, the invoking TP can issue MC_FLUSH or MC_CONFIRM immediately after **MC_ALLOCATE**. Otherwise, the **MC_ALLOCATE** request accumulates with other data in the local LU's send buffer until the buffer is full.

By issuing **MC_CONFIRM** after **MC_ALLOCATE**, the invoking TP can immediately determine whether the allocation was successful (if **synclevel** is set to AP_CONFIRM_SYNC_LEVEL).

Normally, the value of the **MC_ALLOCATE** verb's **mode_name** parameter must match the name of a mode configured for the invoked TP's node and associated during configuration with the partner LU.

If one of the modes associated with the partner LU on the invoked TP's node is an implicit mode, the session established between the two LUs will be of the implicit mode when no mode name associated with the partner LU matches the value of **mode_name**.

Host Integration Server 2004 supports a feature called password substitution. This is a security feature supported by the latest version of the OS/400 operating system (V3R1) that encrypts any password that flows between two nodes on an Attach message. A password flows on an Attach whenever someone invokes an APPC transaction program specifying a user identifier and password. For example, this happens whenever anyone logs on to an AS/400.

Support for password substitution is indicated by setting bit 5 in byte 23 of the BIND request to 1 (which indicates that password substitution is supported). If the remote system sets this bit in the BIND response, Host Integration Server 2004 automatically encrypts the LU 6.2 conversation security password included in the FMH-5 Attach message. Host Integration Server 2004 APPC applications automatically take advantage of this feature by setting the **security** field of the VCB to AP_PGM or AP_STRONG in the **MC_ALLOCATE** request.

If an APPC application wants to force an encrypted password to flow, the application can specify AP_STRONG for the **security** field in the VCB in the **MC_ALLOCATE** request. This option is implemented as defined in OS/400 V3R1, and is documented in the OS/400 CPIC programmer reference as CM_SECURITY_PROGRAM_STRONG, where the LU 6.2 **pwd** (password) field is encrypted before it flows over the physical network.

The password substitution feature is currently only supported by OS/400 V3R1 or later. If the remote system does not support this feature, Host Integration Server 2004 will UNBIND the session with the sense code of 10060006. The two nodes negotiate whether or not they support this feature in the BIND exchange. Host Integration Server 2004 sets a bit in the BIND, and also adds some random data on the BIND for encryption. If the remote node supports password substitution, it sets the same bit in the BIND response, and adds some (different) random data for decryption.

Host Integration Server 2004 supports automatic logon for APPC applications. This feature requires specific configuration by the network administrator: The APPC application must be invoked on the LAN side from a client of Host Integration Server 2004. The client must be logged into a Windows® 2000 domain, but can be any platform that supports the Host Integration Server 2004 APPC APIs.

The client application is coded to use "program" level security, with a special hard-coded APPC user name MS$SAME and password MS$SAME. When this session allocation flows from client to Host Integration Server 2004, the Host Integration Server 2004 server looks up the host account and password corresponding to the Windows 2000 account under which the client is logged in, and substitutes the host account information into the APPC attach message it sends to the host.

> **Note** It is illegal for the remote node to set the bit specifying password substitution and not add the random data.

According to IBM, there are implementations of LU 6.2 password substitution that do not support password substitution but do echo the password substitution bit back to Host Integration Server 2004, without specifying any random data. When they do this, Host Integration Server 2004 will UNBIND the session with the sense code 10060006.This sense code is interpreted as:

- 1006 = Required field or parameter missing.

- 0006 = A required subfield of a control vector was omitted.

Host Integration Server 2004 should also log an Event 17 (APPC session activation failure: BIND negative response sent).

The correct solution is for the failing implementation to be fixed. However, as a short-term workaround, the following Host Integration Server 2004 SNA Service registry setting can be set:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\snaservr\parameters\NOPWDSUB: REG_SZ: YES

When this parameter is specified in the registry, Host Integration Server 2004 password substitution support will be disabled.

Several updates have been made to Host Integration Server 2004 to allow a privileged APPC application to open an APPC conversation using the Single Sign-On feature on behalf of any defined Windows 2000 user. This is referred to as the privileged proxy feature. An extension has been added to the APPC **MC_ALLOCATE** verb to invoke this feature.

An APPC application becomes privileged by being started in a Windows 2000 user account that is a member of a special Windows 2000 group. When a Host Security Domain is configured, SNA Manager will define a second Windows 2000 group for use with the host security features of Host Integration Server 2004. If the user account under which the actual client is running is a member of this second Windows 2000 group, the client is privileged to initiate an APPC conversation on behalf of any user account defined in the Host Account Cache.

The following illustrates how the privileged proxy feature works:

The Host Integration Server 2004 administrator creates a Host Security Domain called APP. SNA Manager now creates two Windows 2000 groups. The first group is called APP and the second is called APP_PROXY for this example. Users that are assigned to the APP group are enabled for Single Sign-On. Users assigned to the APP_PROXY group are privileged proxies. The administrator adds the Windows 2000 user AppcUser to the APP_PROXY group using the Users button on the Host Security Domain property dialog box in SNA Manager.

The administrator then sets up an APPC application on the Host Integration Server 2004 server to run as a Windows 2000 service called APPCAPP, and that service has been set up to operate under the AppcUser user account. When APPCAPP runs, it opens an APPC session via an **ALLOCATE** verb using the extended VCB format and specifies the Windows 2000 user name of the desired user, UserA (for example).

The SNA Service sees the session request coming from a connection that is a member of the Host Security Domain APP. The Client/Server interface tells the SNA Service that the actual client is AppcUser.

The SNA Service checks to see if AppcUser is a member of the APP_PROXY group. Because AppcUser is a member of APP_PROXY, the SNA Service inserts the Username/Password for UserA in the APPC Attach (FMH-5) command and sends it off to the partner TP.

In order to support the privileged proxy feature, the APPC application must implement the following program logic:

The APPC application must determine the Windows 2000 user ID and domain name that it wishes to impersonate.

The APPC application must set the following parameters before calling the **MC_ALLOCATE** verb:

Enable the use of the extended **MC_ALLOCATE** verb control block structure by setting the AP_EXTD_VCB flag in the **opext** field.

Set security to AP_PROXY_SAME, AP_PROXY_PGM, or AP_PROXY_STRONG.

Set up the pointers for **proxy_user** and **proxy_domain** to point to Unicode strings containing the user name and domain name of the user to be impersonated.

> **Note** The application does not need to set up the **user_id** and **pwd** fields in the **MC_ALLOCATE** VCB.

When the APPC application performs the above steps and issues the **MC_ALLOCATE** verb, the Host Integration Server 2004 server will perform a lookup in the host security domain for the specified Windows 2000 user and set the user ID and password fields in the FMH-5 Attach message sent to the remote system.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MC_CONFIRM

The **MC_CONFIRM** verb sends the contents of the local logical unit's (LU's) send buffer and a confirmation request to the partner transaction program (TP).

The following structure describes the verb control block (VCB) used by the **MC_CONFIRM** verb.

```
struct mc_confirm {
    unsigned short  opcode;
    unsigned char   opext;
    unsigned char   reserv2;
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   tp_id[8];
    unsigned long   conv_id;
    unsigned char   rts_rcvd;
};
```

Members

opcode
  Supplied parameter. Specifies the verb operation code, AP_M_CONFIRM.
opext
  Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.
reserv2
  A reserved field.
primary_rc
  Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
  Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
tp_id
  Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED.
conv_id
  Returned parameter. Identifies the conversation established between the two TPs.
rts_rcvd
  Returned parameter. Indicates whether the partner TP issued MC_REQUEST_TO_SEND, which requests the local TP to change the conversation to RECEIVE state.

  To change to RECEIVE state the local TP can use MC_PREPARE_TO_RECEIVE, MC_RECEIVE_AND_WAIT, or MC_RECEIVE_AND_POST.

Return Codes

AP_OK
  Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
  Primary return code; the verb did not execute because of a parameter error.

  AP_BAD_CONV_ID

  Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

  AP_BAD_TP_ID

  Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

  AP_CONFIRM_ON_SYNC_LEVEL_NONE

  Secondary return code; the local TP attempted to use **MC_CONFIRM** in a conversation with a synchronization level of AP_NONE. The synchronization level, established by MC_ALLOCATE, must be AP_CONFIRM_SYNC_LEVEL.

AP_STATE_CHECK
  Primary return code; the verb did not execute because it was issued in an invalid state.

  AP_CONFIRM_BAD_STATE

Secondary return code; the conversation was not in SEND state.

AP_CONFIRM_NOT_LL_BDY

Secondary return code; the conversation for the local TP was in SEND state, and the local TP did not finish sending a logical record.

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after **MC_ALLOCATE**.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE, AP_CONFIRM_SYNC_LEVEL, or AP_SYNCPT) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer has encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_CONV_FAILURE_NO_RETRY

Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY

Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED

Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_PURGING

Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued MC_SEND_ERROR. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY

Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING

Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued MC_DEALLOCATE with **dealloc_type** set to AP_ABEND.
- The partner TP encountered an ABEND, causing the partner LU to send an **MC_DEALLOCATE** request.

Remarks

In response to **MC_CONFIRM**, the partner TP normally issues MC_CONFIRMED to confirm that it has received the data without error. (If the partner TP encounters an error, it issues MC_SEND_ERROR or abnormally deallocates the conversation.)

The TP can issue **MC_CONFIRM** only if the conversation's synchronization level, established by MC_ALLOCATE, is AP_CONFIRM_SYNC_LEVEL.

The conversation must be in SEND state when the TP issues this verb. State changes, summarized in the following table, are based on the value of the **primary_rc**.

primary_rc	New state
AP_OK	No change
AP_ALLOCATION_ERROR	RESET
AP_COMM_SUBSYSTEM_ABENDED AP_COMM_SUBSYSTEM_NOT_LOADED	RESET RESET
AP_CONV_FAILURE_RETRY AP_CONV_FAILURE_NO_RETRY	RESET RESET
AP_DEALLOC_ABEND AP_DEALLOC_ABEND_PROG AP_DEALLOC_ABEND_SVC AP_DEALLOC_ABEND_TIMER	RESET RESET RESET RESET
AP_PROG_ERROR_PURGING AP_SVC_ERROR_PURGING	RECEIVE RECEIVE

MC_CONFIRM waits for a response from the partner TP. A response is generated by one of the following verbs in the partner TP:

- MC_CONFIRMED
- MC_SEND_ERROR

- MC_DEALLOCATE with **dealloc_type** set to AP_ABEND
- TP_ENDED

By issuing **MC_CONFIRM** after MC_ALLOCATE, the invoking TP can immediately determine whether the allocation was successful (if **synclevel** is set to AP_CONFIRM_SYNC_LEVEL).

Normally, the value of the **MC_ALLOCATE** verb's **mode_name** parameter must match the name of a mode configured for the invoked TP's node and associated during configuration with the partner LU.

If one of the modes associated with the partner LU on the invoked TP's node is an implicit mode, the session established between the two LUs will be of the implicit mode when no mode name associated with the partner LU matches the value of **mode_name**. For more information, see Microsoft Host Integration Server 2004 Help.

Several parameters of **MC_ALLOCATE** are EBCDIC or ASCII strings. A TP can use the common service verb (CSV) CONVERT to translate a string from one character set to the other.

To send the **MC_ALLOCATE** request immediately, the invoking TP can issue MC_FLUSH or **MC_CONFIRM** immediately after **MC_ALLOCATE**. Otherwise, the **MC_ALLOCATE** request accumulates with other data in the local LU's send buffer until the buffer is full.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MC_CONFIRMED

The **MC_CONFIRMED** verb responds to a confirmation request from the partner transaction program (TP). It informs the partner TP that the local TP has not detected an error in the received data. Because the TP issuing the confirmation request waits for a confirmation, **MC_CONFIRMED** synchronizes the processing of the two TPs.

The following structure describes the verb control block (VCB) used by the **MC_CONFIRMED** verb.

```
struct mc_confirmed {
    unsigned short  opcode;
    unsigned char   opext;
    unsigned char   reserv2;
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   tp_id[8];
    unsigned long   conv_id;
    unsigned char   rts_rcvd;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_CONFIRMED.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Identifies the conversation established between the two TPs. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

rts_rcvd
Returned parameter. Indicates whether the partner TP issued MC_REQUEST_TO_SEND, which requests the local TP to change the conversation to RECEIVE state.

To change to RECEIVE state the local TP can use MC_PREPARE_TO_RECEIVE, MC_RECEIVE_AND_WAIT, or MC_RECEIVE_AND_POST.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_CONFIRMED_BAD_STATE

Secondary return code; the conversation is not in CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation must be in one of the following states when the TP issues this verb:

- CONFIRM
- CONFIRM_SEND
- CONFIRM_DEALLOCATE

The new state is determined by the old state—the state of the conversation when the local TP issued **MC_CONFIRMED**. The old state is indicated by the value of the **what_rcvd** parameter of the preceding receive verb. The following state changes are possible:

Old state	New state
CONFIRM	RECEIVE
CONFIRM_SEND	SEND
CONFIRM_DEALLOCATE	RESET

Confirmation Requests

A confirmation request is issued by one of the following verbs in the partner TP:

- MC_CONFIRM
- MC_PREPARE_TO_RECEIVE if **ptr_type** is set to AP_SYNC_LEVEL and the conversation's synchronization level (established by MC_ALLOCATE) is AP_CONFIRM_SYNC_LEVEL
- MC_DEALLOCATE if **dealloc_type** is set to AP_SYNC_LEVEL and the conversation's synchronization level (established by MC_ALLOCATE) is AP_CONFIRM_SYNC_LEVEL
- MC_SEND_DATA if type is set to AP_SEND_DATA_CONFIRM and the conversation's synchronization level (established by MC_ALLOCATE) is AP_CONFIRM_SYNC_LEVEL

A confirmation request is received by the local TP through the **what_rcvd** parameter of one of the following verbs:

- MC_RECEIVE_IMMEDIATE
- MC_RECEIVE_AND_WAIT

- MC_RECEIVE_AND_POST

MC_CONFIRMED is issued by the local TP only if **what_rcvd** contains one of the following values:

- AP_CONFIRM_WHAT_RECEIVED
- AP_CONFIRM_SEND
- AP_CONFIRM_DEALLOCATE

If the **rtn_status** parameter is set to AP_YES, **what_rcvd** can also contain the following values:

- AP_DATA_COMPLETE_CONFIRM
- AP_DATA_COMPLETE_CONFIRM_SEND
- AP_DATA_COMPLETE_CONFIRM_DEALL

MC_DEALLOCATE

The **MC_DEALLOCATE** verb deallocates a conversation between two transaction programs (TPs).

The following structure describes the verb control block (VCB) used by the **MC_DEALLOCATE** verb.

```
struct mc_deallocate {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    reserv3;
    unsigned char    dealloc_type;
    unsigned char    reserv4[2];
    unsigned char    reserv5[4];
    void             (WINAPI *callback)();
    void             *correlator;
    unsigned char    reserv6[4];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_DEALLOCATE.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Identifies the conversation established between the two TPs. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

reserv3
A reserved field.

dealloc_type
Supplied parameter. Specifies how to perform the deallocation.

For **MC_DEALLOCATE**, use AP_ABEND to deallocate the conversation abnormally. If the conversation is in SEND state when the local TP issues **MC_DEALLOCATE**, APPC sends the contents of the local logical unit's (LU's) send buffer to the partner TP before deallocating the conversation. If the conversation is in RECEIVE or PENDING_POST state, APPC purges any incoming data before deallocating the conversation.

A TP should specify AP_ABEND when it encounters an error preventing the successful completion of a transaction.

AP_FLUSH sends the contents of the local LU's send buffer to the partner TP before deallocating the conversation. This value is allowed only if the conversation is in SEND state.

AP_SYNC_LEVEL uses the conversation's synchronization level (established by MC_ALLOCATE) to determine how to deallocate the conversation. This value is allowed only if the conversation is in SEND state.

If the synchronization level of the conversation is AP_NONE, APPC sends the contents of the local LU's send buffer to the partner TP before deallocating the conversation.

If the synchronization level is AP_CONFIRM_SYNC_LEVEL, APPC sends the contents of the local LU's send buffer and a confirmation request to the partner TP. Upon receiving confirmation from the partner TP, APPC deallocates the conversation. If, however, the partner TP reports an error, the conversation remains allocated.

callback

Supplied parameter. Only present if the AP_EXTD_VCB bit is set in the **opext** member indicating support for Sync Point. This parameter is the address of a user-supplied callback function. If this field is NULL, no notification will be provided.

The prototype of the callback routine is as follows:

```
void WINAPI callback_proc(
    struct appc_hdr *vcb,
    unsigned char tp_id[8],
    unsigned long conv_id,
    unsigned short type,
    void *correlator
   );
```

The callback procedure can take any name, since the address of the procedure is passed to the APPC DLL. The parameters passed to the function are as follows:

vcb

A pointer to the **MC_DEALLOCATE** verb control block that caused the conversation to be deallocated.

tp_id

The TP identifier of the TP that owned the deallocated conversation.

conv_id

The conversation identifier of the deallocated conversation.

type

The type of the message flow that caused the callback to be invoked. Possible values are:

AP_DATA_FLOW

Normal data flow on the session.

AP_UNBIND

The session was unbound normally.

AP_FAILURE

The session terminated due to an outage.

correlator

This value is the **correlator** specified on the **MC_DEALLOCATE** verb.

correlator

Supplied parameter. Only present if the AP_EXTD_VCB bit is set in the **opext** member indicating support for the Sync Point API. This **correlator** field allows the TP to specify a value it can use to correlate a call to the callback function with, for example, its own internal data structures. This value is returned to the TP as one of the parameters of the callback routine when it is invoked.

reserv4

A reserved field.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_DEALLOC_BAD_TYPE

Secondary return code; the **dealloc_type** parameter was not set to a valid value.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_DEALLOC_CONFIRM_BAD_STATE

Secondary return code; the conversation was not in SEND state, and the TP attempted to flush the send buffer and send a confirmation request. This attempt occurred because the value of **dealloc_type** was AP_SYNC_LEVEL and the synchronization level of the conversation was AP_CONFIRM_SYNC_LEVEL.

AP_DEALLOC_FLUSH_BAD_STATE

Secondary return code; the conversation was not in SEND state and the TP attempted to flush the send buffer. This attempt occurred because the value of **dealloc_type** was AP_FLUSH or because the value of **dealloc_type** was AP_SYNC_LEVEL and the synchronization level of the conversation was AP_NONE. In either case, the conversation must be in SEND state.

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONV_FAILURE_NO_RETRY
Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued MC_SEND_ERROR. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued **MC_DEALLOCATE** with **dealloc_type** set to AP_ABEND.
- The partner TP encountered an ABEND, causing the partner LU to send an **MC_DEALLOCATE** request.

Remarks

Depending on the value of the **dealloc_type** parameter, the conversation can be in one of the states indicated in the following table when the TP issues **MC_DEALLOCATE**.

Dealloc_type	Allowed state
AP_FLUSH	SEND
AP_SYNC_LEVEL	SEND
AP_ABEND	Any state except RESET
AP_ABEND_PROG	Any state except RESET
AP_ABEND_SVC	Any state except RESET
AP_ABEND_TIMER	Any state except RESET

State changes, summarized in the following table, are based on the value of the **primary_rc**.

Primary_rc	New state
AP_OK	RESET
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET

AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_PROG_ERROR_PURGING	RECEIVE

Before deallocating the conversation, this verb performs the equivalent of one of the following:

- MC_FLUSH, by sending the contents of the local LU's send buffer to the partner LU (and TP).
- MC_CONFIRM, by sending the contents of the local LU's send buffer and a confirmation request to the partner TP.

After this verb has successfully executed, the conversation identifier is no longer valid.

LU 6.2 Sync Point can use an optimization of the message flows known as implied forget. When the protocol specifies that a FORGET PS header is required, the next data flow on the session implies that a FORGET has been received. In the normal situation, the TP is aware of the next data flow when data is received or sent on one of its Sync Point conversations.

However, it is possible that the last message to flow is caused by the conversation being deallocated. In this case, the TP is unaware when the next data flow on the session occurs. In order to provide the TP with this notification, the **MC_DEALLOCATE** verb is modified to allow the TP to register a callback function which will be called:

- On the first normal flow transmission (request or response) over the session used by the conversation.
- If the session is unbound before any other data flows.
- If the session is terminated abnormally due to a DLC outage.

The **MC_DEALLOCATE** verb also contains a **correlator** field member that is returned as one of the parameters when the callback function is invoked. The application can use this parameter in any way (for example, as a pointer to a control block within the application).

The TP can use the *type* parameter passed to the callback function to determine whether the message flow indicates an implied forget has been received.

Note that the **MC_DEALLOCATE** verb will probably complete before the callback routine is called. The conversation is considered to be in RESET state and no further verbs can be issued using the conversation identifier. If the application issues a TP_ENDED verb before the next data flow on the session, the callback routine will not be invoked.

Microsoft® Host Integration Server 2004 allows TPs to deallocate conversations immediately after sending data by specifying the type parameter on MC_SEND_DATA as AP_SEND_DATA_DEALLOC_*. However, the **MC_SEND_DATA** verbs do not contain the implied forget callback function. TPs wishing to receive implied forget notification must issue **MC_DEALLOCATE** explicitly.

MC_FLUSH

The **MC_FLUSH** verb sends the contents of the local logical unit's (LU's) send buffer to the partner LU and transaction program (TP). If the send buffer is empty, no action takes place.

The following structure describes the verb control block (VCB) used by the **MC_FLUSH** verb.

```
struct mc_flush {
    unsigned short  opcode;
    unsigned char   opext;
    unsigned char   reserv2;
    unsigned short  primary_rc;
    unsigned long   secondary_rc;
    unsigned char   tp_id[8];
    unsigned long   conv_id;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_FLUSH.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_FLUSH_NOT_SEND_STATE

Secondary return code; the conversation was not in SEND state.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

Data processed by MC_SEND_DATA accumulates in the local LU's send buffer until one of the following happens:

- The local TP issues **MC_FLUSH** (or other verb that flushes the LU's send buffer).
- The buffer is full.

The request generated by MC_ALLOCATE is also buffered.

The conversation must be in SEND state when the TP issues this verb.

There is no state change.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MC_GET_ATTRIBUTES

The **MC_GET_ATTRIBUTES** verb returns the attributes of the conversation.

The following structure describes the verb control block (VCB) used by the **MC_GET_ATTRIBUTES** verb.

```
struct mc_get_attributes {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    reserv3;
    unsigned char    sync_level;
    unsigned char    mode_name[8];
    unsigned char    net_name[8];
    unsigned char    lu_name[8];
    unsigned char    lu_alias[8];
    unsigned char    plu_alias[8];
    unsigned char    plu_un_name[8];
    unsigned char    reserv4[2];
    unsigned char    fqplu_name[17];
    unsigned char    reserv5;
    unsigned char    user_id[10];
    unsigned long    conv_group_id;
    unsigned char    conv_corr_len;
    unsigned char    conv_corr[8];
    unsigned char    reserv6[13];
//  NOTE: The following fields are present
//  when the high bit of opext is set
//  (opext & AP_EXTD_VCB) != 0.
    unsigned char    luw_id[26];
    unsigned char    sess_id[8];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_GET_ATTRIBUTES.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local transaction program (TP). The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

sync_level
Returned parameter. Specifies the level of synchronization processing for the conversation. This parameter determines whether the TPs can request confirmation of receipt of data and confirm receipt of data.

AP_NONE indicates that confirmation processing will not be used in this conversation.

AP_CONFIRM_SYNC_LEVEL indicates that TPs can use confirmation processing in this conversation.

AP_SYNCPT indicates that TPs can use Sync Point Level 2 confirmation processing in this conversation.

mode_name
Returned parameter. Specifies the name of a set of networking characteristics. It is a type A EBCDIC character string.
net_name
Returned parameter. Specifies the name of the SNA network containing the local logical unit (LU) used by this TP. It is a type A EBCDIC character string.
lu_name
Returned parameter. Provides the name of the local LU.
lu_alias
Returned parameter. Provides the alias by which the local LU is known to the local TP. It is an ASCII character string.
plu_alias
Returned parameter. Provides the alias by which the partner LU is known to the local TP. It is an ASCII character string.
plu_un_name
Returned parameter. Specifies the uninterpreted name of the partner LU—the name of the partner LU as defined to the system services control point (SSCP). It is a type AE EBCDIC character string. This parameter is returned only if the local LU is dependent.
fqplu_name
Returned parameter. Provides the fully qualified name of the partner LU. It is a type A EBCDIC character string. The field contains the network name, an EBCDIC period, and the partner-LU name.
user_id
Returned parameter. Specifies the user identifier sent by the invoking TP through MC_ALLOCATE to access the invoked TP (if applicable). It is a type AE EBCDIC character string. The field contains the user identifier if the following conditions are true:

- The invoked TP requires conversation security.
- **MC_GET_ATTRIBUTES** was issued by the invoked TP.

Otherwise, the field contains spaces.

conv_group_id
Returned parameter. Specifies the conversation group identifier for the session to which the conversation has been allocated. This is also returned on MC_ALLOCATE and RECEIVE_ALLOCATE.
conv_corr_len
Returned parameter. Specifies the length of the conversation correlator identifier that is returned.
conv_corr
Returned parameter. Specifies the conversation correlator identifier (if any) that the source LU assigns to identify the conversation, which is unique for the source/partner LU pair. It is sent by the source LU on the allocation request.

> **Note** The following fields are present when the high bit of opext is set (opext & AP_EXTD_VCB) != 0.These fields are only present when using Sync Point Level 2 support.

luw_id
Logical unit-of-work identifier.
sess_id
Session identifier.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).

- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation can be in any state except RESET when the TP issues this verb.

There is no state change.

MC_POST_ON_RECEIPT

The **MC_POST_ON_RECEIPT** verb allows the application to register to receive a notification when data or status arrives at the local logical unit (LU) without actually receiving it at the same time. This verb can only be issued while in RECEIVE state and it never causes a change in conversation state.

When the transaction program (TP) issues this verb, APPC returns control to the TP immediately. When the specified conditions are satisfied, the Win32® event specified by the **sema** parameter is signaled and the verb completes. Then the TP looks at the return code in the verb control block (VCB) to determine whether or not any data or status notification has arrived at the local LU and issues an MC_RECEIVE_IMMEDIATE or MC_RECEIVE_AND_WAIT verb to actually receive the data or status notification.

The **MC_POST_ON_RECEIPT** verb implements both the **POST_ON_RECEIPT** and **TEST** verbs as described in the IBM Transaction Programmer's manual for LU Type 6.2.

The following structure describes the verb control block used by the **MC_POST_ON_RECEIPT** verb.

```
struct mc_post_on_receipt {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv1;
    unsigned char    primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned short   reserv2;
    unsigned char    reserv3;
    unsigned char    reserv4;
    unsigned short   max_len;
    unsigned short   reserv5;
    unsigned char *  reserv6;
    unsigned char    reserv7[5];
    unsigned long    sema;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_POST_ON_RECEIPT.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv1
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

reserv2
A reserved field.

reserv3
A reserved field.

reserv4
A reserved field.

max_len
Supplied parameter. Specifies the length of data that triggers APPC to post a notification to the TP.

reserv5

A reserved field.

reserv6

A reserved field.

reserv7

A reserved field.

sema

Supplied parameter. Specifies the handle of a Win32 event. The event should have been created by the TP and the TP is responsible for ensuring that it is reset before a call is made and after the verb completes.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

AP_DATA

Secondary return code; data is available for the program to receive.

AP_NOT_DATA

Secondary return code; information other than data is available for the program to receive.

AP_CANCELLED

Primary return code; the verb was canceled.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_INVALID_SEMAPHORE_HANDLE

Secondary return code; the **sema** parameter was not set to a valid value.

AP_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_DEALLOC_ABEND_PROG

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued MC_DEALLOCATE.
- The partner TP has encountered an ABEND, causing the partner LU to send an **MC_DEALLOCATE** request.

AP_DEALLOC_NORMAL

Primary return code; the partner TP has deallocated the conversation without requesting confirmation and issued MC_DEALLOCATE with **dealloc_type** set to one of the following:

- AP_CONFIRM_SYNC_LEVEL
- AP_FLUSH
- AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE

AP_PROG_ERROR_NO_TRUNC

Primary return code; the partner TP has issued MC_SEND_ERROR while the conversation was in SEND state. Data was not truncated.

AP_PROG_ERROR_PURGING

Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued MC_SEND_ERROR. Data sent but not yet received is purged.

AP_PROG_ERROR_TRUNC

Primary return code; the partner TP has issued MC_SEND_ERROR while the conversation was in SEND state. Data was truncated.

AP_SVC_ERROR_NO_TRUNC

Primary return code; the partner TP (or partner LU) issued MC_SEND_ERROR with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP was not truncated.

AP_SVC_ERROR_PURGING

Primary return code; the partner TP (or partner LU) issued MC_SEND_ERROR with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

AP_SVC_ERROR_TRUNC

Primary return code; the partner TP (or partner LU) issued MC_SEND_ERROR with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been truncated.

Remarks

While an **MC_POST_ON_RECEIPT** verb is outstanding, the following verbs can be issued on the same conversation:

GET_ATTRIBUTES

GET_TYPE

MC_DEALLOCATE

MC_RECEIVE_AND_WAIT

MC_RECEIVE_IMMEDIATE

MC_REQUEST_TO_SEND

MC_SEND_ERROR

MC_TEST_RTS

TP_ENDED

Issuing any of the following verbs prior to completion of the asynchronous **MC_POST_ON_RECEIPT** verb causes the **MC_POST_ON_RECEIPT** verb to be canceled (the Win32 event is signaled and the primary return code in the verb control block is set to AP_CANCELLED).

MC_DEALLOCATE

MC_RECEIVE_AND_WAIT

MC_RECEIVE_IMMEDIATE

MC_SEND_ERROR

TP_ENDED

MC_PREPARE_TO_RECEIVE

The **MC_PREPARE_TO_RECEIVE** verb changes the state of the conversation for the local transaction program (TP) from SEND to RECEIVE.

The following structure describes the verb control block (VCB) used by the **MC_PREPARE_TO_RECEIVE** verb.

```
struct mc_prepare_to_receive {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    primary_rc;
    unsigned short   reserv2;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    ptr_type;
    unsigned char    locks;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_PREPARE_TO_RECEIVE.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

ptr_type
Supplied parameter. Specifies how to perform the state change.

Use AP_FLUSH to send the contents of the local logical unit's (LU's) send buffer to the partner LU (and TP) before changing the conversation's state to RECEIVE.

The AP_SYNC_LEVEL value uses the conversation's synchronization level (established by **MC_ALLOCATE**) to determine how to perform the state change.

If the synchronization level of the conversation is AP_NONE, APPC sends the contents of the local LU's send buffer to the partner TP before changing the conversation's state to RECEIVE. If the synchronization level is AP_CONFIRM_SYNC_LEVEL, APPC sends the contents of the local LU's send buffer and a confirmation request to the partner TP. Upon receiving confirmation from the partner TP, APPC changes the conversation's state to RECEIVE. If, however, the partner TP reports an error, the state changes to RECEIVE or RESET. See the Remarks in this topic.

locks
Supplied parameter. Specifies when APPC should return control to the local TP.

Use this parameter only if **ptr_type** is set to AP_SYNC_LEVEL and the synchronization level of the conversation, established by **MC_ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. (Otherwise, the parameter is ignored.)

- AP_LONG indicates that APPC returns control to the local TP when the confirmation and subsequent data from the partner TP arrive at the local LU. (This method results in more efficient use of the network but requires a longer time to return control to the local TP.)
- AP_SHORT indicates that APPC returns control to the local TP when the confirmation from the partner TP arrives at the

local LU.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_P_TO_R_INVALID_TYPE

Secondary return code; the **ptr_type** parameter was not set to a valid value.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_P_TO_R_NOT_SEND_STATE

Secondary return code; the conversation was not in SEND state.

AP_P_TO_R_NOT_LL_BDY

Secondary return code; the local TP did not finish sending a logical record.

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONV_FAILURE_NO_RETRY
Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued MC_SEND_ERROR. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued MC_DEALLOCATE with **dealloc_type** set to AP_ABEND.
- The partner TP encountered an ABEND, causing the partner LU to send an **MC_DEALLOCATE** request.

Remarks

Before changing the conversation state, this verb performs the equivalent of one of the following:

- MC_FLUSH, by sending the contents of the local LU's send buffer to the partner LU (and TP).
- MC_CONFIRM, by sending the contents of the local LU's send buffer and a confirmation request to the partner TP.

After this verb has successfully executed, the local TP can receive data.

The conversation must be in SEND state when the TP issues this verb.

State changes, summarized in the following table, are based on the value of **primary_rc**.

primary_rc	**New state**
AP_OK	RECEIVE
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE

The conversation does not change to SEND state for the partner TP until the partner TP receives one of the following values through the **what_rcvd** parameter of a subsequent receive verb:

- AP_SEND
- AP_CONFIRM_SEND and replies with MC_CONFIRMED
- AP_DATA_COMPLETE_CONFIRM_SEND and replies with **MC_CONFIRMED**
- AP_DATA_CONFIRM_SEND and replies with **MC_CONFIRMED**

The receive verbs are MC_RECEIVE_AND_POST, MC_RECEIVE_IMMEDIATE, and MC_RECEIVE_AND_WAIT.

MC_RECEIVE_AND_POST

The **MC_RECEIVE_AND_POST** verb receives application data and status information asynchronously. This allows the local transaction program (TP) to proceed with processing while data is still arriving at the local logical unit (LU).

While an asynchronous **MC_RECEIVE_AND_POST** is outstanding, the following verbs can be issued on the same conversation:

- GET_TYPE
- MC_GET_ATTRIBUTES
- MC_REQUEST_TO_SEND
- MC_SEND_ERROR
- MC_TEST_RTS
- TP_ENDED

This allows an application to use an asynchronous **MC_RECEIVE_AND_POST** to receive data. While the **MC_RECEIVE_AND_POST** is outstanding, it can still use **MC_SEND_ERROR** and **REQUEST_TO_SEND**. It is recommended that you use this feature for full asynchronous support. For information on how a TP receives data and how to use this verb, see Remarks in this topic.

The following structure describes the verb control block (VCB) used by the **MC_RECEIVE_AND_POST** verb.

```
struct mc_receive_and_post {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned short      what_rcvd;
    unsigned char       rtn_status;
    unsigned char       reserv4;
    unsigned char       rts_rcvd;
    unsigned char       reserv5;
    unsigned short      max_len;
    unsigned short      dlen;
    unsigned char FAR * dptr;
    unsigned char FAR * sema;
    unsigned char       reserv6;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_RECEIVE_AND_POST.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

what_rcvd
Returned parameter. Indicates whether data or conversation status was received.

- AP_CONFIRM_DEALLOCATE indicates that the partner TP issued MC_DEALLOCATE with **dealloc_type** set to AP_SYNC_LEVEL. The conversation's synchronization level, established by MC_ALLOCATE, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues MC_CONFIRMED.
- AP_CONFIRM_SEND indicates that the partner TP issued MC_PREPARE_TO_RECEIVE with ptr_type set to AP_SYNC_LEVEL. The conversation's synchronization level, established by **MC_ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues **MC_CONFIRMED**, and begins to send data.
- AP_CONFIRM_WHAT_RECEIVED indicates that the partner TP issued MC_CONFIRM. Upon receiving this value, the local TP normally issues **MC_CONFIRMED**.
- AP_DATA_COMPLETE indicates, for **MC_RECEIVE_AND_POST**, that the local TP has received a complete data record or the last part of a data record. Upon receiving this value, the local TP normally reissues **MC_RECEIVE_AND_POST** or issues another receive verb. If the partner TP has sent more data, the local TP begins to receive a new unit of data. Otherwise, the local TP examines status information.

  If **primary_rc** contains AP_OK and **what_rcvd** contains AP_SEND, AP_CONFIRM_SEND, AP_CONFIRM_DEALLOCATE, or AP_CONFIRM_WHAT_RECEIVED, see the description of the value (in this section) for the next action the local TP normally takes.

  If primary_rc contains AP_DEALLOC_NORMAL, the conversation has been deallocated in response to the MC_DEALLOCATE issued by the partner TP.

- AP_DATA_INCOMPLETE indicates, for **MC_RECEIVE_AND_POST**, that the local TP has received an incomplete data record. The **max_len** parameter specified a value less than the length of the data record (or less than the remainder of the data record if this is not the first receive verb to read the record). Upon receiving this value, the local TP normally reissues **MC_RECEIVE_AND_POST** (or issues another receive verb) to receive the next part of the record.
- AP_NONE indicates that the TP did not receive data or conversation status indicators.
- AP_SEND indicates, for the partner TP, that the conversation has entered RECEIVE state. For the local TP, the conversation is now in SEND state. Upon receiving this value, the local TP normally uses MC_SEND_DATA to begin sending data.

rtn_status

Supplied parameter. Indicates whether both data and conversation status indicators should be returned within one API call.

- AP_NO specifies that indicators should be returned individually on separate invocations of the verb.
- AP_YES specifies that indicators should be returned together, provided both are available. Both can be returned when:

  The receive buffer is large enough to hold all of the data that precedes the status indicator.

  The data is the last data record before the status indicator.

rts_rcvd

Returned parameter. Indicates whether the partner TP issued MC_REQUEST_TO_SEND.

- AP_YES indicates that the partner TP issued **MC_REQUEST_TO_SEND**, which requests that the local TP change the conversation to RECEIVE state.
- AP_NO indicates that the partner TP has not issued **MC_REQUEST_TO_SEND**.

max_len

Supplied parameter. Specifies the maximum number of bytes of data the local TP can receive. The range is from 0 through 65535.

The value must not exceed the length of the buffer to contain the received data. The offset of **dptr** plus the value of **max_len** must not exceed the size of the data segment.

dlen

Returned parameter. Specifies the number of bytes of data received. Data is stored in the buffer specified by **dptr**. A length of zero indicates that no data was received.

dptr

Supplied parameter. Provides the address of the buffer to contain the data received by the local LU.

For the Microsoft® Windows® 2000 operating system, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

For the OS/2 operating system, the data buffer must reside on an unnamed, shared segment, which is allocated by the **DosAllocSeg** function with Flags equal to 1. The data buffer must fit entirely on the data segment.

sema

Supplied parameter. Provides the address of the semaphore that APPC is to clear when the asynchronous receiving operation is finished. The **sema** parameter is an event handle obtained by calling either the **CreateEvent** or **OpenEvent** Win32 function.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

When **rtn_status** is AP_YES, the preceding return code or one of the following return codes can be returned.

AP_DATA_COMPLETE_SEND

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_SEND.

AP_DATA_COMPLETE_CONFIRM_SEND

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_SEND.

AP_DATA_COMPLETE_CONFIRM

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_WHAT_RECEIVED.

AP_DATA_COMPLETE_CONFIRM_DEALL

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_DEALLOCATE.

AP_DEALLOC_NORMAL

Primary return code; the partner TP issued MC_DEALLOCATE with **dealloc_type** set to AP_FLUSH or AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE.

If **rtn_status** is AP_YES, examine **what_rcvd** also.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_BAD_RETURN_STATUS_WITH_DATA

Secondary return code; the specified **rtn_status** value was not recognized by APPC.

AP_INVALID_DATA_SEGMENT

Secondary return code; the length specified for the data buffer was longer than the segment allocated to contain the buffer.

AP_INVALID_SEMAPHORE_HANDLE

Secondary return code; the address of the RAM semaphore or system semaphore handle was invalid.

> **Note** APPC cannot trap all invalid semaphore handles. If the TP passes a bad RAM semaphore handle, a protection violation results.

AP_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

AP_RCV_AND_POST_BAD_STATE

Secondary return code; the conversation was not in RECEIVE or SEND state when the TP issued this verb.

AP_RCV_AND_POST_NOT_LL_BDY

Secondary return code; the conversation was in SEND state; the TP began but did not finish sending a logical record.

AP_CANCELED

Primary return code; the local TP issued one of the following verbs, which canceled **MC_RECEIVE_AND_POST**:

MC_DEALLOCATE with **dealloc_type** set to AP_ABEND

MC_SEND_ERROR

TP_ENDED

Issuing one of these verbs causes the semaphore to be cleared.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONV_FAILURE_NO_RETRY

Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_NO_TRUNC
Primary return code; the partner TP issued MC_SEND_ERROR while the conversation was in SEND state. Data was not truncated.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **MC_SEND_ERROR**. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued MC_DEALLOCATE with **dealloc_type** set to AP_ABEND.
- The partner TP encountered an ABEND, causing the partner LU to send an **MC_DEALLOCATE** request.

Remarks

The local TP receives data through the following process:

1. The local TP issues a receive verb until it finishes receiving a complete unit of data. The data received is one data record.

   The local TP may need to issue the receive verb several times in order to receive a complete unit of data. After a complete unit of data has been received, the local TP can manipulate it. The receive verbs are **MC_RECEIVE_AND_POST**, MC_RECEIVE_AND_WAIT, and MC_RECEIVE_IMMEDIATE.

2. The local TP issues the receive verb again. This has one of the following effects:

   - If the partner TP has sent more data, the local TP begins to receive a new unit of data.
   - If the partner TP has finished sending data or is waiting for confirmation, status information (available through **what_rcvd**) indicates the next action the local TP normally takes.

The following procedure shows tasks performed by the local TP in using **MC_RECEIVE_AND_POST**.

To use MC_RECEIVE_AND_POST

1. For the Windows® 2000 operating system, the TP retrieves the WinAsyncAPPC message number by calling the **RegisterWindowMessage** API or allocating a semaphore. The **sema** field should be set to NULL if the application expects to be notified through the Windows message mechanism.

   APPC sends the Windows message or clears the semaphore when the local TP finishes receiving data.

   For the OS/2 operating system, the TP uses the **DosSemSet** function to set the semaphore pointed to by **sema**.

   The semaphore will remain set while the local TP receives data asynchronously. APPC will clear the semaphore when the local TP finishes receiving data.

2. The TP issues **MC_RECEIVE_AND_POST**.
3. The TP checks the value of **primary_rc**.

   If **primary_rc** is AP_OK, the receive buffer (pointed to by **dptr**) is asynchronously receiving data from the partner TP. While receiving data asynchronously, the local TP can:

    - Perform tasks not related to this conversation.
    - Issue MC_REQUEST_TO_SEND.
    - Gather information about this conversation by issuing GET_TYPE, MC_GET_ATTRIBUTES, or MC_TEST_RTS.
    - Prematurely cancel **MC_RECEIVE_AND_POST** by issuing MC_DEALLOCATE with **dealloc_type** set to AP_ABEND; MC_SEND_ERROR; or TP_ENDED.

   If, however, **primary_rc** is not AP_OK, **MC_RECEIVE_AND_POST** has failed. In this case, the local TP does not perform the next two tasks.

4. For the Windows 2000 operating system, when the TP finishes receiving data asynchronously, APPC issues the WinAsyncAPPC Windows message or clears the semaphore.

   For the OS/2 operating system, the TP uses the **DosSemWait** function to wait for APPC to clear the semaphore pointed to by **sema**. When the TP finishes receiving data asynchronously, APPC clears the semaphore. To prevent the local TP from waiting, have it test the semaphore (invoking **DosSemWait** with **Timeout** set to zero) until APPC clears the semaphore.

5. The TP checks the new value of **primary_rc**.

   If **primary_rc** is AP_OK, the local TP can examine the other returned parameters and manipulate the asynchronously received data.

   If **primary_rc** is not AP_OK, only **secondary_rc** and **rts_rcvd** (request-to-send received) are meaningful.

Conversation State Effects

The conversation must be in RECEIVE or SEND state when the TP issues this verb.

Issuing **MC_RECEIVE_AND_POST** while the conversation is in SEND state has the following effects:

- The local LU sends the information in its send buffer and a SEND indicator to the partner TP.
- The conversation changes to PENDING_POST state; the local TP is ready to receive information from the partner TP asynchronously.

The conversation changes states twice:

- Upon initial return of the verb, if **primary_rc** contains AP_OK, the conversation changes to PENDING_POST state.
- After completion of the verb, the state changes depending on the value of the following:

  The **primary_rc** parameter

  The **what_rcvd** parameter if **primary_rc** is AP_OK

The following table shows the new state associated with each value of **what_rcvd** when **primary_rc** is AP_OK.

what_rcvd	**New state**
AP_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_DATA_COMPLETE_CONFIRM_DEALL	CONFIRM_DEALLOCATE
AP_DATA_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_COMPLETE_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_CONFIRM_SEND	CONFIRM_SEND
AP_CONFIRM_WHAT_RECEIVED	CONFIRM
AP_DATA_COMPLETE_CONFIRM	CONFIRM
AP_DATA_CONFIRM	CONFIRM
AP_DATA	RECEIVE
AP_DATA_COMPLETE	RECEIVE
AP_DATA_INCOMPLETE	RECEIVE
AP_SEND	SEND
AP_DATA_COMPLETE_SEND	SEND_PENDING

The following table shows the new state associated with each value of **primary_rc** other than AP_OK.

primary_rc	**New state**
AP_CANCELED	No change

AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_PROG_ERROR_NO_TRUNC	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_NO_TRUNC	RECEIVE
AP_PROG_ERROR_TRUNC	RECEIVE
AP_SVC_ERROR_TRUNC	RECEIVE

MC_RECEIVE_AND_WAIT

The **MC_RECEIVE_AND_WAIT** verb receives any data that is currently available from the partner transaction program (TP). If no data is currently available, the local TP waits for data to arrive.

To allow full use to be made of the asynchronous support, asynchronously issued **MC_RECEIVE_AND_WAIT** verbs have been altered to act like MC_RECEIVE_AND_POST verbs. Specifically, while an asynchronous **MC_RECEIVE_AND_WAIT** is outstanding, the following verbs can be issued on the same conversation:

- GET_TYPE
- MC_GET_ATTRIBUTES
- MC_REQUEST_TO_SEND
- MC_SEND_ERROR
- MC_TEST_RTS
- TP_ENDED

This allows an application, and in particular, a 5250 emulator, to use an asynchronous **MC_RECEIVE_AND_WAIT** to receive data. While the **MC_RECEIVE_AND_WAIT** is outstanding, it can still use **MC_SEND_ERROR** and **MC_REQUEST_TO_SEND**. It is recommended that you use this feature for full asynchronous support.

The following structure describes the verb control block (VCB) used by the **MC_RECEIVE_AND_WAIT** verb.

```
struct mc_receive_and_wait {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned short      what_rcvd;
    unsigned char       rtn_status;
    unsigned char       reserv4;
    unsigned char       rts_rcvd;
    unsigned char       reserv5;
    unsigned short      max_len;
    unsigned short      dlen;
    unsigned char FAR * dptr;
    unsigned char       reserv6[5];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_RECEIVE_AND_WAIT.
opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.
reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
tp_id
Supplied parameter. Identifies the local TP.

The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Specifies the conversation identifier.

The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

what_rcvd

Returned parameter. Indicates whether data or conversation status was received.

- AP_CONFIRM_DEALLOCATE indicates that the partner TP has issued MC_DEALLOCATE with **dealloc_type** set to AP_SYNC_LEVEL, and the conversation's synchronization level, established by **MC_ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues MC_CONFIRMED.
- AP_CONFIRM_SEND indicates that the partner TP has issued MC_PREPARE_TO_RECEIVE with **ptr_type** set to AP_SYNC_LEVEL, and the conversation's synchronization level, established by **MC_ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues **MC_CONFIRMED** and begins to send data.
- AP_CONFIRM_WHAT_RECEIVED indicates that the partner TP has issued MC_CONFIRM. Upon receiving this value, the local TP normally issues **MC_CONFIRMED**.
- AP_DATA_COMPLETE indicates, for **MC_RECEIVE_AND_WAIT**, that the local TP has received a complete data record or the last part of a data record. Upon receiving this value, the local TP normally reissues **MC_RECEIVE_AND_WAIT** or issues another receive verb. If the partner TP has sent more data, the local TP begins to receive a new unit of data.

  Otherwise, the local TP examines status information, if **primary_rc** contains AP_OK and **what_rcvd** contains AP_SEND, AP_CONFIRM_SEND, AP_CONFIRM_DEALLOCATE, or AP_CONFIRM_WHAT_RECEIVED.

  See Return Codes in this topic for the next action the local TP normally takes.

  If primary_rc contains AP_DEALLOC_NORMAL, the conversation has been deallocated in response to MC_DEALLOCATE issued by the partner TP.

- AP_DATA_INCOMPLETE indicates that the local TP has received an incomplete data record. The **max_len** parameter specified a value less than the length of the data record (or less than the remainder of the data record if this is not the first receive verb to read the record). Upon receiving this value, the local TP normally reissues **MC_RECEIVE_AND_WAIT** (or issues another receive verb) to receive the next part of the record.
- AP_NONE indicates that the TP did not receive data or conversation status indicators.
- AP_SEND indicates, for the partner TP, that the conversation has entered RECEIVE state. For the local TP, the conversation is now in SEND state. Upon receiving this value, the local TP normally uses MC_SEND_DATA to begin sending data.

rtn_status

Supplied parameter. Indicates whether both data and conversation status indicators should be returned within one API call.

- AP_NO specifies that indicators should be returned individually on separate invocations of the verb.
- AP_YES specifies that indicators should be returned together, provided both are available. Both can be returned when:

  The receive buffer is large enough to hold all of the data that precedes the status indicator.

  The data is the last data record before the status indicator.

rts_rcvd

Returned parameter. Contains the request-to-send indicator.

- AP_YES indicates that the partner TP has issued MC_REQUEST_TO_SEND, which requests that the local TP change the conversation to RECEIVE state.
- AP_NO indicates that the partner TP has not issued **MC_REQUEST_TO_SEND**.

max_len

Supplied parameter. Indicates the maximum number of bytes of data the local TP can receive. The range is from 0 through 65535.

For the Microsoft® Windows® 2000 operating system and the Windows graphical environment, this value must not exceed the length of the buffer to contain the received data.

For the OS/2 operating system, the offset of **dptr** plus the value of **max_len** must not exceed the size of the data segment.

By issuing **MC_RECEIVE_AND_WAIT** with **max_len** set to zero, the local TP can determine whether the partner TP has data to send, seeks confirmation, or has changed the conversation state.

dlen

Returned parameter. Indicates the number of bytes of data received. Data is stored in the buffer specified by **dptr**. A length of zero indicates that no data was received.

dptr

Supplied parameter. Provides the address of the buffer to contain the data received by the local TP.

For the Windows 2000 operating system and the Windows graphical environment, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

For the OS/2 operating system, the data buffer must reside on an unnamed, shared segment, which is allocated by the **DosAllocSeg** function with Flags equal to 1. The data buffer must fit entirely on the data segment.

For the Windows environment, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

When **rtn_status** is AP_YES, the preceding return code or one of the following return codes can be returned.

AP_DATA_COMPLETE_SEND

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_SEND.

AP_DATA_COMPLETE_CONFIRM_SEND

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_SEND.

AP_DATA_COMPLETE_CONFIRM

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_WHAT_RECEIVED.

AP_DATA_COMPLETE_CONFIRM_DEALL

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_DEALLOCATE.

AP_DEALLOC_NORMAL
Primary return code; the partner TP has deallocated the conversation without requesting confirmation and issued MC_DEALLOCATE with **dealloc_type** set to one of the following:

- AP_CONFIRM_SYNC_LEVEL
- AP_FLUSH
- AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE

If **rtn_status** is AP_YES, examine **what_rcvd** also.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_BAD_RETURN_STATUS_WITH_DATA

Secondary return code; the specified **rtn_status** value was not recognized by APPC.

AP_INVALID_DATA_SEGMENT

Secondary return code; the length specified for the data buffer was longer than the segment allocated to contain the buffer.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_RCV_AND_WAIT_BAD_STATE

Secondary return code; the conversation was not in RECEIVE or SEND state when the TP issued this verb.

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code may be returned through a verb issued after MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner logical unit (LU) or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONV_FAILURE_NO_RETRY

Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY

Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED

Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_NO_TRUNC

Primary return code; the partner TP has issued MC_SEND_ERROR while the conversation was in SEND state. Data was not truncated.

AP_PROG_ERROR_PURGING

Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **MC_SEND_ERROR**. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY

Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING

Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued MC_DEALLOCATE with **dealloc_type** set to AP_ABEND.
- The partner TP encountered an ABEND, causing the partner LU to send an **MC_DEALLOCATE** request.

Remarks

The local TP receives data through the following process:

1. The local TP issues a receive verb until it finishes receiving a complete unit of data. The data received is one data record.

   The local TP may need to issue the receive verb several times in order to receive a complete unit of data. After a complete unit of data has been received, the local TP can manipulate it.

   The receive verbs are MC_RECEIVE_AND_POST, **MC_RECEIVE_AND_WAIT**, and MC_RECEIVE_IMMEDIATE.

2. The local TP issues the receive verb again. This has one of the following effects:

   - If the partner TP has sent more data, the local TP begins to receive a new unit of data.
   - If the partner TP has finished sending data or is waiting for confirmation, status information (available through the **what_rcvd** parameter) indicates the next action the local TP normally takes.

The conversation must be in RECEIVE or SEND state when the TP issues this verb.

Issuing the Verb in SEND State

Issuing **MC_RECEIVE_AND_WAIT** while the conversation is in SEND state has the following effects:

- The local LU sends the information in its send buffer and a SEND indicator to the partner TP.
- The conversation changes to RECEIVE state; the local TP waits for the partner TP to send data.

State Change

The new conversation state is determined by the following factors:

- The state the conversation is in when the TP issues the verb.
- The **primary_rc** parameter.
- The **what_rcvd** parameter if **primary_rc** contains AP_OK.

Verb Issued in SEND State

The following table details the state changes when **MC_RECEIVE_AND_WAIT** is issued in SEND state and **primary_rc** is AP_OK.

what_rcvd	New state
AP_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_DATA_COMPLETE_CONFIRM_DEALL	CONFIRM_DEALLOCATE
AP_DATA_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE

AP_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_COMPLETE_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_CONFIRM_SEND	CONFIRM_SEND
AP_CONFIRM_WHAT_RECEIVED	CONFIRM
AP_DATA_COMPLETE_CONFIRM	CONFIRM
AP_DATA_CONFIRM	CONFIRM
AP_DATA	RECEIVE
AP_DATA_COMPLETE	RECEIVE
AP_DATA_INCOMPLETE	RECEIVE
AP_SEND	No change
AP_DATA_COMPLETE_SEND	SEND_PENDING

The following table details the state changes when **MC_RECEIVE_AND_WAIT** is issued in SEND state and **primary_rc** is not AP_OK.

primary_rc	**New state**
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_PROG_ERROR_NO_TRUNC	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_NO_TRUNC	RECEIVE

Verb Issued in RECEIVE State

The following table details the state changes when **MC_RECEIVE_AND_WAIT** is issued in RECEIVE state and **primary_rc** is AP_OK.

what_rcvd	**New state**
AP_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_DATA_COMPLETE_CONFIRM_DEALL	CONFIRM_DEALLOCATE
AP_DATA_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_COMPLETE_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_CONFIRM_SEND	CONFIRM_SEND
AP_CONFIRM_WHAT_RECEIVED	CONFIRM
AP_DATA_COMPLETE_CONFIRM	CONFIRM
AP_DATA_CONFIRM	CONFIRM
AP_DATA	No change
AP_DATA_COMPLETE	No change
AP_DATA_INCOMPLETE	No change
AP_SEND	SEND
AP_DATA_COMPLETE_SEND	SEND_PENDING

The following table details the state changes when **MC_RECEIVE_AND_WAIT** is issued in RECEIVE state and **primary_rc** is not AP_OK.

primary_rc	**New state**
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET

AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	No change
AP_PROG_ERROR_NO_TRUNC	No change
AP_SVC_ERROR_PURGING	No change
AP_SVC_ERROR_NO_TRUNC	No change
AP_PROG_ERROR_TRUNC	No change
AP_SVC_ERROR_TRUNC	No change

MC_RECEIVE_IMMEDIATE

The **MC_RECEIVE_IMMEDIATE** verb receives any data currently available from the partner transaction program (TP). If no data is available, the local TP does not wait. To avoid blocking the conversation, issue MC_RECEIVE_AND_WAIT in conjunction with WinAsyncAPPC. The following structure describes the verb control block (VCB) used by the **MC_RECEIVE_IMMEDIATE** verb.

```
struct mc_receive_immediate {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned short      what_rcvd;
    unsigned char       rtn_status;
    unsigned char       reserv4;
    unsigned char       rts_rcvd;
    unsigned char       reserv5;
    unsigned short      max_len;
    unsigned short      dlen;
    unsigned char FAR * dptr;
    unsigned char       reserv6[5];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_RECEIVE_IMMEDIATE.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

what_rcvd
Returned parameter. Contains information received with the incoming data:

- AP_CONFIRM_DEALLOCATE indicates that the partner TP has issued MC_DEALLOCATE with **dealloc_type** set to AP_SYNC_LEVEL, and the conversation's synchronization level, established by **MC_ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues MC_CONFIRMED.
- AP_CONFIRM_SEND indicates that the partner TP has issued MC_PREPARE_TO_RECEIVE with **ptr_type** set to AP_SYNC_LEVEL, and the conversation's synchronization level, established by **MC_ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues **MC_CONFIRMED**, and begins to send data.
- AP_CONFIRM_WHAT_RECEIVED indicates that the partner TP has issued MC_CONFIRM. Upon receiving this value, the local TP normally issues **MC_CONFIRMED**.
- AP_DATA_COMPLETE indicates, for **MC_RECEIVE_IMMEDIATE** in mapped conversations, that the local TP has received a complete data record or the last part of a data record. Upon receiving this value, the local TP normally reissues **MC_RECEIVE_IMMEDIATE** or issues another receive verb. If the partner TP has sent more data, the local TP begins to receive a new unit of data.

Otherwise, the local TP examines status information if **primary_rc** contains AP_OK and **what_rcvd** contains any of these values:

AP_SEND

AP_CONFIRM_SEND

AP_CONFIRM_DEALLOCATE

AP_CONFIRM_WHAT_RECEIVED

See the description of the value in Return Codes in this topic for the next action the local TP normally takes.

If **primary_rc** contains AP_DEALLOC_NORMAL, the conversation has been deallocated in response to MC_DEALLOCATE issued by the partner TP.

- AP_DATA_INCOMPLETE indicates for **MC_RECEIVE_IMMEDIATE** in mapped conversations that the local TP has received an incomplete data record. The **max_len** parameter specified a value less than the length of the data record (or less than the remainder of the data record if this is not the first receive verb to read the record). Upon receiving this value, the local TP normally reissues **MC_RECEIVE_IMMEDIATE** (or issues another receive verb) to receive the next part of the record.
- AP_NONE indicates that the TP did not receive data or conversation status indicators.
- AP_SEND indicates, for the partner TP, the conversation has entered RECEIVE state. For the local TP, the conversation is now in SEND state. Upon receiving this value, the local TP normally uses MC_SEND_DATA to begin sending data.

rtn_status
Supplied parameter. Indicates whether both data and conversation status indicators should be returned within one API call.

- AP_NO specifies that indicators should be returned individually on separate invocations of the verb.
- AP_YES specifies that indicators should be returned together, provided both are available. Both can be returned when:

  The receive buffer is large enough to hold all of the data that precedes the status indicator.

  The data is the last data record before the status indicator.

rts_rcvd
Returned parameter. Contains the request-to-send indicator. Possible values are:

- AP_YES indicates that the partner TP has issued MC_REQUEST_TO_SEND, which requests that the local TP change the conversation to RECEIVE state.
- AP_NO indicates that the partner TP has not issued **MC_REQUEST_TO_SEND**.

max_len
Supplied parameter. Indicates the maximum number of bytes of data the local TP can receive. The range is from 0 through 65535.

For the Microsoft® Windows® 2000 operating system and the Windows graphical environment, this value must not exceed the length of the buffer to contain the received data.

For the OS/2 operating system, the offset of **dptr** plus the value of **max_len** must not exceed the size of the data segment.

By issuing **MC_RECEIVE_IMMEDIATE** with **max_len** set to zero, the local TP can determine whether the partner TP has data to send, seeks confirmation, or has changed the conversation state.

dlen
Returned parameter. Provides the number of bytes of data received. Data is stored in a buffer specified by **dptr**. A length of zero indicates that no data was received.

dptr
Supplied parameter. Address of the buffer to contain the data received by the local TP.

For the Windows 2000 operating system and the Windows graphical environment, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

For the OS/2 operating system, the data buffer must reside on an unnamed, shared segment, which is allocated by the function **DosAllocSeg** with Flags equal to 1. The data buffer must fit entirely on the data segment.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

When **rtn_status** is AP_YES, the preceding return code or one of the following return codes can be returned.

AP_DATA_COMPLETE_SEND

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_SEND.

AP_DATA_COMPLETE_CONFIRM_SEND

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_SEND.

AP_DATA_COMPLETE_CONFIRM

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_WHAT_RECEIVED.

AP_DATA_COMPLETE_CONFIRM_DEALL

Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_DEALLOCATE.

AP_UNSUCCESSFUL

Primary return code; no data is immediately available from the partner TP.

AP_DEALLOC_NORMAL

Primary return code; the partner TP has deallocated the conversation without requesting confirmation. The partner TP issued MC_DEALLOCATE with **dealloc_type** set to one of the following:

- AP_FLUSH
- AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE

If **rtn_status** is AP_YES, examine **what_rcvd** also.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_BAD_RETURN_STATUS_WITH_DATA

Secondary return code; the specified **rtn_status** value was not recognized by APPC.

AP_INVALID_DATA_SEGMENT

Secondary return code; the length specified for the data buffer was longer than the segment allocated to contain the buffer.

AP_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

AP_RCV_IMMD_BAD_STATE

Secondary return code; the conversation was not in RECEIVE state.

AP_ALLOCATION_ERROR

Secondary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code may be returned through a verb issued after MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner logical unit (LU) or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONV_FAILURE_NO_RETRY
Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_NO_TRUNC
Primary return code; the partner TP has issued MC_SEND_ERROR while the conversation was in SEND state. Data was not truncated.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **MC_SEND_ERROR**. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued MC_DEALLOCATE with **dealloc_type** set to AP_ABEND.
- The partner TP encountered an ABEND, causing the partner LU to send an **MC_DEALLOCATE** request.

Remarks

The local TP receives data through the following process:

1. The local TP issues a receive verb until it finishes receiving a complete unit of data. The data received is one data record.

   The local TP may need to issue the receive verb several times in order to receive a complete unit of data. After a complete unit of data has been received, the local TP can manipulate it.

   The receive verbs are MC_RECEIVE_AND_POST, MC_RECEIVE_AND_WAIT, and **MC_RECEIVE_IMMEDIATE**.

2. The local TP issues the receive verb again. This has one of the following effects:

   - If the partner TP has sent more data, the local TP begins to receive a new unit of data.
   - If the partner TP has finished sending data or is waiting for confirmation, status information (available through **what_rcvd**) indicates the next action the local TP normally takes.

The conversation must be in RECEIVE state when the TP issues this verb.

The new state is determined by **primary_rc**. If **primary_rc** is AP_OK, the new state is determined by **what_rcvd**.

The following table details the state changes when the **primary_rc** is AP_OK.

what_rcvd	New state
AP_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_DATA_COMPLETE_CONFIRM_DEALL	CONFIRM_DEALLOCATE
AP_DATA_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_COMPLETE_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_CONFIRM_SEND	CONFIRM_SEND
AP_CONFIRM_WHAT_RECEIVED	CONFIRM
AP_DATA_COMPLETE_CONFIRM	CONFIRM
AP_DATA_CONFIRM	CONFIRM
AP_DATA	No change
AP_DATA_COMPLETE	No change
AP_DATA_INCOMPLETE	No change
AP_SEND	SEND
AP_DATA_COMPLETE_SEND	SEND_PENDING

The following table details the state changes when the **primary_rc** is not AP_OK.

primary_rc	New state
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	No change
AP_PROG_ERROR_NO_TRUNC	No change

AP_SVC_ERROR_PURGING	No change
AP_SVC_ERROR_NO_TRUNC	No change
AP_PROG_ERROR_TRUNC	No change
AP_SVC_ERROR_TRUNC	No change
AP_UNSUCCESSFUL	No change

MC_RECEIVE_LOG_DATA

The **MC_RECEIVE_LOG_DATA** verb allows the user to register to receive the log data associated with an inbound Function Management Header 7 (FMH7) error report. The verb passes a buffer to APPC, and any log data received is placed in that buffer. APPC continues to use this buffer as successive FMH7s arrive until it is provided with another buffer (that is, until the transaction program (TP) issues another **MC_RECEIVE_LOG_DATA** specifying a different buffer or no buffer at all).

Note that the TP itself is responsible for allocating and freeing the buffer. After the buffer has been passed to APPC, the TP should either issue another **MC_RECEIVE_LOG_DATA** specifying a new buffer or a zero-length buffer, or wait until the conversation has finished before freeing the original buffer.

When an FMH7 is received, APPC copies any associated error log general data stream (GDS) into the buffer. If there is no associated error log variable, the buffer is zeroed out. It is up to the TP to check the buffer whenever a return code from a receive verb indicates that an error has been received.

The following structure describes the verb control block (VCB) used by the **MC_RECEIVE_LOG_DATA** verb.

```
struct mc_receive_log_data {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv1;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned short      log_dlen;
    unsigned char FAR * log_dptr;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_RECEIVE_LOG_DATA.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv1
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

log_dlen
Supplied parameter. Specifies the maximum length of log data that APPC can place in the buffer (that is, the buffer size). The range is from 0 through 65535. Note that a length of zero here indicates that any previous **MC_RECEIVE_LOG_DATA** verb should be cancelled.

log_dptr
Supplied parameter. Specifies the address of the buffer that APPC will use to store the log data.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

MC_REQUEST_TO_SEND

The **MC_REQUEST_TO_SEND** verb notifies the partner transaction program (TP) that the local TP wants to send data.

The following structure describes the verb control block (VCB) used by the **MC_REQUEST_TO_SEND** verb.

```
struct mc_request_to_send {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_REQUEST_TO_SEND.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP.

The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier.

The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_R_T_S_BAD_STATE

Secondary return code; the conversation is not in an allowed state when the TP issued this verb.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).

- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with MC_ALLOCATE, it may indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **MC_ALLOCATE** request.

When **MC_ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation can be in any of the following states when the TP issues this verb:

CONFIRM

PENDING_POST (OS/2)

RECEIVE

There is no state change.

The request-to-send notification is received by the partner program through the **rts_rcvd** parameter of the following verbs:

- MC_CONFIRM
- MC_RECEIVE_AND_POST
- MC_RECEIVE_AND_WAIT
- MC_RECEIVE_IMMEDIATE
- MC_SEND_DATA
- MC_SEND_ERROR

It is also indicated by a **primary_rc** of AP_OK on MC_TEST_RTS.

Request-to-send notification is sent to the partner TP immediately; APPC does not wait until the send buffer fills up or is flushed. Consequently, the request-to-send notification may arrive out of sequence. For example, if the local TP is in SEND state and issues MC_PREPARE_TO_RECEIVE followed by **MC_REQUEST_TO_SEND**, the partner TP, in RECEIVE state, may receive the request-to-send notification before it receives the send notification. For this reason, request-to-send can be reported to a TP through a receive verb.

In response to this request, the partner TP can change the conversation to:

- RECEIVE state by issuing **MC_PREPARE_TO_RECEIVE** or MC_RECEIVE_AND_WAIT.
- PENDING_POST state by issuing MC_RECEIVE_AND_POST.

The partner TP can also ignore the request-to-send.

The conversation state changes to SEND for the local TP when the local TP receives one of the following values through the **what_rcvd** parameter of a subsequent receive verb:

- AP_CONFIRM_SEND and replies with MC_CONFIRMED
- AP_DATA_COMPLETE_CONFIRM_SEND and replies with **MC_CONFIRMED**
- AP_SEND

The receive verbs are MC_RECEIVE_AND_POST, MC_RECEIVE_IMMEDIATE, and MC_RECEIVE_AND_WAIT.

MC_SEND_CONVERSATION

The **MC_SEND_CONVERSATION** verb allocates a session between the local logical unit (LU) and partner LU, sends data on the session, and then deallocates the session.

The following structure describes the verb control block (VCB) used by the **MC_SEND_CONVERSATION** verb.

```
struct mc_send_conversation {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       reserv3[8];
    unsigned char       rtn_ctl;
    unsigned char       reserv4;
    unsigned long       conv_group_id;
    unsigned long       sense_data;
    unsigned char       plu_alias[8];
    unsigned char       mode_name[8];
    unsigned char       tp_name[64];
    unsigned char       security;
    unsigned char       reserv6[11];
    unsigned char       pwd[10];
    unsigned char       user_id[10];
    unsigned short      pip_dlen;
    unsigned char FAR * pip_dptr;
    unsigned char       reserv6;
    unsigned char       fqplu_name[17];
    unsigned char       reserv7[8];
    unsigned short      dlen;
    unsigned char FAR * dptr;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_SEND_CONVERSATION.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local transaction program (TP). The value of this parameter was returned by TP_STARTED.

conv_id
Supplied parameter. Provides the conversation identifier.

The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

rtn_ctl
Supplied parameter. Specifies how APPC should select a session to allocate for the conversation and when the local LU should return control to the local TP. The allowed values are:

- AP_IMMEDIATE specifies that the LU allocates a contention-winner session, if one is immediately available, and returns control to the TP.
- AP_WHEN_SESSION_ALLOCATED specifies that the LU does not return control to the TP until it allocates a session or

encounters one of the errors described in Return Codes in this topic. If the session limit is zero, the LU returns control immediately. Note that if a session is not available, the TP waits for one.

- AP_WHEN_SESSION_FREE specifies that the LU allocates a contention-winner or contention-loser session, if one is available or able to be activated, and returns control to the TP. If an error occurs (as described in Return Codes in this topic) the call will return immediately with the error in the **primary_rc** and **secondary_rc** fields.
- AP_WHEN_CONWINNER_ALLOC specifies that the LU does not return control until it allocates a contention-winner session or encounters one of the errors described in Return Codes in this topic. If the session limit is zero, the LU returns control immediately. Note that if a session is not available, the TP waits for one.
- AP_WHEN_CONV_GROUP_ALLOC specifies that the LU does not return control to the TP until it allocates the session specified by **conv_group_id** or encounters one of the errors described in Return Codes in this topic. If the session is not available, the TP waits for it to become free.

conv_group_id

Supplied/returned parameter. Used as a supplied parameter when **rtn_ctl** is WHEN_CONV_GROUP_ALLOC to specify the identity of the conversation group from which the session should be allocated. When **rtn_ctl** specifies a different value, and the **primary_rc** is AP_OK, this is a returned value. The purpose of this parameter is to provide a TP with the assurance that the same session will be reallocated and therefore the conversations conducted over the session will occur in the same sequence that they were initiated.

sense_data

Returned parameter. If the primary and secondary return codes indicate an allocation error (retry or no-retry), an SNA-defined sense code is returned.

plu_alias

Supplied parameter. Specifies the alias by which the partner LU is known to the local TP. This parameter must match the name of a partner LU established during configuration. The parameter is an 8-byte, type G ASCII character set that includes:

- Uppercase letters
- Numerals 0 to 9
- Spaces
- Special characters $, #, %, and @

If the value of this parameter is fewer than eight bytes, pad it on the right with ASCII spaces (0x20).

mode_name

Supplied parameter. Specifies the name of a set of networking characteristics defined during configuration. This parameter must match the name of a mode associated with the partner LU during configuration.

The parameter is an 8-byte EBCDIC character string. It can consist of characters from the type A EBCDIC character set, including all EBCDIC spaces. These characters are:

- Uppercase letters
- Numerals 0 to 9
- Special characters $, #, and @

The first character in the string must be an uppercase letter or special character.

In a mapped conversation, the name cannot be SNASVCMG (a reserved mode name used internally by APPC).

tp_name

Supplied parameter. Specifies the name of the invoked TP. The value of **tp_name** specified by MC_ALLOCATE in the invoking TP must match the value of **tp_name** specified by RECEIVE_ALLOCATE in the invoked TP.

The parameter is a 64-byte, case-sensitive, EBCDIC character string. This parameter can consist of characters from the type AE EBCDIC character set. These characters are:

- Uppercase and lowercase letters
- Numerals 0 to 9
- Special characters $, #, @, and period (.)

If the TP name is fewer than 64 bytes, use EBCDIC spaces (0x40) to pad it on the right.

The SNA convention is that a service TP name can have up to four characters. The first character is a hexadecimal byte between 0x00 and 0x3F. The other characters are from the EBCDIC AE character set.

security

Supplied parameter. Specifies the information the partner LU requires in order to validate access to the invoked TP.

- AP_NONE specifies that the invoked TP uses no conversation security.
- AP_PGM specifies that the invoked TP uses conversation security and requires a user identifier and password. Use **user_id** and **pwd** to supply this information.
- AP_SAME specifies that the invoked TP, invoked with a valid user identifier and password, in turn invokes another TP.

For example, assume that TP A invokes TP B with a valid user identifier and password, and TP B in turn invokes TP C. If TP B specifies the value AP_SAME, APPC will send the LU for TP C the user identifier from TP A and an already-verified indicator. This indicator indicates to TP C not to require the password (if TP C is configured to accept an already-verified indicator).

pwd

Supplied parameter. Specifies the password associated with **user_id**. This parameter is required only if the security parameter is set to AP_PGM and must match the password for **user_id** that was established during configuration.

This parameter is a 10-byte, case-sensitive, EBCDIC character string. It can consist of characters from the type AE EBCDIC character set. These characters are:

- Uppercase and lowercase letters
- Numerals 0 to 9
- Special characters $, #, @, and period (.)

If the password is fewer than 10 bytes, use EBCDIC spaces (0x40) to pad it on the right.

user_id

Supplied parameter. Specifies the user identifier required to access the partner TP. This parameter is required only if the security parameter is set to AP_PGM and must match one of the user identifiers configured for the partner TP.

The parameter can consist of characters from the type AE EBCDIC character set. These characters are:

- Uppercase and lowercase letters
- Numerals 0 to 9
- Special characters $, #, @, and period (.)

If the user identifier is fewer than 10 bytes, use EBCDIC spaces (0x40) to pad it on the right.

pip_dlen

Supplied parameter. Specifies the length of the PIP to be passed to the partner TP. The range for this parameter is from 0 through 32767.

pip_dptr

Supplied parameter. Specifies the address of the buffer containing PIP data. Use this parameter only if **pip_dlen** is greater than zero.

PIP data can consist of initialization parameters or environmental setup information required by a partner TP or remote operating system. The PIP data must follow the GDS format. For more information, see your IBM SNA manual(s).

For the Microsoft® Windows® 2000 operating system, the data buffer can reside in a static data area or in a globally allocated area.

fqplu_name

Supplied parameter. Specifies the fully qualified name of the local LU. This parameter must match the fully qualified name of the local LU defined in the remote node. The parameter is made up of two type A EBCDIC character strings (each of up to eight characters), which are the network name (NETID) and the LU name of the partner LU. The names are separated by an EBCDIC period (.). The NETID can be omitted, and if this is the case, the period should also be omitted.

This name must be provided if no **plu_alias** is provided.

Type A EBCDIC characters contain:

- Uppercase letters
- Numerals 0 to 9
- Special characters $, #, and @

If the value of this parameter is fewer than 17 bytes, pad it on the right with EBCDIC spaces (0x40).

dlen

Supplied parameter. Specifies the number of bytes of data to be put in the local LU's send buffer. The range for this parameter is from 0 through 65535.

dptr

Supplied parameter. Specifies the address of the buffer containing the data to be put in the local LU's send buffer.

For the Windows 2000 operating system, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

AP_UNSUCCESSFUL

Primary return code; the supplied parameter **rtn_ctl** specified immediate return of the control to the TP (AP_IMMEDIATE), and the local LU did not have an available contention-winner session.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_BAD_RETURN_CONTROL

Secondary return code; the value specified for **rtn_ctl** was invalid.

AP_BAD_SECURITY

Secondary return code; the value specified for **security** was invalid.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_PIP_LEN_INCORRECT

Secondary return code; the value of **pip_dlen** was greater than 32767.

AP_UNKNOWN_PARTNER_MODE

Secondary return code; the value specified for **mode_name** was invalid.

AP_BAD_PARTNER_LU_ALIAS

Secondary return code, APPC did not recognize the supplied **partner_lu_alias**.

AP_NO_USE_OF_SNASVCMG

Secondary return code; SNASVCMG is not a valid value for **mode_name**.

AP_INVALID_DATA_SEGMENT

Secondary return code; the PIP data or application data was longer than the allocated data segment, or the address of a data buffer was wrong.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code may be returned through a verb issued after MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with MC_ALLOCATE, it may indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **MC_ALLOCATE** request.

When **MC_ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY

Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING

Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

This verb is issued by the invoking TP to conduct an entire conversation with the remote TP. If the remote TP rejects either the conversation initiation or the data, the invoking TP will not receive notification of the rejection.

The conversation state is RESET when the TP issues this verb. There is no state change.

Several parameters of **MC_SEND_CONVERSATION** are EBCDIC or ASCII strings. A TP can use the common service verb (CSV) CONVERT to translate a string from one character set to the other.

Normally, the value of **mode_name** must match the name of a mode configured for the invoked TP's node and associated during configuration with the partner LU. If one of the modes associated with the partner LU on the invoked TP's node is an implicit mode, the session established between the two LUs will be of the implicit mode when no mode name associated with the partner LU matches the value of **mode_name**.

MC_SEND_DATA

The **MC_SEND_DATA** verb places data in the local logical unit's (LU's) send buffer for transmission to the partner transaction program (TP).

The following structure describes the verb control block (VCB) used by the **MC_SEND_DATA** verb.

```
struct mc_send_data {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       rts_rcvd;
    unsigned char       data_type;
    unsigned short int  dlen;
    unsigned char FAR * dptr ;
    unsigned char       type;
    unsigned char       reserv4;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_SEND_DATA.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP.

The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier.

The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

rts_rcvd
Returned parameter. Provides the request-to-send-received indicator.

- AP_YES indicates that the partner TP has issued MC_REQUEST_TO_SEND, which requests that the local TP change the conversation to RECEIVE state. To change to RECEIVE state, the local TP can use MC_PREPARE_TO_RECEIVE, MC_RECEIVE_AND_WAIT, or MC_RECEIVE_AND_POST.
- AP_NO indicates that the partner TP has not issued **MC_REQUEST_TO_SEND**.

data_type
Supplied parameter. Specifies the type of data to be sent if Sync Point is supported. Valid parameters are:

AP_APPLICATION

AP_USER_CONTROL_DATA

AP_PS_HEADER

dlen
Supplied parameter. Specifies the number of bytes of data to be put in the local LU's send buffer. The range is from 0 through

65535.

dptr

Supplied parameter. Specifies the address of the buffer containing the data to be put in the local LU's send buffer.

For the Windows 2000 operating system, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

type

Supplied parameter. Allows a TP to send data and perform other functions within one API call. For example, you can combine **MC_SEND_DATA** with **type** set to CONFIRM to accomplish the same objective as issuing **MC_SEND_DATA** followed by MC_CONFIRM.

- AP_SEND_DATA_CONFIRM corresponds to **MC_SEND_DATA** followed by **MC_CONFIRM**.
- AP_SEND_DATA_FLUSH corresponds to **MC_SEND_DATA** followed by MC_FLUSH.
- AP_SEND_DATA_DEALLOC_ABEND corresponds to **MC_SEND_DATA** followed by MC_DEALLOCATE with a **dealloc_type** of AP_ABEND.
- AP_SEND_DATA_DEALLOC_FLUSH corresponds to **MC_SEND_DATA** followed by **MC_DEALLOCATE** with a **dealloc_type** of AP_FLUSH.
- AP_SEND_DATA_DEALLOC_SYNC_LEVEL corresponds to **MC_SEND_DATA** followed by **MC_DEALLOCATE** with a **dealloc_type** of AP_SYNC_LEVEL.
- AP_SEND_DATA_P_TO_R_FLUSH corresponds to **MC_SEND_DATA** followed by MC_PREPARE_TO_RECEIVE with a **ptr_type** of AP_FLUSH.
- AP_SEND_DATA_P_TO_R_SYNC_LEVEL corresponds to **MC_SEND_DATA** followed by **MC_PREPARE_TO_RECEIVE** with a **ptr_type** of AP_SYNC_LEVEL and **locks** set to AP_SHORT.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_INVALID_DATA_SEGMENT

Secondary return code; the length specified for the data buffer was longer than the segment allocated to contain the buffer.

AP_SEND_DATA_INVALID_TYPE

Secondary return code; the specified type was not recognized by APPC.

AP_SEND_DATA_CONFIRM_SYNC_NONE

Secondary return code; the **type** CONFIRM is not permitted for a conversation that was allocated with a **sync_level** of NONE.

AP_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

AP_SEND_DATA_NOT_SEND_STATE

Secondary return code; the local TP issued **MC_SEND_DATA**, but the conversation was not in SEND state.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with MC_ALLOCATE, it may indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **MC_ALLOCATE** request.

When **MC_ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONV_FAILURE_NO_RETRY
Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.
AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.
AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.
AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **MC_SEND_ERROR**. Data sent but not yet received is purged.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.
AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.
AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.
AP_DEALLOC_ABEND
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued MC_DEALLOCATE with **dealloc_type** set to AP_ABEND.
- The partner TP encountered an ABEND, causing the partner LU to send an **MC_DEALLOCATE** request.

Remarks

The conversation must be in SEND state when the TP issues this verb. State changes, based on **primary_rc**, are summarized in the following table.

primary_rc	New state
AP_OK	No change
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE

MC_SEND_DATA may wait indefinitely because the partner TP has not issued a receive verb. If this occurs, the send buffer may fill up.

The data collected in the local LU's send buffer is transmitted to the partner LU (and partner TP) when one of the following occurs:

- The send buffer fills up.
- The local TP issues MC_FLUSH, MC_CONFIRM, or MC_DEALLOCATE (or other verb that flushes the LU's send buffer).

MC_SEND_ERROR

The **MC_SEND_ERROR** verb notifies the partner transaction program (TP) that the local TP has encountered an application-level error.

The following structure describes the verb control block (VCB) used by the **MC_SEND_ERROR** verb.

```
struct mc_send_error {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       rts_rcvd;
    unsigned char       err_type;
    unsigned char       err_dir;
    unsigned char       reserv4;
    unsigned char       reserv5[2];
    unsigned char       reserv6[4];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_SEND_ERROR.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP.

The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

rts_rcvd
Returned parameter. Indicates whether the partner TP issued MC_REQUEST_TO_SEND. Possible values include:

- AP_YES indicates that the partner TP has issued **MC_REQUEST_TO_SEND**, which requests that the local TP change the conversation to RECEIVE state. To change to RECEIVE state, the local TP can use MC_PREPARE_TO_RECEIVE, MC_RECEIVE_AND_WAIT, or MC_RECEIVE_AND_POST.
- AP_NO indicates that the partner TP has not issued **MC_REQUEST_TO_SEND**.

err_type
For a mapped conversation, this parameter is supplied if Sync Point is supported. Valid values are:

AP_PROG

AP_BACKOUT_NO_RESYNC

AP_BACKOUT_RESYNC

err_dir
Supplied parameter. Indicates whether the error is with data just received or with data that is about to be sent. Use this parameter only when the conversation is in SEND_PENDING state. The parameter is ignored otherwise. The following are

allowed values:

- AP_RCV_DIR_ERROR indicates that the TP issued **MC_SEND_ERROR** after detecting an error associated with the data just received.
- AP_SEND_DIR_ERROR indicates that the TP issued **MC_SEND_ERROR** after detecting an error associated with data it was going to send. For example, the TP encountered an error while reading data from the disk drive.

reserv3
A reserved field.

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_BAD_ERROR_DIRECTION

Secondary return code; the specified **err_dir** was not recognized by APPC.

AP_SEND_ERROR_BAD_TYPE

Secondary return code; the value of **err_type** was invalid.

AP_SEND_ERROR_LOG_LL_WRONG

Secondary return code; the LL field of the error log GDS variable did not match the actual length of the data.

The following return codes can be generated when **MC_SEND_ERROR** is issued in any allowed state:

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with MC_ALLOCATE, it may indicate that no communications subsystem could be found to support the local logical unit (LU). (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **MC_ALLOCATE** request.

When **MC_ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.

- The local LU is not configured.

AP_CONV_FAILURE_NO_RETRY
Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This may occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

The following return codes can be generated only if **MC_SEND_ERROR** is issued in SEND state:

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code may be returned through a verb issued after MC_ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **MC_SEND_ERROR**. Data sent but not yet received is purged.

AP_DEALLOC_ABEND
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued MC_DEALLOCATE with **dealloc_type** set to AP_ABEND.
- The partner TP encountered an ABEND, causing the partner LU to send an **MC_DEALLOCATE** request.

The following return code can be generated only if **MC_SEND_ERROR** is issued in RECEIVE state:

AP_DEALLOC_NORMAL
Primary return code; this return code does not indicate an error.

The partner TP issued MC_DEALLOCATE with **dealloc_type** set to one of the following:

- AP_FLUSH
- AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE

Remarks

The conversation can be in any state except RESET when the TP issues this verb. The conversation state must be SEND_PENDING if **err_dir** is used.

The local TP sends the error notification immediately to the partner TP; it does not hold the information in the local LU's send buffer.

Upon successful execution of this verb, the conversation is in SEND state for the local TP and in RECEIVE state for the partner TP.

The new state is determined by **primary_rc**. Possible state changes are summarized in the following table.

primary_rc	New state
AP_OK	SEND
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE

If the conversation is in RECEIVE state when the TP issues **MC_SEND_ERROR**, incoming data is purged by APPC. This data includes:

- Data sent by MC_SEND_DATA.
- Return code indicators.
- Confirmation requests.
- Deallocation requests.

APPC does not purge an incoming request-to-send indicator. APPC replaces purged incoming return code indicators with other return codes. The primary return code AP_OK replaces the following purged return code indicators:

AP_PROG_ERROR_NO_TRUNC

AP_PROG_ERROR_PURGING

AP_PROG_ERROR_TRUNC

AP_SVC_ERROR_NO_TRUNC

AP_SVC_ERROR_PURGING

AP_SVC_ERROR_TRUNC

The primary return code AP_DEALLOC_NORMAL replaces the following purged return code indicators:

AP_ALLOCATION_ERROR

AP_ALLOCATION_FAILURE_NO_RETRY

AP_ALLOCATION_FAILURE_RETRY

AP_CONVERSATION_TYPE_MISMATCH

AP_DEALLOC_ABEND

AP_DEALLOC_ABEND_PROG

AP_DEALLOC_ABEND_SVC

AP_DEALLOC_ABEND_TIMER

AP_PIP_NOT_ALLOWED

AP_PIP_NOT_SPECIFIED_CORRECTLY

AP_SECURITY_NOT_VALID

AP_SYNC_LEVEL_NOT_SUPPORTED

AP_TP_NAME_NOT_RECOGNIZED

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

AP_TRANS_PGM_NOT_AVAIL_RETRY

When the conversation is in SEND_PENDING state, APPC reports the following return codes to the partner TP based on the value in **err_dir**:

AP_PROG_ERROR_PURGING
  The local TP issued **MC_SEND_ERROR** with RECEIVE as the **err_dir**.
AP_PROG_ERROR_NO_TRUNC
  The local TP issued **MC_SEND_ERROR** with SEND as the **err_dir**.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MC_TEST_RTS

The **MC_TEST_RTS** verb determines whether a request-to-send notification has been received from the partner transaction program (TP).

The following structure describes the verb control block (VCB) used by the **MC_TEST_RTS** verb.

```
struct mc_test_rts {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       reserv3;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_TEST_RTS.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter was returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

reserv3
A reserved field.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_UNSUCCESSFUL
Primary return code; request-to-send notification has not been received.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID
Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with MC_ALLOCATE, it may indicate that no communications subsystem could be found to support the local logical unit (LU). (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **MC_ALLOCATE** request.

When **MC_ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation can be in any state except RESET when the TP issues this verb.

There is no state change.

MC_TEST_RTS_AND_POST

The **MC_TEST_RTS_AND_POST** verb allows an application, typically a 5250 emulator, to request asynchronous notification when a partner transaction program (TP) requests send direction.

The following structure describes the verb control block (VCB) used by the **MC_TEST_RTS_AND_POST** verb.

```
struct mc_test_rts_and_post {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       reserv3;
    unsigned long       handle;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_M_TEST_RTS_AND_POST.

opext
Supplied parameter. Specifies the verb operation extension, AP_MAPPED_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter was returned by MC_ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

reserv3
A reserved field.

handle
Supplied parameter. On Microsoft® Windows® 2000, this field provides the event handle to set.

Return Codes from Initial Verb

AP_OK
Primary return code; the verb executed successfully. Note particularly that a return code of AP_OK from the initial verb does not indicate that **MC_REQUEST_TO_SEND** verb received from the partner TP. It simply indicates that the facility to receive asynchronous notification has been registered.

AP_UNSUCCESSFUL
Primary return code; request-to-send notification has not been received.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with MC_ALLOCATE, it may indicate that no communications subsystem could be found to support the local logical unit (LU). (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **MC_ALLOCATE** request.

When **MC_ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Return Codes from Asynchronous Completion

AP_OK
Primary return code; the request-to-send notification has been received from the partner TP.

AP_CANCELLED
The outstanding **TEST_RTS_AND_POST** verb has been terminated. This will occur if the underlying conversation has been deallocated or an AP_TP_ENDED has been issued.
Note that as with **RECEIVE_AND_POST**, the TP is still responsible for correctly terminating the conversation and possibly terminating the TP. Issuing another verb, such as **RECEIVE_IMMEDIATE,** at this point will indicate the reason for the conversation failure.

Remarks

The conversation can be in any state except RESET when the TP issues this verb. There is no state change.

A common feature of many APPC applications, such as 5250 emulators, is a requirement to detect a partner's request to send. Currently, this can be done by polling the APPC interface to detect the partner's request. For example, an application can occasionally issue one of the following verbs:

- **MC_TEST_RTS**
- **MC_RECEIVE_IMMEDIATE** and check the **rts_rcvd** field
- **MC_SEND_DATA** of zero bytes, again checking the **rts_rcvd** field.

Some of the problems associated with this polling approach are:

- The application must continually interrupt its main work to poll APPC.
- The partner's request is not detected as soon as it becomes available.
- These approaches are processor-intensive.

The **MC_TEST_RTS_AND_POST** verb allows an application running on Windows 2000, typically a 5250 emulator, to request asynchronous notification when the partner TP requests send direction.

An APPC application typically issues the **MC_TEST_RTS_AND_POST** verb while in SEND state and then continues with its main processing. A request for send direction from the partner TP is indicated asynchronously to the application. After dealing with the partner's request, the application typically returns to SEND state, reissues **MC_TEST_RTS_AND_POST**, and continues.

The **MC_TEST_RTS_AND_POST** verb completes synchronously and the return code AP_OK indicates that a request for asynchronous notification has been registered. It is important to emphasize that this does not indicate that request-to-send was received from the partner TP.

When the partner's request to send is received, the asynchronous event completion occurs. It is important to note that this may be before the completion of the local TP's original **MC_TEST_RTS_AND_POST** verb. This will be the case if the partner's request to send was received before the local TP's **MC_TEST_RTS_AND_POST** verb was issued, or while the local TP's **MC_TEST_RTS_AND_POST** verb was being processed.

POST_ON_RECEIPT

The **POST_ON_RECEIPT** verb allows the application to register to receive a notification when data or status arrives at the local logical unit (LU) without actually receiving it at the same time. This verb can only be issued while in RECEIVE state and it never causes a change in conversation state. This verb is only supported on Microsoft® Windows® 2000.

When the transaction program (TP) issues this verb, APPC returns control to the TP immediately. When the specified conditions are satisfied the Win32® event specified by the **sema** parameter is signalled and the verb completes. Then the TP looks at the return code in the verb control block to determine whether or not any data or status notification has arrived at the local LU and issues a RECEIVE_IMMEDIATE or RECEIVE_AND_WAIT verb to actually receive the data or status notification.

The **POST_ON_RECEIPT** verb implements both the **POST_ON_RECEIPT** and **TEST** verbs as described in the IBM Transaction Programmer's manual for LU Type 6.2.

The following structure describes the verb control block (VCB) used by the **POST_ON_RECEIPT** verb.

```
struct post_on_receipt {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv1;
    unsigned char    primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned short   reserv2;
    unsigned char    fill;
    unsigned char    reserv4;
    unsigned short   max_len;
    unsigned short   reserv5;
    unsigned char *  reserv6;
    unsigned char    reserv7[5];
    unsigned long    sema;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_POST_ON_RECEIPT.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv1
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

reserv2
A reserved field.

fill
Supplied parameter. Specifies how the local TP receives data. The following values are allowed:

AP_BUFFER

Specifies that APPC should post a notification when the number of data bytes specified by **max_len** have arrived at the local LU, the end of the data has been reached, or information other than data is received (such as a conversation status, a confirmation, or a syncpoint request).

AP_LL

Specifies that APPC should post a notification when a complete or truncated logical record is received, when a portion of a logical record is received which is at least equal in length to the length specified by **max_len**, or when information other than data is received.

reserv4
A reserved field.

max_len
Supplied parameter. Specifies the length of data that triggers APPC to post a notification to the TP.

reserv5
A reserved field.

reserv6
A reserved field.

reserv7
A reserved field.

sema
Supplied parameter. Specifies the handle of a Win32 event. The event should have been created by the TP and the TP is responsible for ensuring that it is reset before a call is made and after the verb completes.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_DATA

Secondary return code; data is available for the program to receive.

AP_NOT_DATA

Secondary return code; information other than data is available for the program to receive.

AP_CANCELLED
Primary return code; the verb was canceled.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_INVALID_SEMAPHORE_HANDLE

Secondary return code; the **sema** parameter was not set to a valid value.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

AP_DEALLOC_ABEND_PROG

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP has encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

AP_DEALLOC_ABEND_SVC

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_SVC.

AP_DEALLOC_ABEND_TIMER

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_TIMER.

AP_DEALLOC_NORMAL

Primary return code; the partner TP has deallocated the conversation without requesting confirmation and issued DEALLOCATE with **dealloc_type** set to one of the following:

- AP_CONFIRM_SYNC_LEVEL
- AP_FLUSH
- AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE

AP_PROG_ERROR_NO_TRUNC

Primary return code; the partner TP has issued SEND_ERROR while the conversation was in SEND state. Data was not truncated.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued SEND_ERROR. Data sent but not yet received is purged.

AP_PROG_ERROR_TRUNC
Primary return code; the partner TP has issued SEND_ERROR while the conversation was in SEND state. Data was truncated.

AP_SVC_ERROR_NO_TRUNC
Primary return code; the partner TP (or partner LU) issued SEND_ERROR with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP was not truncated.

AP_SVC_ERROR_PURGING
Primary return code; the partner TP (or partner LU) issued SEND_ERROR with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

AP_SVC_ERROR_TRUNC
Primary return code; the partner TP (or partner LU) issued SEND_ERROR with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been truncated.

Remarks

While a **POST_ON_RECEIPT** verb is outstanding, the following verbs can be issued on the same conversation:

GET_ATTRIBUTES

GET_TYPE

DEALLOCATE

RECEIVE_AND_WAIT

RECEIVE_IMMEDIATE

REQUEST_TO_SEND

SEND_ERROR

TEST_RTS

TP_ENDED

Issuing any of the following verbs prior to completion of the asynchronous **POST_ON_RECEIPT** verb causes the **POST_ON_RECEIPT** verb to be canceled (the Win32 event is signaled and the primary return code in the verb control block is set to AP_CANCELLED).

DEALLOCATE

RECEIVE_AND_WAIT

RECEIVE_IMMEDIATE

SEND_ERROR

TP_ENDED

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PREPARE_TO_RECEIVE

The **PREPARE_TO_RECEIVE** verb changes the state of the conversation for the local transaction program (TP) from SEND to RECEIVE.

The following structure describes the verb control block (VCB) used by the **PREPARE_TO_RECEIVE** verb.

```
struct prepare_to_receive {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    primary_rc;
    unsigned short   reserv2;
    unsigned long    secondary_rc;
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    ptr_type;
    unsigned char    locks;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_PREPARE_TO_RECEIVE.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

ptr_type
Supplied parameter. Specifies how to perform the state change.

Use AP_FLUSH to send the contents of the local logical unit's (LU's) send buffer to the partner LU (and TP) before changing the conversation's state to RECEIVE.

The AP_SYNC_LEVEL value uses the conversation's synchronization level (established by **ALLOCATE**) to determine how to perform the state change.

If the synchronization level of the conversation is AP_NONE, APPC sends the contents of the local LU's send buffer to the partner TP before changing the conversation's state to RECEIVE. If the synchronization level is AP_CONFIRM_SYNC_LEVEL, APPC sends the contents of the local LU's send buffer and a confirmation request to the partner TP. Upon receiving confirmation from the partner TP, APPC changes the conversation's state to RECEIVE. If, however, the partner TP reports an error, the state changes to RECEIVE or RESET. See the Remarks in this topic.

locks
Supplied parameter. Specifies when APPC should return control to the local TP.

Use this parameter only if **ptr_type** is set to AP_SYNC_LEVEL and the synchronization level of the conversation, established by ALLOCATE, is AP_CONFIRM_SYNC_LEVEL. (Otherwise, the parameter is ignored.)

Use AP_LONG to indicate that APPC returns control to the local TP when the confirmation and subsequent data from the partner TP arrive at the local LU. (This method results in more efficient use of the network but requires a longer time to return control to the local TP.)

Use AP_SHORT to indicate that APPC returns control to the local TP when the confirmation from the partner TP arrives at the local LU.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_P_TO_R_INVALID_TYPE

Secondary return code; the **ptr_type** parameter was not set to a valid value.

AP_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

AP_P_TO_R_NOT_SEND_STATE

Secondary return code; the conversation was not in SEND state.

AP_P_TO_R_NOT_LL_BDY

Secondary return code; the local TP did not finish sending a logical record.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with ALLOCATE, it can indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONV_FAILURE_NO_RETRY
Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued SEND_ERROR with **err_type** set to AP_PROG. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING

Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND_PROG

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP has encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

AP_DEALLOC_ABEND_SVC

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_SVC.

AP_DEALLOC_ABEND_TIMER

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_TIMER.

AP_SVC_ERROR_PURGING

Primary return code; the partner TP (or partner LU) issued a SEND_ERROR verb with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

Remarks

Before changing the conversation state, this verb performs the equivalent of one of the following:

- FLUSH, by sending the contents of the local LU's send buffer to the partner LU (and TP).
- CONFIRM, by sending the contents of the local LU's send buffer and a confirmation request to the partner TP.

After this verb has successfully executed, the local TP can receive data.

The conversation must be in SEND state when the TP issues this verb.

State changes, summarized in the following table, are based on the value of **primary_rc**.

primary_rc	New state
AP_OK	RECEIVE
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE

The conversation does not change to SEND state for the partner TP until the partner TP receives one of the following values through the **what_rcvd** parameter of a subsequent receive verb:

- AP_SEND
- AP_CONFIRM_SEND and replies with CONFIRMED
- AP_DATA_COMPLETE_CONFIRM_SEND and replies with **CONFIRMED**
- AP_DATA_CONFIRM_SEND and replies with **CONFIRMED**

The receive verbs are RECEIVE_AND_POST, RECEIVE_IMMEDIATE, and RECEIVE_AND_WAIT.

RECEIVE_ALLOCATE

The **RECEIVE_ALLOCATE** verb is issued by the invoked transaction program (TP) to confirm that the invoked TP is ready to begin a conversation with the invoking TP that issued ALLOCATE or MC_ALLOCATE.

The following structure describes the verb control block (VCB) used by the **RECEIVE_ALLOCATE** verb.

```
struct receive_allocate {
    unsigned short   opcode;
    unsigned char    opext;
    unsigned char    reserv2;
    unsigned short   primary_rc;
    unsigned long    secondary_rc;
    unsigned char    tp_name[64];
    unsigned char    tp_id[8];
    unsigned long    conv_id;
    unsigned char    sync_level;
    unsigned char    conv_type;
    unsigned char    user_id[10];
    unsigned char    lu_alias[8];
    unsigned char    plu_alias[8];
    unsigned char    mode_name[8];
    unsigned char    reserv3[2];
    unsigned long    conv_group_id;
    unsigned char    fqplu_name[17];
    unsigned char    pip_incoming;
    unsigned char    syncpoint_rqd;
    unsigned char    reserv4[3];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_RECEIVE_ALLOCATE.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_name
Supplied parameter. Provides the name of the local TP. The value of **tp_name** must match the TP name configured through registry or environment variables. APPC matches the **RECEIVE_ALLOCATE** verb's **tp_name** parameter with the TP name specified by the incoming allocate, which is generated by MC_ALLOCATE or ALLOCATE in the invoking TP.

This parameter is a 64-byte EBCDIC character string and is case-sensitive. The **tp_name** parameter can consist of characters from the type AE EBCDIC character set:

- Uppercase and lowercase letters
- Numerals 0 through 9
- Special characters $, #, and period (.)

If **tp_name** is fewer than 64 bytes, use EBCDIC spaces (0x40) to pad it on the right.

The SNA convention is that a service TP name can have up to four characters. The first character is a hexadecimal byte between 0x00 and 0x3F. The other characters are from the type AE EBCDIC character set.

tp_id
Returned parameter. Identifies the local TP.

conv_id

Returned parameter. Provides the conversation identifier. It identifies the conversation APPC has established between the two partner TPs.

sync_level

Returned parameter. Specifies the synchronization level of the conversation. It determines whether the TPs can request confirmation of receipt of data and confirm receipt of data.

- AP_NONE specifies that confirmation processing will not be used in this conversation.
- AP_CONFIRM_SYNC_LEVEL specifies that the TPs can use confirmation processing in this conversation.
- AP_SYNCPT specifies that TPs can use Sync Point Level 2 confirmation processing in this conversation.

conv_type

Returned parameter. Specifies the type of conversation chosen by the partner TP, using MC_ALLOCATE or ALLOCATE. The following are possible values:

AP_BASIC_CONVERSATION

AP_MAPPED_CONVERSATION

user_id

Returned parameter. Provides the user identifier specified by the partner TP, using **MC_ALLOCATE** or **ALLOCATE** (if the partner TP set the **MC_ALLOCATE** or **ALLOCATE** verb's security parameter to AP_PGM or AP_SAME). It is a type AE EBCDIC character string.

lu_alias

Returned parameter. Provides the alias by which the local logical unit (LU) is known to the local TP. It is an ASCII character string.

plu_alias

Returned parameter. Provides the alias by which the partner LU (which initiated the incoming allocate) is known to the local TP. It is an ASCII character string.

mode_name

Returned parameter. Provides the mode name specified by **MC_ALLOCATE** or **ALLOCATE** in the partner TP. It is the name of a set of networking characteristics defined during configuration. The **mode_name** is a type A EBCDIC character string.

reserv3

A reserved field.

conv_group_id

Conversation group identifier.

fqplu_name

This returned parameter provides the fully qualified LU name.

pip_incoming

This optional supplied and returned parameter is applicable only if Sync Point services are required.

For the supplied parameter:

AP_YES if TP does accept PIP data.

AP_NO if TP does not accept PIP data.

For the returned parameter:

AP_YES if PIP data is available.

AP_NO if PIP data is not available.

syncpoint_rqd

This parameter indicates if Sync Point services are required.

AP_YES if Sync Point is required.

AP_NO if Sync Point is not required.

reserv4

A reserved field.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_UNDEFINED_TP_NAME

Secondary return code; the TP name was not configured correctly.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_ALLOCATE_NOT_PENDING

Secondary return code; APPC did not find an incoming allocate (from the invoking TP) to match the value of **tp_name**, supplied by **RECEIVE_ALLOCATE**. **RECEIVE_ALLOCATE** waited for the incoming allocate and eventually timed out.

AP_INVALID_PROCESS

Secondary return code; the process issuing **RECEIVE_ALLOCATE** was different from the one started by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation.
AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.
AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

This must be the first APPC verb issued by the invoked TP. The initial state is RESET. If the verb executes successfully (**primary_rc** is AP_OK), the state changes to RECEIVE.

In response to this verb, APPC establishes a conversation between the two TPs and generates a TP identifier for the invoked TP and a conversation identifier. These identifiers are required parameters for subsequent APPC verbs.

If the invoked TP issues **RECEIVE_ALLOCATE** and a corresponding incoming allocate (resulting from MC_ALLOCATE or ALLOCATE issued by the invoking TP) is not present, the invoked TP waits until the incoming allocate arrives or the verb times out. The time-out value is set by the system administrator.

RECEIVE_AND_POST

The **RECEIVE_AND_POST** verb receives application data and status information asynchronously. This allows the local transaction program (TP) to proceed with processing while data is still arriving at the local logical unit (LU).

While an asynchronous **RECEIVE_AND_POST** is outstanding, the following verbs can be issued on the same conversation:

DEALLOCATE (AP_ABEND_PROG, AP_ABEND_SVC, or AP_ABEND_TIMER)

GET_ATTRIBUTES

GET_TYPE

REQUEST_TO_SEND

SEND_ERROR

TEST_RTS

TP_ENDED

This allows an application to use an asynchronous **RECEIVE_AND_POST** to receive data. While the **RECEIVE_AND_POST** is outstanding, it can still use **SEND_ERROR** and **REQUEST_TO_SEND**. It is recommended that you use this feature for full asynchronous support. For information on how a TP receives data and how to use this verb, see Remarks in this topic.

The following structure describes the verb control block (VCB) used by the **RECEIVE_AND_POST** verb.

```
struct receive_and_post {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned short      what_rcvd;
    unsigned char       rtn_status;
    unsigned char       fill;
    unsigned char       rts_rcvd;
    unsigned char       reserv4;
    unsigned short      max_len;
    unsigned short      dlen;
    unsigned char FAR * dptr;
    unsigned char FAR * sema;
    unsigned char       reserv5;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_RECEIVE_AND_POST.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

what_rcvd
Returned parameter. Indicates whether data or conversation status was received. Possible values are listed following the Members section
rtn_status
Supplied parameter. Indicates whether both data and conversation status indicators should be returned within one API call.

- AP_NO specifies that indicators should be returned individually on separate invocations of the verb.
- AP_YES specifies that indicators should be returned together, provided both are available. Both can be returned when:

  The receive buffer is large enough to hold all of the data that precedes the status indicator.

  The **fill** parameter specifies BUFFER or LL, and the data is the last logical record before the status indicator.

fill
Supplied parameter. Specifies how the local TP receives data.

Use AP_BUFFER to indicate that the local TP receives data until the number of bytes specified by **max_len** is reached or until end of data. Data is received without regard for the logical-record format.

Use AP_LL to indicate that data is received in logical-record format. The data received can be:

- A complete logical record.
- A **max_len** byte portion of a logical record.
- The end of a logical record**.**

rts_rcvd
Returned parameter. Indicates whether the partner TP issued REQUEST_TO_SEND. Possible values are:

- AP_YES indicates that the partner TP issued **REQUEST_TO_SEND**, which requests that the local TP change the conversation to RECEIVE state.
- AP_NO indicates that the partner TP has not issued **REQUEST_TO_SEND**.

max_len
Supplied parameter. Specifies the maximum number of bytes of data the local TP can receive. The range is from 0 through 65535.

The value must not exceed the length of the buffer to contain the received data. The offset of **dptr** plus the value of **max_len** must not exceed the size of the data segment.

dlen
Returned parameter. Specifies the number of bytes of data received. Data is stored in the buffer specified by **dptr**. A length of zero indicates that no data was received.
dptr
Supplied parameter. Provides the address of the buffer to contain the data received by the local LU.

For Microsoft® Windows® 2000, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

sema
Supplied parameter. Provides the address of the semaphore that APPC is to clear when the asynchronous receiving operation is finished. The **sema** parameter is an event handle obtained by calling either the **CreateEvent** or **OpenEvent** Win32 function.

Values Returned by the what_rcvd Parameter

- AP_CONFIRM_DEALLOCATE indicates that the partner TP issued DEALLOCATE with **dealloc_type** set to AP_SYNC_LEVEL. The conversation's synchronization level, established by ALLOCATE, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues CONFIRMED.
- AP_CONFIRM_SEND indicates that the partner TP issued PREPARE_TO_RECEIVE with **ptr_type** set to AP_SYNC_LEVEL. The conversation's synchronization level, established by **ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues **CONFIRMED**, and begins to send data.
- AP_CONFIRM_WHAT_RECEIVED indicates that the partner TP issued CONFIRM. Upon receiving this value, the local TP normally issues **CONFIRMED**.
- AP_DATA indicates that this value can be returned by **RECEIVE_AND_POST** if **fill** is set to AP_BUFFER. The local TP received data until **max_len** or the end of the data was reached. For more information, see Remarks in this topic.
- AP_DATA_COMPLETE indicates, for **RECEIVE_AND_POST**, that the local TP has received a complete data record or the last

part of a data record.

For **RECEIVE_AND_POST** with **fill** set to AP_LL, this value indicates that the local TP has received a complete logical record or the end of a logical record.

Upon receiving this value, the local TP normally reissues **RECEIVE_AND_POST** or issues another receive verb. If the partner TP has sent more data, the local TP begins to receive a new unit of data.

Otherwise, the local TP examines status information.

If **primary_rc** contains AP_OK and **what_rcvd** contains AP_SEND, AP_CONFIRM_SEND, AP_CONFIRM_DEALLOCATE, or AP_CONFIRM_WHAT_RECEIVED, see the description of the value (in this section) for the next action the local TP normally takes.

If **primary_rc** contains AP_DEALLOC_NORMAL, the conversation has been deallocated in response to the DEALLOCATE issued by the partner TP.

- AP_DATA_INCOMPLETE indicates, for **RECEIVE_AND_POST**, that the local TP has received an incomplete data record. The **max_len** parameter specified a value less than the length of the data record (or less than the remainder of the data record if this is not the first receive verb to read the record).

  For **RECEIVE_AND_POST** with **fill** set to AP_LL, this value indicates that the local TP has received an incomplete logical record.

  Upon receiving this value, the local TP normally reissues **RECEIVE_AND_POST** (or issues another receive verb) to receive the next part of the record.

- AP_NONE indicates that the TP did not receive data or conversation status indicators.
- AP_SEND indicates, for the partner TP, that the conversation has entered RECEIVE state. For the local TP, the conversation is now in SEND state. Upon receiving this value, the local TP normally uses SEND_DATA to begin sending data.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

When **rtn_status** is AP_YES, the preceding return code or one of the following return codes can be returned.

AP_DATA_COMPLETE_SEND
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_SEND.
AP_DATA_COMPLETE_CONFIRM_SEND
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_SEND.
AP_DATA_COMPLETE_CONFIRM
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_WHAT_RECEIVED.
AP_DATA_COMPLETE_CONFIRM_DEALL
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_DEALLOCATE.
AP_DATA_SEND
Primary return code; this is a combination of AP_DATA and AP_SEND.
AP_DATA_CONFIRM_SEND
Primary return code; this is a combination of AP_DATA and AP_CONFIRM_SEND.
AP_DATA_CONFIRM
Primary return code; this is a combination of AP_DATA and AP_CONFIRM.
AP_DATA_CONFIRM_DEALLOCATE
Primary return code; this is a combination of AP_DATA and AP_CONFIRM_DEALLOCATE.
AP_DEALLOC_NORMAL
Primary return code; the partner TP issued DEALLOCATE with **dealloc_type** set to AP_FLUSH or AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE.

If **rtn_status** is AP_YES, examine **what_rcvd** also.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_BAD_RETURN_STATUS_WITH_DATA

Secondary return code; the specified **rtn_status** value was not recognized by APPC.

AP_INVALID_DATA_SEGMENT

Secondary return code; the length specified for the data buffer was longer than the segment allocated to contain the buffer.

AP_INVALID_SEMAPHORE_HANDLE

Secondary return code; the address of the RAM semaphore or system semaphore handle was invalid.

> APPC cannot trap all invalid semaphore handles. If the TP passes a bad RAM semaphore handle, a protection violation results.

AP_RCV_AND_POST_BAD_FILL

Secondary return code; the **fill** parameter was set to an invalid value.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_RCV_AND_POST_BAD_STATE

Secondary return code; the conversation was not in RECEIVE or SEND state when the TP issued this verb.

AP_RCV_AND_POST_NOT_LL_BDY

Secondary return code; the conversation was in SEND state; the TP began but did not finish sending a logical record.

AP_CANCELED
Primary return code; the local TP issued one of the following verbs, which canceled **RECEIVE_AND_POST**:

DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG, AP_ABEND_SVC, or AP_ABEND_TIMER

SEND_ERROR

TP_ENDED

Issuing one of these verbs causes the semaphore to be cleared.

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with ALLOCATE, it can indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONV_FAILURE_NO_RETRY

Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY

Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED

Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_NO_TRUNC
Primary return code; the partner TP issued SEND_ERROR with **err_type** set to AP_PROG while the conversation was in SEND state. Data was not truncated.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **SEND_ERROR** with **err_type** set to AP_PROG. Data sent but not yet received is purged.

AP_PROG_ERROR_TRUNC
Primary return code; in SEND state, after sending an incomplete logical record, the partner TP issued **SEND_ERROR** with **err_type** set to AP_PROG. The local TP may have received the first part of the logical record through a receive verb.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND_PROG
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP issued DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP has encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

AP_DEALLOC_ABEND_SVC
Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_SVC.

AP_DEALLOC_ABEND_TIMER
Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_TIMER.

AP_SVC_ERROR_NO_TRUNC
Primary return code; while in SEND state, the partner TP (or partner LU) issued SEND_ERROR with **err_type** set to AP_SVC. Data was not truncated.

AP_SVC_ERROR_PURGING
Primary return code; the partner TP (or partner LU) issued **SEND_ERROR** with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

AP_SVC_ERROR_TRUNC
Primary return code; in SEND state, after sending an incomplete logical record, the partner TP (or partner LU) issued **SEND_ERROR**. The local TP may have received the first part of the logical record.

Remarks

The local TP receives data through the following process:

1. The local TP issues a receive verb until it finishes receiving a complete unit of data. The data received can be:

   - One logical record.
   - A buffer of data received independent of its logical-record format.

   The local TP may need to issue the receive verb several times in order to receive a complete unit of data. After a complete unit of data has been received, the local TP can manipulate it. The receive verbs are **RECEIVE_AND_POST**, RECEIVE_AND_WAIT, and RECEIVE_IMMEDIATE.

2. The local TP issues the receive verb again. This has one of the following effects:

   - If the partner TP has sent more data, the local TP begins to receive a new unit of data.
   - If the partner TP has finished sending data or is waiting for confirmation, status information (available through **what_rcvd**) indicates the next action the local TP normally takes.

The following procedure shows tasks performed by the local TP in using **RECEIVE_AND_POST**.

To use RECEIVE_AND_POST

1. For the Microsoft Windows® 2000 operating system, the TP retrieves the WinAsyncAPPC message number by calling the

RegisterWindowMessage API or allocating a semaphore. The **sema** field should be set to NULL if the application expects to be notified through the Windows message mechanism.

APPC sends the Windows message or clears the semaphore when the local TP finishes receiving data.

The semaphore will remain set while the local TP receives data asynchronously. APPC will clear the semaphore when the local TP finishes receiving data.

2. The TP issues **RECEIVE_AND_POST**.
3. The TP checks the value of **primary_rc**.

   If **primary_rc** is AP_OK, the receive buffer (pointed to by **dptr**) is asynchronously receiving data from the partner TP. While receiving data asynchronously, the local TP can:

   - Perform tasks not related to this conversation.
   - Issue REQUEST_TO_SEND.
   - Gather information about this conversation by issuing GET_TYPE, GET_ATTRIBUTES, or TEST_RTS.
   - Prematurely cancel **RECEIVE_AND_POST** by issuing DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG, AP_ABEND_SVC, or AP_ABEND_TIMER; SEND_ERROR; or TP_ENDED.

   If, however, **primary_rc** is not AP_OK, **RECEIVE_AND_POST** has failed. In this case, the local TP does not perform the next two tasks.

4. For the Windows 2000 operating system, when the TP finishes receiving data asynchronously, APPC issues the WinAsyncAPPC Windows message or clears the semaphore.
5. The TP checks the new value of **primary_rc**.

   If **primary_rc** is AP_OK, the local TP can examine the other returned parameters and manipulate the asynchronously received data.

   If **primary_rc** is not AP_OK, only **secondary_rc** and **rts_rcvd** (request-to-send received) are meaningful.

Conversation State Effects

The conversation must be in RECEIVE or SEND state when the TP issues this verb.

Issuing **RECEIVE_AND_POST** while the conversation is in SEND state has the following effects:

- The local LU sends the information in its send buffer and a SEND indicator to the partner TP.
- The conversation changes to PENDING_POST state; the local TP is ready to receive information from the partner TP asynchronously.

The conversation changes states twice:

- Upon initial return of the verb, if **primary_rc** contains AP_OK, the conversation changes to PENDING_POST state.
- After completion of the verb, the state changes depending on the value of the following:

  The **primary_rc** parameter

  The **what_rcvd** parameter if **primary_rc** is AP_OK

The following table shows the new state associated with each value of **what_rcvd** when **primary_rc** is AP_OK.

what_rcvd	New state
AP_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_DATA_COMPLETE_CONFIRM_DEALL	CONFIRM_DEALLOCATE
AP_DATA_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_COMPLETE_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_CONFIRM_SEND	CONFIRM_SEND
AP_CONFIRM_WHAT_RECEIVED	CONFIRM
AP_DATA_COMPLETE_CONFIRM	CONFIRM
AP_DATA_CONFIRM	CONFIRM
AP_DATA	RECEIVE
AP_DATA_COMPLETE	RECEIVE

AP_DATA_INCOMPLETE	RECEIVE
AP_SEND	SEND
AP_DATA_COMPLETE_SEND	SEND_PENDING

The following table shows the new state associated with each value of **primary_rc** other than AP_OK.

primary_rc	**New state**
AP_CANCELED	No change
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_PROG_ERROR_NO_TRUNC	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_NO_TRUNC	RECEIVE
AP_PROG_ERROR_TRUNC	RECEIVE
AP_SVC_ERROR_TRUNC	RECEIVE

End of Data for a Basic Conversation

If the local TP issues **RECEIVE_AND_POST** and sets **fill** to AP_BUFFER, the receipt of data ends when **max_len** or the end of the data is reached. The end of the data is indicated by either **primary_rc** with a value other than AP_OK (for example, AP_DEALLOC_NORMAL), or by **what_rcvd** with one of the following values:

AP_SEND

AP_CONFIRM_SEND

AP_CONFIRM_DEALLOCATE

AP_CONFIRM_WHAT_RECEIVED

AP_DATA_CONFIRM_SEND

AP_DATA_CONFIRM_DEALLOCATE

AP_DATA_CONFIRM

To determine if the end of the data has been reached, the local TP reissues **RECEIVE_AND_POST**. If the new **primary_rc** contains AP_OK and **what_rcvd** contains AP_DATA, the end of the data has not been reached. If, however, the end of the data has been reached, **primary_rc** or **what_rcvd** will indicate the cause of the end of the data.

Troubleshooting

The local TP can wait indefinitely if one of the following situations occurs:

- For the Windows 2000 operating system, the local TP issues a **RECEIVE_AND_POST** request, but either the partner TP has not sent data or the initial **primary_rc** is not AP_OK.
- For the OS/2 operating system, the local TP issues a **DosSemWait** function call, but either the partner TP has not sent data or the initial **primary_rc** is not AP_OK.

This is because APPC will not issue the Windows message or clear the semaphore.

When a condition resulting in one of the following **primary_rc** parameters occurs, APPC does not clear the semaphore:

AP_INVALID_SEMAPHORE_HANDLE

AP_INVALID_VERB_SEGMENT

AP_STACK_TOO_SMALL

To test **what_rcvd**, issue **RECEIVE_AND_POST** with **max_len** set to zero, so that the local TP can determine whether the partner TP has data to send, seeks confirmation, or has changed the conversation state.

RECEIVE_AND_WAIT

The **RECEIVE_AND_WAIT** verb receives any data that is currently available from the partner transaction program (TP). If no data is currently available, the local TP waits for data to arrive.

To allow full use to be made of the asynchronous support, asynchronously issued **RECEIVE_AND_WAIT** verbs have been altered to act like RECEIVE_AND_POST verbs. Specifically, while an asynchronous **RECEIVE_AND_WAIT** is outstanding, the following verbs can be issued on the same conversation:

DEALLOCATE (AP_ABEND_PROG, AP_ABEND_SVC, or AP_ABEND_TIMER)

GET_ATTRIBUTES

GET_TYPE

REQUEST_TO_SEND

SEND_ERROR

TEST_RTS

TP_ENDED

This allows an application, and in particular, a 5250 emulator, to use an asynchronous **RECEIVE_AND_WAIT** to receive data. While the **RECEIVE_AND_WAIT** is outstanding, it can still use **SEND_ERROR** and **REQUEST_TO_SEND**. It is recommended that you use this feature for full asynchronous support.

The following structure describes the verb control block (VCB) used by the **RECEIVE_AND_WAIT** verb.

```
struct receive_and_wait {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned short      what_rcvd;
    unsigned char       rtn_status;
    unsigned char       fill;
    unsigned char       rts_rcvd;
    unsigned char       reserv4;
    unsigned short      max_len;
    unsigned short      dlen;
    unsigned char FAR * dptr;
    unsigned char       reserv5[5];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_RECEIVE_AND_WAIT.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP.

The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Specifies the conversation identifier.

The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

what_rcvd
Returned parameter. Indicates whether data or conversation status was received. Possible values are listed in the table following the Members section.

rtn_status
Supplied parameter. Indicates whether both data and conversation status indicators should be returned within one API call.

- AP_NO specifies that indicators should be returned individually on separate invocations of the verb.
- AP_YES specifies that indicators should be returned together, provided both are available. Both can be returned when:

  The receive buffer is large enough to hold all of the data that precedes the status indicator.

  The **fill** parameter specifies BUFFER or LL, and the data is the last logical record before the status indicator.

fill
Supplied parameter. Used in a basic conversation to specify how the local TP receives data. The following are allowed values:

- AP_BUFFER specifies that the local TP receives data until the number of bytes specified by **max_len** is reached or until the end of the data. Data is received without regard for the logical-record format.
- AP_LL specifies that data is received in logical-record format. The data received can be a complete logical record, a **max_len** byte portion of a logical record, or the end of a logical record.

rts_rcvd
Returned parameter. Contains the request-to-send indicator. Possible values are:

- AP_YES indicates that the partner TP has issued REQUEST_TO_SEND, which requests that the local TP change the conversation to RECEIVE state.
- AP_NO indicates that the partner TP has not issued **REQUEST_TO_SEND**.

max_len
Supplied parameter. Indicates the maximum number of bytes of data the local TP can receive. The range is from 0 through 65535.

For the Microsoft Windows 2000 operating system, this value must not exceed the length of the buffer to contain the received data.

By issuing **RECEIVE_AND_WAIT** with **max_len** set to zero, the local TP can determine whether the partner TP has data to send, seeks confirmation, or has changed the conversation state.

dlen
Returned parameter. Indicates the number of bytes of data received. Data is stored in the buffer specified by **dptr**. A length of zero indicates that no data was received.

dptr
Supplied parameter. Provides the address of the buffer to contain the data received by the local TP.

For the Windows 2000 operating system, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

Values Returned by the what_rcvd Parameter

- AP_CONFIRM_DEALLOCATE indicates that the partner TP has issued DEALLOCATE with **dealloc_type** set to AP_SYNC_LEVEL, and the conversation's synchronization level, established by **ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues CONFIRMED.
- AP_CONFIRM_SEND indicates that the partner TP has issued PREPARE_TO_RECEIVE with **ptr_type** set to AP_SYNC_LEVEL, and the conversation's synchronization level, established by **ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues **CONFIRMED** and begins to send data.
- AP_CONFIRM_WHAT_RECEIVED indicates that the partner TP has issued CONFIRM. Upon receiving this value, the local TP normally issues **CONFIRMED**.
- AP_DATA can be returned in a basic conversation by **RECEIVE_AND_WAIT** if **fill** is set to AP_BUFFER. The local TP received data until **max_len** or end of data was reached. For more information, see "**RECEIVE_AND_WAIT** End of Data" at the end of this topic.

- AP_DATA_COMPLETE indicates, for **RECEIVE_AND_WAIT**, that the local TP has received a complete data record or the last part of a data record.

  For **RECEIVE_AND_WAIT** with **fill** set to AP_LL, this value indicates that the local TP has received a complete logical record or the end of a logical record.

  Upon receiving this value, the local TP normally reissues **RECEIVE_AND_WAIT** or issues another receive verb. If the partner TP has sent more data, the local TP begins to receive a new unit of data.

  Otherwise, the local TP examines status information, if **primary_rc** contains AP_OK and **what_rcvd** contains AP_SEND, AP_CONFIRM_SEND, AP_CONFIRM_DEALLOCATE, or AP_CONFIRM_WHAT_RECEIVED.

  See Return Codes in this topic for the next action the local TP normally takes.

  If **primary_rc** contains AP_DEALLOC_NORMAL, the conversation has been deallocated in response to DEALLOCATE issued by the partner TP.

- AP_DATA_INCOMPLETE indicates, for **RECEIVE_AND_WAIT**, that the local TP has received an incomplete data record. The **max_len** parameter specified a value less than the length of the data record (or less than the remainder of the data record if this is not the first receive verb to read the record).

  For **RECEIVE_AND_WAIT** with **fill** set to AP_LL, this value indicates that the local TP has received an incomplete logical record.

  Upon receiving this value, the local TP normally reissues **RECEIVE_AND_WAIT** (or issues another receive verb) to receive the next part of the record.

- AP_NONE indicates that the TP did not receive data or conversation status indicators.
- AP_SEND indicates, for the partner TP, that the conversation has entered RECEIVE state. For the local TP, the conversation is now in SEND state. Upon receiving this value, the local TP normally uses SEND_DATA to begin sending data.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

When **rtn_status** is AP_YES, the preceding return code or one of the following return codes can be returned.

AP_DATA_COMPLETE_SEND
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_SEND.
AP_DATA_COMPLETE_CONFIRM_SEND
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_SEND.
AP_DATA_COMPLETE_CONFIRM
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_WHAT_RECEIVED.
AP_DATA_COMPLETE_CONFIRM_DEALL
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_DEALLOCATE.
AP_DATA_SEND
Primary return code; this is a combination of AP_DATA and AP_SEND.
AP_DATA_CONFIRM_SEND
Primary return code; this is a combination of AP_DATA and AP_CONFIRM_SEND.
AP_DATA_CONFIRM
Primary return code; this is a combination of AP_DATA and AP_CONFIRM_WHAT_RECEIVED.
AP_DATA_CONFIRM_DEALLOCATE
Primary return code; this is a combination of AP_DATA and AP_CONFIRM_DEALLOCATE.
AP_DEALLOC_NORMAL
Primary return code; the partner TP has deallocated the conversation without requesting confirmation and issued DEALLOCATE with **dealloc_type** set to one of the following:

AP_CONFIRM_SYNC_LEVEL

AP_FLUSH

AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE

If **rtn_status** is AP_YES, examine **what_rcvd** also.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_BAD_RETURN_STATUS_WITH_DATA

Secondary return code; the specified **rtn_status** value was not recognized by APPC.

AP_INVALID_DATA_SEGMENT

Secondary return code; the length specified for the data buffer was longer than the segment allocated to contain the buffer.

AP_RCV_AND_WAIT_BAD_FILL

Secondary return code; for basic conversations, **fill** was set to an invalid value.

AP_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

AP_RCV_AND_WAIT_BAD_STATE

Secondary return code; the conversation was not in RECEIVE or SEND state when the TP issued this verb.

AP_RCV_AND_WAIT_NOT_LL_BDY

Secondary return code; for basic conversations, the conversation was in SEND state; the TP began but did not finish sending a logical record.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code may be returned through a verb issued after ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner logical unit (LU) or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with ALLOCATE, it may indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONV_FAILURE_NO_RETRY
Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_NO_TRUNC
Primary return code; the partner TP has issued SEND_ERROR with **err_type** set to AP_PROG while the conversation was in SEND state. Data was not truncated.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **SEND_ERROR** with **err_type** set to AP_PROG. Data sent but not yet received is purged.

AP_PROG_ERROR_TRUNC
Primary return code; in SEND state, after sending an incomplete logical record, the partner TP issued **SEND_ERROR** with **err_type** set to AP_PROG. The local TP may have received the first part of the logical record through a receive verb.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND_PROG
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP has issued DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP has encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

AP_DEALLOC_ABEND_SVC
Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_SVC.

AP_DEALLOC_ABEND_TIMER
Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_TIMER.

AP_SVC_ERROR_NO_TRUNC
Primary return code; while in SEND state, the partner TP (or partner LU) issued SEND_ERROR with **err_type** set to AP_SVC. Data was not truncated.

AP_SVC_ERROR_PURGING
Primary return code; the partner TP (or partner LU) issued **SEND_ERROR** with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

AP_SVC_ERROR_NO_TRUNC
Primary return code; while in SEND state, after sending an incomplete logical record, the partner TP (or partner LU) issued **SEND_ERROR**. The local TP may have received the first part of the logical record.

Remarks

The local TP receives data through the following process:

1. The local TP issues a receive verb until it finishes receiving a complete unit of data. The data received can be:

   - One logical record.
   - A buffer of data received independent of its logical-record format.

   The local TP may need to issue the receive verb several times in order to receive a complete unit of data. After a complete unit of data has been received, the local TP can manipulate it.

   The receive verbs are RECEIVE_AND_POST, **RECEIVE_AND_WAIT**, and RECEIVE_IMMEDIATE.

2. The local TP issues the receive verb again. This has one of the following effects:

   - If the partner TP has sent more data, the local TP begins to receive a new unit of data.
   - If the partner TP has finished sending data or is waiting for confirmation, status information (available through the **what_rcvd** parameter) indicates the next action the local TP normally takes.

The conversation must be in RECEIVE or SEND state when the TP issues this verb.

Issuing the Verb in SEND State

Issuing **RECEIVE_AND_WAIT** while the conversation is in SEND state has the following effects:

- The local LU sends the information in its send buffer and a SEND indicator to the partner TP.
- The conversation changes to RECEIVE state; the local TP waits for the partner TP to send data.

State Change

The new conversation state is determined by the following factors:

- The state the conversation is in when the TP issues the verb.
- The **primary_rc** parameter.
- The **what_rcvd** parameter if **primary_rc** contains AP_OK.

Verb Issued in SEND State

The following table details the state changes when **RECEIVE_AND_WAIT** is issued in SEND state and **primary_rc** is AP_OK.

what_rcvd	New state
AP_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_DATA_COMPLETE_CONFIRM_DEALL	CONFIRM_DEALLOCATE
AP_DATA_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_COMPLETE_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_CONFIRM_SEND	CONFIRM_SEND
AP_CONFIRM_WHAT_RECEIVED	CONFIRM
AP_DATA_COMPLETE_CONFIRM	CONFIRM
AP_DATA_CONFIRM	CONFIRM
AP_DATA	RECEIVE
AP_DATA_COMPLETE	RECEIVE
AP_DATA_INCOMPLETE	RECEIVE
AP_SEND	No change
AP_DATA_COMPLETE_SEND	SEND_PENDING

The following table details the state changes when **RECEIVE_AND_WAIT** is issued in SEND state and **primary_rc** is not AP_OK.

primary_rc	New state
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_PROG_ERROR_NO_TRUNC	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_NO_TRUNC	RECEIVE

Verb Issued in RECEIVE State

The following table details the state changes when **RECEIVE_AND_WAIT** is issued in RECEIVE state and **primary_rc** is AP_OK.

what_rcvd	New state
AP_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_DATA_COMPLETE_CONFIRM_DEALL	CONFIRM_DEALLOCATE
AP_DATA_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_COMPLETE_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_CONFIRM_SEND	CONFIRM_SEND
AP_CONFIRM_WHAT_RECEIVED	CONFIRM
AP_DATA_COMPLETE_CONFIRM	CONFIRM
AP_DATA_CONFIRM	CONFIRM
AP_DATA	No change
AP_DATA_COMPLETE	No change
AP_DATA_INCOMPLETE	No change
AP_SEND	SEND

AP_DATA_COMPLETE_SEND	SEND_PENDING

The following table details the state changes when **RECEIVE_AND_WAIT** is issued in RECEIVE state and **primary_rc** is not AP_OK.

primary_rc	**New state**
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	No change
AP_PROG_ERROR_NO_TRUNC	No change
AP_SVC_ERROR_PURGING	No change
AP_SVC_ERROR_NO_TRUNC	No change
AP_PROG_ERROR_TRUNC	No change
AP_SVC_ERROR_TRUNC	No change

RECEIVE_AND_WAIT End of Data

In basic conversations, if the local TP issues **RECEIVE_AND_WAIT** and sets **fill** to AP_BUFFER, the receipt of the data ends when **max_len** or the end of the data is reached. The end of the data is indicated by either:

- A **primary_rc** parameter with a value other than AP_OK (for example, AP_DEALLOC_NORMAL).
- A **what_rcvd** parameter with one of the following values:

  AP_SEND

  AP_CONFIRM_SEND

  AP_CONFIRM_DEALLOCATE

  AP_CONFIRM_WHAT_RECEIVED

  AP_DATA_CONFIRM_SEND

  AP_DATA_CONFIRM_DEALLOCATE

  AP_DATA_CONFIRM

To determine if the end of the data has been reached, the local TP reissues **RECEIVE_AND_WAIT**. If the new **primary_rc** contains AP_OK and **what_rcvd** contains AP_DATA, the end of the data has not been reached. If, however, the end of the data has been reached, **primary_rc** or **what_rcvd** will indicate the cause of the end of the data.

RECEIVE_AND_WAIT waits for data or an indicator to be sent by the partner TP. If you need the local TP to operate continuously, use RECEIVE_IMMEDIATE instead.

RECEIVE_IMMEDIATE

The **RECEIVE_IMMEDIATE** verb receives any data currently available from the partner transaction program (TP). If no data is available, the local TP does not wait. To avoid blocking the conversation, the Microsoft® Windows® 2000 system can issue RECEIVE_AND_WAIT in conjunction with WinAsyncAPPC.

The following structure describes the verb control block used by the **RECEIVE_IMMEDIATE** verb.

```
struct receive_immediate {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned short      what_rcvd;
    unsigned char       rtn_status;
    unsigned char       fill;
    unsigned char       rts_rcvd;
    unsigned char       reserv4;
    unsigned short      max_len;
    unsigned short      dlen;
    unsigned char FAR * dptr;
    unsigned char       reserv5[5];
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_RECEIVE_IMMEDIATE.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

what_rcvd
Returned parameter. Contains information received with the incoming data. Possible values are listed following the Members section.

rtn_status
Supplied parameter. Indicates whether both data and conversation status indicators should be returned within one API call.

Use AP_NO to specify that indicators should be returned individually on separate invocations of the verb.

Use AP_YES to specify that indicators should be returned together, provided both are available. Both can be returned when:

- The receive buffer is large enough to hold all of the data that precedes the status indicator.
- The **fill** parameter specifies either BUFFER or LL, and the data is the last logical record before the status indicator.

fill
Supplied parameter. Specifies the manner in which the local TP receives data. It is used only for **RECEIVE_IMMEDIATE**.

Use AP_BUFFER to indicate that the local TP receives data until the number of bytes specified by **max_len** is reached or until end of data. Data is received without regard for the logical-record format.

Use AP_LL to indicate that data is received in logical-record format. The data received can be a complete logical record, a **max_len** byte portion of a logical record, or the end of a logical record.

rts_rcvd

Returned parameter. Contains the request-to-send indicator. Possible values are:

- AP_YES indicates that the partner TP has issued REQUEST_TO_SEND, which requests that the local TP change the conversation to RECEIVE state.
- AP_NO indicates that the partner TP has not issued **REQUEST_TO_SEND**.

max_len

Supplied parameter. Indicates the maximum number of bytes of data the local TP can receive. The range is from 0 through 65535.

For the Windows 2000 operating system, this value must not exceed the length of the buffer to contain the received data.

By issuing **RECEIVE_IMMEDIATE** with **max_len** set to zero, the local TP can determine whether the partner TP has data to send, seeks confirmation, or has changed the conversation state.

dlen

Returned parameter. Provides the number of bytes of data received. Data is stored in a buffer specified by **dptr**. A length of zero indicates that no data was received.

dptr

Supplied parameter. Address of the buffer to contain the data received by the local TP.

For the Windows 2000 operating system, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

Values Returned by the what_rcvd Parameter

- AP_CONFIRM_DEALLOCATE indicates that the partner TP has issued DEALLOCATE with **dealloc_type** set to AP_SYNC_LEVEL, and the conversation's synchronization level, established by **ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues CONFIRMED.
- AP_CONFIRM_SEND indicates that the partner TP has issued PREPARE_TO_RECEIVE with **ptr_type** set to AP_SYNC_LEVEL, and the conversation's synchronization level, established by **ALLOCATE**, is AP_CONFIRM_SYNC_LEVEL. Upon receiving this value, the local TP normally issues **CONFIRMED**, and begins to send data.
- AP_CONFIRM_WHAT_RECEIVED indicates that the partner TP has issued CONFIRM. Upon receiving this value, the local TP normally issues **CONFIRMED**.
- AP_DATA is returned for basic conversations by **RECEIVE_IMMEDIATE** if **fill** is set to AP_BUFFER. The local TP received data until **max_len** or end of data was reached. For more information, see "RECEIVE_IMMEDIATE End of Data" at the end of this topic.
- AP_DATA_COMPLETE indicates, for **RECEIVE_IMMEDIATE** with **fill** set to AP_LL in basic conversations, that the local TP has received a complete logical record or the end of a logical record.

  Upon receiving this value, the local TP normally reissues **RECEIVE_IMMEDIATE** or issues another receive verb. If the partner TP has sent more data, the local TP begins to receive a new unit of data.

  Otherwise, the local TP examines status information if **primary_rc** contains AP_OK and **what_rcvd** contains any of these values:

  AP_SEND

  AP_CONFIRM_SEND

  AP_CONFIRM_DEALLOCATE

  AP_CONFIRM_WHAT_RECEIVED

  See the description of the value in Return Codes in this topic for the next action the local TP normally takes.

  If **primary_rc** contains AP_DEALLOC_NORMAL, the conversation has been deallocated in response to DEALLOCATE issued by the partner TP.

- AP_DATA_INCOMPLETE indicates for **RECEIVE_IMMEDIATE** in mapped conversations that the local TP has received an incomplete data record. The **max_len** parameter specified a value less than the length of the data record (or less than the remainder of the data record if this is not the first receive verb to read the record).

For **RECEIVE_IMMEDIATE** with **fill** set to AP_LL in basic conversations, this value indicates that the local TP has received an incomplete logical record.

Upon receiving this value, the local TP normally reissues RECEIVE_IMMEDIATE (or issues another receive verb) to receive the next part of the record.

- AP_NONE indicates that the TP did not receive data or conversation status indicators.
- AP_SEND indicates, for the partner TP, the conversation has entered RECEIVE state. For the local TP, the conversation is now in SEND state. Upon receiving this value, the local TP normally uses SEND_DATA to begin sending data.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

When **rtn_status** is AP_YES, the preceding return code or one of the following return codes can be returned.

AP_DATA_COMPLETE_SEND
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_SEND.
AP_DATA_COMPLETE_CONFIRM_SEND
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_SEND.
AP_DATA_COMPLETE_CONFIRM
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_WHAT_RECEIVED.
AP_DATA_COMPLETE_CONFIRM_DEALL
Primary return code; this is a combination of AP_DATA_COMPLETE and AP_CONFIRM_DEALLOCATE.
AP_DATA_SEND
Primary return code; this is a combination of AP_DATA and AP_SEND.
AP_DATA_CONFIRM_SEND
Primary return code; this is a combination of AP_DATA and AP_CONFIRM_SEND.
AP_DATA_CONFIRM
Primary return code; this is a combination of AP_DATA and AP_CONFIRM_WHAT_RECEIVED.
AP_DATA_CONFIRM_DEALLOCATE
Primary return code; this is a combination of AP_DATA and AP_CONFIRM_DEALLOCATE.
AP_UNSUCCESSFUL
Primary return code; no data is immediately available from the partner TP.
AP_DEALLOC_NORMAL
Primary return code; the partner TP has deallocated the conversation without requesting confirmation. The partner TP issued DEALLOCATE with **dealloc_type** set to one of the following:

- AP_FLUSH
- AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE

If **rtn_status** is AP_YES, examine **what_rcvd** also.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_BAD_RETURN_STATUS_WITH_DATA

Secondary return code; the specified **rtn_status** value was not recognized by APPC.

AP_INVALID_DATA_SEGMENT

Secondary return code; the length specified for the data buffer was longer than the segment allocated to contain the buffer.

AP_RCV_IMMD_BAD_FILL

Secondary return code for a basic conversation; the **fill** parameter was set to an invalid value.

AP_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

AP_RCV_IMMD_BAD_STATE

Secondary return code; the conversation was not in RECEIVE state.

AP_ALLOCATION_ERROR

Secondary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code may be returned through a verb issued after ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner logical unit (LU) or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with ALLOCATE, it can indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONV_FAILURE_NO_RETRY
Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_NO_TRUNC
Primary return code; the partner TP has issued SEND_ERROR with **err_type** set to AP_PROG while the conversation was in SEND state. Data was not truncated.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **SEND_ERROR** with **err_type** set to AP_PROG. Data sent but not yet received is purged.

AP_PROG_ERROR_TRUNC
Primary return code; in SEND state, after sending an incomplete logical record, the partner TP issued **SEND_ERROR** with **err_type** set to AP_PROG. The local TP may have received the first part of the logical record through a receive verb.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND_PROG
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP has issued DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP has encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

AP_DEALLOC_ABEND_SVC
Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_SVC.

AP_DEALLOC_ABEND_TIMER
Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set

to AP_ABEND_TIMER.

AP_SVC_ERROR_NO_TRUNC

Primary return code; while in SEND state, the partner TP (or partner LU) issued **SEND_ERROR** with **err_type** set to AP_SVC. Data was not truncated.

AP_SVC_ERROR_PURGING

Primary return code; the partner TP (or partner LU) issued **SEND_ERROR** with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

AP_SVC_ERROR_TRUNC

Primary return code; in SEND state, after sending an incomplete logical record, the partner TP (or partner LU) issued **SEND_ERROR**. The local TP may have received the first part of the logical record.

Remarks

The local TP receives data through the following process:

1. The local TP issues a receive verb until it finishes receiving a complete unit of data. The data received can be:

    - One logical record.
    - A buffer of data received independent of its logical-record format.

    The local TP may need to issue the receive verb several times in order to receive a complete unit of data. After a complete unit of data has been received, the local TP can manipulate it.

    The receive verbs are RECEIVE_AND_POST, RECEIVE_AND_WAIT, and **RECEIVE_IMMEDIATE**.

2. The local TP issues the receive verb again. This has one of the following effects:

    - If the partner TP has sent more data, the local TP begins to receive a new unit of data.
    - If the partner TP has finished sending data or is waiting for confirmation, status information (available through **what_rcvd**) indicates the next action the local TP normally takes.

The conversation must be in RECEIVE state when the TP issues this verb.

The new state is determined by **primary_rc**. If **primary_rc** is AP_OK, the new state is determined by **what_rcvd**.

The following table details the state changes when the **primary_rc** is AP_OK.

what_rcvd	New state
AP_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_DATA_COMPLETE_CONFIRM_DEALL	CONFIRM_DEALLOCATE
AP_DATA_CONFIRM_DEALLOCATE	CONFIRM_DEALLOCATE
AP_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_COMPLETE_CONFIRM_SEND	CONFIRM_SEND
AP_DATA_CONFIRM_SEND	CONFIRM_SEND
AP_CONFIRM_WHAT_RECEIVED	CONFIRM
AP_DATA_COMPLETE_CONFIRM	CONFIRM
AP_DATA_CONFIRM	CONFIRM
AP_DATA	No change
AP_DATA_COMPLETE	No change
AP_DATA_INCOMPLETE	No change
AP_SEND	SEND
AP_DATA_COMPLETE_SEND	SEND_PENDING

The following table details the state changes when the **primary_rc** is not AP_OK.

primary_rc	New state
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET

AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	No change
AP_PROG_ERROR_NO_TRUNC	No change
AP_SVC_ERROR_PURGING	No change
AP_SVC_ERROR_NO_TRUNC	No change
AP_PROG_ERROR_TRUNC	No change
AP_SVC_ERROR_TRUNC	No change
AP_UNSUCCESSFUL	No change

RECEIVE IMMEDIATE End of Data

In basic conversations, if the local TP issues **RECEIVE_IMMEDIATE** and sets **fill** to AP_BUFFER, the receipt of the data ends when **max_len** or the end of the data is reached. The end of the data is indicated by either:

- A **primary_rc** parameter with a value other than AP_OK (for example, AP_DEALLOC_NORMAL).
- A **what_rcvd** parameter with one of the following values:

  AP_SEND

  AP_CONFIRM_SEND

  AP_CONFIRM_DEALLOCATE

  AP_CONFIRM_WHAT_RECEIVED

  AP_DATA_CONFIRM_SEND

  AP_DATA_CONFIRM_DEALLOCATE

  AP_DATA_CONFIRM

To determine if the end of the data has been reached, the local TP reissues **RECEIVE_IMMEDIATE**. If the new **primary_rc** parameter contains AP_OK and **what_rcvd** contains AP_DATA, the end of the data has not been reached. If, however, the end of the data has been reached, **primary_rc** or **what_rcvd** will indicate the cause of the end of the data.

RECEIVE_LOG_DATA

The **RECEIVE_LOG_DATA** verb allows the user to register to receive the log data associated with an inbound Function Management Header 7 (FMH7) error report. The verb passes a buffer to APPC, and any log data received is placed in that buffer. APPC continues to use this buffer as successive FMH7s arrive until it is provided with another one (that is, until the transaction program (TP) issues another **RECEIVE_LOG_DATA** specifying a different buffer or no buffer at all).

Note that the TP itself is responsible for allocating and freeing the buffer. After the buffer has been passed to APPC, the TP should either issue another **RECEIVE_LOG_DATA** specifying a new buffer or a zero-length buffer, or wait until the conversation has finished before freeing the original buffer.

When an FMH7 is received, APPC copies any associated error log general data stream (GDS) into the buffer. If there is no associated error log variable, the buffer is zeroed out. It is up to the TP to check the buffer whenever a return code from a receive verb indicates that an error has been received.

The following structure describes the verb control block (VCB) used by the **RECEIVE_LOG_DATA** verb.

```
struct receive_log_data {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv1;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned short      log_dlen;
    unsigned char FAR * log_dptr;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_RECEIVE_LOG_DATA.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv1
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

log_dlen
Supplied parameter. Specifies the maximum length of log data that APPC can place in the buffer (that is, the buffer size). The range is from 0 through 65535. Note that a length of zero here indicates that any previous **RECEIVE_LOG_DATA** verb should be cancelled.

log_dptr
Supplied parameter. Specifies the address of the buffer that APPC will use to store the log data.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

REQUEST_TO_SEND

The **REQUEST_TO_SEND** verb notifies the partner transaction program (TP) that the local TP wants to send data.

The following structure describes the verb control block (VCB) used by the **REQUEST_TO_SEND** verb.

```
struct request_to_send {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_REQUEST_TO_SEND.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP.

The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier.

The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

AP_R_T_S_BAD_STATE

Secondary return code; the conversation is not in an allowed state when the TP issued this verb.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).

- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with ALLOCATE, it may indicate that no communications subsystem could be found to support the local logical unit (LU). (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation can be in any of the following states when the TP issues this verb:

CONFIRM

PENDING_POST (OS/2)

RECEIVE

There is no state change.

The request-to-send notification is received by the partner program through the **rts_rcvd** parameter of the following verbs:

- CONFIRM
- RECEIVE_AND_POST
- RECEIVE_AND_WAIT
- RECEIVE_IMMEDIATE
- SEND_DATA
- SEND_ERROR

It is also indicated by a **primary_rc** of AP_OK on TEST_RTS.

Request-to-send notification is sent to the partner TP immediately; APPC does not wait until the send buffer fills up or is flushed. Consequently, the request-to-send notification may arrive out of sequence. For example, if the local TP is in SEND state and issues PREPARE_TO_RECEIVE followed by **REQUEST_TO_SEND**, the partner TP, in RECEIVE state, may receive the request-to-send notification before it receives the send notification. For this reason, request-to-send can be reported to a TP through a receive verb.

In response to this request, the partner TP can change the conversation to:

- RECEIVE state by issuing **PREPARE_TO_RECEIVE** or **RECEIVE_AND_WAIT**.
- PENDING_POST state by issuing **RECEIVE_AND_POST**.

The partner TP can also ignore the request-to-send.

The conversation state changes to SEND for the local TP when the local TP receives one of the following values through the **what_rcvd** parameter of a subsequent receive verb:

- AP_CONFIRM_SEND and replies with CONFIRMED
- AP_DATA_COMPLETE_CONFIRM_SEND and replies with **CONFIRMED**
- AP_DATA_CONFIRM_SEND and replies with **CONFIRMED**
- AP_SEND

The receive verbs are RECEIVE_AND_POST, RECEIVE_IMMEDIATE, and RECEIVE_AND_WAIT.

SEND_CONVERSATION

The **SEND_CONVERSATION** verb allocates a session between the local logical unit (LU) and partner LU, sends data on the session, and then deallocates the session.

The following structure describes the verb control block (VCB) used by the **SEND_CONVERSATION** verb.

```
struct send_conversation {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       reserv3[8];
    unsigned char       rtn_ctl;
    unsigned char       reserv4;
    unsigned long       conv_group_id;
    unsigned long       sense_data;
    unsigned char       plu_alias[8];
    unsigned char       mode_name[8];
    unsigned char       tp_name[64];
    unsigned char       security;
    unsigned char       reserv6[11];
    unsigned char       pwd[10];
    unsigned char       user_id[10];
    unsigned short      pip_dlen;
    unsigned char FAR * pip_dptr;
    unsigned char       reserv6;
    unsigned char       fqplu_name[17];
    unsigned char       reserv7[8];
    unsigned short      dlen;
    unsigned char FAR * dptr;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_SEND_CONVERSATION.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local transaction program (TP). The value of this parameter was returned by TP_STARTED.

conv_id
Supplied parameter. Provides the conversation identifier.

The value of this parameter is returned by ALLOCATE in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

rtn_ctl
Supplied parameter. Specifies how APPC should select a session to allocate for the conversation and when the local LU should return control to the local TP. The allowed values are:

- AP_IMMEDIATE specifies that the LU allocates a contention-winner session, if one is immediately available, and returns control to the TP.
- AP_WHEN_SESSION_ALLOCATED specifies that the LU does not return control to the TP until it allocates a session or

encounters one of the errors described in Return Codes in this topic. If the session limit is zero, the LU returns control immediately. Note that if a session is not available, the TP waits for one.

- AP_WHEN_SESSION_FREE specifies that the LU allocates a contention-winner or contention-loser session, if one is available or able to be activated, and returns control to the TP. If an error occurs (as described in Return Codes in this topic) the call will return immediately with the error in the **primary_rc** and **secondary_rc** fields.
- AP_WHEN_CONWINNER_ALLOC specifies that the LU does not return control until it allocates a contention-winner session or encounters one of the errors described in Return Codes in this topic. If the session limit is zero, the LU returns control immediately. Note that if a session is not available, the TP waits for one.
- AP_WHEN_CONV_GROUP_ALLOC specifies that the LU does not return control to the TP until it allocates the session specified by **conv_group_id** or encounters one of the errors described in Return Codes in this topic. If the session is not available, the TP waits for it to become free.

conv_group_id

Supplied/returned parameter. Used as a supplied parameter when **rtn_ctl** is WHEN_CONV_GROUP_ALLOC to specify the identity of the conversation group from which the session should be allocated. When **rtn_ctl** specifies a different value, and the **primary_rc** is AP_OK, this is a returned value. The purpose of this parameter is to provide a TP with the assurance that the same session will be reallocated and therefore the conversations conducted over the session will occur in the same sequence that they were initiated.

sense_data

Returned parameter. If the primary and secondary return codes indicate an allocation error (retry or no-retry), an SNA-defined sense code is returned.

plu_alias

Supplied parameter. Specifies the alias by which the partner LU is known to the local TP. This parameter must match the name of a partner LU established during configuration. The parameter is an 8-byte, type G ASCII character set that includes:

- Uppercase letters
- Numerals 0 to 9
- Spaces
- Special characters $, #, %, and @

If the value of this parameter is fewer than eight bytes, pad it on the right with ASCII spaces (0x20).

mode_name

Supplied parameter. Specifies the name of a set of networking characteristics defined during configuration. This parameter must match the name of a mode associated with the partner LU during configuration.

The parameter is an 8-byte EBCDIC character string. It can consist of characters from the type A EBCDIC character set, including all EBCDIC spaces. These characters are:

- Uppercase letters
- Numerals 0 to 9
- Special characters $, #, and @

The first character in the string must be an uppercase letter or special character.

Using the name SNASVCMG (a reserved mode name used internally by APPC) in a basic conversation is not recommended.

tp_name

Supplied parameter. Specifies the name of the invoked TP. The value of **tp_name** specified by ALLOCATE in the invoking TP must match the value of **tp_name** specified by RECEIVE_ALLOCATE in the invoked TP.

The parameter is a 64-byte, case-sensitive, EBCDIC character string. This parameter can consist of characters from the type AE EBCDIC character set. These characters are:

- Uppercase and lowercase letters
- Numerals 0 to 9
- Special characters $, #, @, and period (.)

If the TP name is fewer than 64 bytes, use EBCDIC spaces (0x40) to pad it on the right.

The SNA convention for naming a service TP is up to four characters. The first character is a hexadecimal byte between 0x00 and 0x3F. The other characters are from the EBCDIC AE character set.

security

Supplied parameter. Specifies the information the partner LU requires in order to validate access to the invoked TP.

- AP_NONE specifies that the invoked TP uses no conversation security.
- AP_PGM specifies that the invoked TP uses conversation security and requires a user identifier and password. Use **user_id** and **pwd** to supply this information.
- AP_SAME specifies that the invoked TP, invoked with a valid user identifier and password, in turn invokes another TP.

For example, assume that TP A invokes TP B with a valid user identifier and password, and TP B in turn invokes TP C. If TP B specifies the value AP_SAME, APPC will send the LU for TP C the user identifier from TP A and an already-verified indicator. This indicator indicates to TP C not to require the password (if TP C is configured to accept an already-verified indicator).

pwd

Supplied parameter. Specifies the password associated with **user_id**. This parameter is required only if the security parameter is set to AP_PGM and must match the password for **user_id** that was established during configuration.

This parameter is a 10-byte, case-sensitive, EBCDIC character string. It can consist of characters from the type AE EBCDIC character set. These characters are:

- Uppercase and lowercase letters
- Numerals 0 to 9
- Special characters $, #, @, and period (.)

If the password is fewer than 10 bytes, use EBCDIC spaces (0x40) to pad it on the right.

user_id

Supplied parameter. Specifies the user identifier required to access the partner TP. This parameter is required only if the security parameter is set to AP_PGM and must match one of the user identifiers configured for the partner TP.

The parameter can consist of characters from the type AE EBCDIC character set. These characters are:

- Uppercase and lowercase letters
- Numerals 0 to 9
- Special characters $, #, @, and period (.)

If the user identifier is fewer than 10 bytes, use EBCDIC spaces (0x40) to pad it on the right.

pip_dlen

Supplied parameter. Specifies the length of the PIP to be passed to the partner TP. The range for this parameter is from 0 through 32767.

pip_dptr

Supplied parameter. Specifies the address of the buffer containing PIP data. Use this parameter only if **pip_dlen** is greater than zero.

PIP data can consist of initialization parameters or environmental setup information required by a partner TP or remote operating system. The PIP data must follow the GDS format. For more information, see your IBM SNA manual(s).

For the Microsoft Windows 2000 operating system, the data buffer can reside in a static data area or in a globally allocated area.

fqplu_name

Supplied parameter. Specifies the fully qualified name of the local LU. This parameter must match the fully qualified name of the local LU defined in the remote node. The parameter is made up of two type A EBCDIC character strings (each of up to eight characters), which are the network name (NETID) and the LU name of the partner LU. The names are separated by an EBCDIC period (.). The NETID can be omitted, and if this is the case, the period should also be omitted.

This name must be provided if no **plu_alias** is provided.

Type A EBCDIC characters contain:

- Uppercase letters
- Numerals 0 to 9
- Special characters $, #, and @

If the value of this parameter is fewer than 17 bytes, pad it on the right with EBCDIC spaces (0x40).

dlen

Supplied parameter. Specifies the number of bytes of data to be put in the local LU's send buffer. The range for this parameter is from 0 through 65535.

dptr

Supplied parameter. Specifies the address of the buffer containing the data to be put in the local LU's send buffer.

For the Windows 2000 operating system, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

AP_UNSUCCESSFUL

Primary return code; the supplied parameter **rtn_ctl** specified immediate return of the control to the TP (AP_IMMEDIATE), and the local LU did not have an available contention-winner session.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_BAD_RETURN_CONTROL

Secondary return code; the value specified for **rtn_ctl** was invalid.

AP_BAD_SECURITY

Secondary return code; the value specified for **security** was invalid.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_PIP_LEN_INCORRECT

Secondary return code; the value of **pip_dlen** was greater than 32767.

AP_UNKNOWN_PARTNER_MODE

Secondary return code; the value specified for **mode_name** was invalid.

AP_BAD_PARTNER_LU_ALIAS

Secondary return code; APPC did not recognize the supplied **partner_lu_alias**.

AP_ALLOCATION_ERROR

Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code may be returned through a verb issued after ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with ALLOCATE, it may indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with TP_STARTED is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.
AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.
AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

This verb is issued by the invoking TP to conduct an entire conversation with the remote TP. If the remote TP rejects either the conversation initiation or the data, the invoking TP will not receive notification of the rejection.

The conversation state is RESET when the TP issues this verb. There is no state change.

Several parameters of **SEND_CONVERSATION** are EBCDIC or ASCII strings. A TP can use the CSV CONVERT to translate a string from one character set to the other.

Normally, the value of **mode_name** must match the name of a mode configured for the invoked TP's node and associated during configuration with the partner LU. If one of the modes associated with the partner LU on the invoked TP's node is an implicit mode, the session established between the two LUs will be of the implicit mode when no mode name associated with the partner LU matches the value of **mode_name**.

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SEND_DATA

The **SEND_DATA** verb places data in the local logical unit's (LU's) send buffer for transmission to the partner transaction program (TP).

The following structure describes the verb control block (VCB) used by the **SEND_DATA** verb.

```
struct send_data {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       rts_rcvd;
    unsigned char       data_type;
    unsigned short int  dlen;
    unsigned char FAR * dptr ;
    unsigned char       type;
    unsigned char       reserv4;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_SEND_DATA.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP.

The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier.

The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

rts_rcvd
Returned parameter. Provides the request-to-send-received indicator.

- AP_YES indicates that the partner TP has issued REQUEST_TO_SEND, which requests that the local TP change the conversation to RECEIVE state. To change to RECEIVE state, the local TP can use PREPARE_TO_RECEIVE, RECEIVE_AND_WAIT, or RECEIVE_AND_POST.
- AP_NO indicates that the partner TP has not issued **REQUEST_TO_SEND**.

data_type
Supplied parameter. Specifies the type of data to be sent if Sync Point is supported. Valid parameters are:

AP_APPLICATION

AP_USER_CONTROL_DATA

AP_PS_HEADER

dlen
Supplied parameter. Specifies the number of bytes of data to be put in the local LU's send buffer. The range is from 0 through

65535.

dptr

Supplied parameter. Specifies the address of the buffer containing the data to be put in the local LU's send buffer.

For the Microsoft Windows 2000 operating system, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

type

Supplied parameter. Allows a TP to send data and perform other functions within one API call. For example, you can combine **SEND_DATA** with **type** set to CONFIRM to accomplish the same objective as issuing **SEND_DATA** followed by CONFIRM.

- AP_SEND_DATA_CONFIRM corresponds to **SEND_DATA** followed by **CONFIRM**.
- AP_SEND_DATA_FLUSH corresponds to **SEND_DATA** followed by FLUSH.
- AP_SEND_DATA_DEALLOC_ABEND corresponds to **SEND_DATA** followed by DEALLOCATE with a **dealloc_type** of AP_ABEND_PROG.
- AP_SEND_DATA_DEALLOC_FLUSH corresponds to **SEND_DATA** followed by **DEALLOCATE** with a **dealloc_type** of AP_FLUSH.
- AP_SEND_DATA_DEALLOC_SYNC_LEVEL corresponds to **SEND_DATA** followed by **DEALLOCATE** with a **dealloc_type** of AP_SYNC_LEVEL.
- AP_SEND_DATA_P_TO_R_FLUSH corresponds to **SEND_DATA** followed by PREPARE_TO_RECEIVE with a **ptr_type** of AP_FLUSH.
- AP_SEND_DATA_P_TO_R_SYNC_LEVEL corresponds to **SEND_DATA** followed by **PREPARE_TO_RECEIVE** with a **ptr_type** of AP_SYNC_LEVEL and **locks** set to AP_SHORT.

reserv4

A reserved field.

Return Codes

AP_OK

Primary return code; the verb executed successfully.

AP_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_LL

Secondary return code; the logical record length field of a logical record contained an invalid value—0x0000, 0x0001, 0x8000, or 0x8001. See About Transaction Programs for information on logical records.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_INVALID_DATA_SEGMENT

Secondary return code; the length specified for the data buffer was longer than the segment allocated to contain the buffer.

AP_SEND_DATA_INVALID_TYPE

Secondary return code; the specified type was not recognized by APPC.

AP_SEND_DATA_CONFIRM_SYNC_NONE

Secondary return code; the **type** CONFIRM is not permitted for a conversation that was allocated with a **sync_level** of NONE.

AP_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

AP_SEND_DATA_NOT_SEND_STATE

Secondary return code; the local TP issued **SEND_DATA**, but the conversation was not in SEND state.

AP_SEND_DATA_NOT_LL_BDY

Secondary return code; the TP started but did not finish sending a logical record. This occurs only when the **type** parameter is one of the following:

AP_SEND_DATA_CONFIRM

AP_SEND_DATA_DEALLOC_FLUSH

AP_SEND_DATA_DEALLOC_SYNC_LEVEL

AP_SEND_DATA_P_TO_R_FLUSH

AP_SEND_DATA_P_TO_R_SYNC_LEVEL

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with **ALLOCATE**, it may indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with **TP_STARTED** is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONV_FAILURE_NO_RETRY

Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY

Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED

Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_PROG_ERROR_PURGING

Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **SEND_ERROR** with **err_type** set to AP_PROG. Data sent but not yet received is purged.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY

Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING

Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

AP_DEALLOC_ABEND_PROG

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP has issued DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP has encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

AP_DEALLOC_ABEND_SVC

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_SVC.

AP_DEALLOC_ABEND_TIMER

Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_TIMER.

AP_SVC_ERROR_PURGING

Primary return code; the partner TP (or partner LU) issued a **SEND_ERROR** verb with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

Remarks

The conversation must be in SEND state when the TP issues this verb. State changes, based on **primary_rc**, are summarized in the following table.

primary_rc	**New state**
AP_OK	No change
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE

SEND_DATA may wait indefinitely because the partner TP has not issued a receive verb. If this occurs, the send buffer may fill up.

The data collected in the local LU's send buffer is transmitted to the partner LU (and partner TP) when one of the following occurs:

- The send buffer fills up.
- The local TP issues FLUSH, CONFIRM, or DEALLOCATE (or other verb that flushes the LU's send buffer).

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SEND_ERROR

The **SEND_ERROR** verb notifies the partner transaction program (TP) that the local TP has encountered an application-level error.

The following structure describes the verb control block (VCB) used by the **SEND_ERROR** verb.

```
struct send_error {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       rts_rcvd;
    unsigned char       err_type;
    unsigned char       err_dir;
    unsigned char       reserv3;
    unsigned short      log_dlen;
    unsigned char FAR * log_dptr;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_SEND_ERROR.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP.

The value of this parameter is returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter is returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

rts_rcvd
Returned parameter. Indicates whether the partner TP issued REQUEST_TO_SEND. Possible values include:

- AP_YES indicates that the partner TP has issued **REQUEST_TO_SEND**, which requests that the local TP change the conversation to RECEIVE state. To change to RECEIVE state, the local TP can use PREPARE_TO_RECEIVE, RECEIVE_AND_WAIT, or RECEIVE_AND_POST.
- AP_NO indicates that the partner TP has not issued **REQUEST_TO_SEND**.

err_type
Supplied parameter. Indicates the type of the error being reported—application program or service program.

AP_PROG indicates that the error is to be reported to an end-user application program. This value causes APPC to send one of the following return codes to the partner TP:

AP_PROG_ERROR_NO_TRUNC

AP_PROG_ERROR_PURGING

AP_PROG_ERROR_TRUNC

AP_SVC indicates that the error is to be reported to a service program. This value causes APPC to send one of the following return codes to the partner TP:

AP_SVC_ERROR_NO_TRUNC

AP_SVC_ERROR_PURGING

AP_SVC_ERROR_TRUNC

err_dir
Supplied parameter. Indicates whether the error is with data just received or with data that is about to be sent. Use this parameter only when the conversation is in SEND_PENDING state. The parameter is ignored otherwise. The following are allowed values:

- AP_RCV_DIR_ERROR indicates that the TP issued **SEND_ERROR** after detecting an error associated with the data just received.
- AP_SEND_DIR_ERROR indicates that the TP issued **SEND_ERROR** after detecting an error associated with data it was going to send. For example, the TP encountered an error while reading data from the disk drive.

reserv3
A reserved field.
log_dlen
Supplied parameter for basic conversations; specifies the number of bytes of data to be sent to the error log file. The range is from 0 through 32767.

A length of zero indicates that there is no error log data.

log_dptr
Supplied parameter for basic conversations; specifies the address of the data buffer containing error information. The data is sent to the local error log and to the partner logical unit (LU).

This parameter is used by **SEND_ERROR** if **log_dlen** is greater than zero.

For Microsoft Windows 2000, the data buffer can reside in a static data area or in a globally allocated area. The data buffer must fit entirely within this area.

The TP must format the error data as a GDS error log variable. For more information, see your IBM SNA manual(s).

Return Codes

AP_OK
Primary return code; the verb executed successfully.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_BAD_ERROR_DIRECTION

Secondary return code; the specified **err_dir** was not recognized by APPC.

AP_INVALID_DATA_SEGMENT

Secondary return code; the error data for the log file was longer than the segment allocated to contain the error data, or the address of the error data buffer was wrong.

AP_SEND_ERROR_BAD_TYPE

Secondary return code; the value of **err_type** was invalid.

AP_SEND_ERROR_LOG_LL_WRONG

Secondary return code; the LL field of the error log GDS variable did not match the actual length of the data.

The following return codes can be generated when **SEND_ERROR** is issued in any allowed state:

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with **ALLOCATE**, it may indicate that no communications subsystem could be found to support the local LU. (For example, the local LU alias specified with **TP_STARTED** is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONV_FAILURE_NO_RETRY
Primary return code; the conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

AP_CONV_FAILURE_RETRY
Primary return code; the conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the system administrator should examine the error log to determine the cause of the error.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This may occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

The following return codes can be generated only if **SEND_ERROR** is issued in SEND state:

AP_ALLOCATION_ERROR
Primary return code; APPC has failed to allocate a conversation. The conversation state is set to RESET.

This code may be returned through a verb issued after ALLOCATE.

AP_ALLOCATION_FAILURE_NO_RETRY

Secondary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY

Secondary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

AP_CONVERSATION_TYPE_MISMATCH

Secondary return code; the partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

AP_PIP_NOT_ALLOWED

Secondary return code; the allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

AP_PIP_NOT_SPECIFIED_CORRECTLY

Secondary return code; the partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

AP_SECURITY_NOT_VALID

Secondary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

AP_SYNC_LEVEL_NOT_SUPPORTED

Secondary return code; the partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

AP_TP_NAME_NOT_RECOGNIZED

Secondary return code; the partner LU does not recognize the TP name specified in the allocation request.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY

Secondary return code; the remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

AP_PROG_ERROR_PURGING
Primary return code; while in RECEIVE, PENDING, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the partner TP issued **SEND_ERROR** with **err_type** set to AP_PROG. Data sent but not yet received is purged.

The following return codes can be generated only if **SEND_ERROR** is issued in SEND state:

AP_DEALLOC_ABEND_PROG
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner TP has issued DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP has encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

AP_DEALLOC_ABEND_SVC
Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_SVC.

AP_DEALLOC_ABEND_TIMER
Primary return code; the conversation has been deallocated because the partner TP issued **DEALLOCATE** with **dealloc_type** set to AP_ABEND_TIMER.

AP_SVC_ERROR_PURGING
Primary return code; the partner TP (or partner LU) issued **SEND_ERROR** with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

The following return code can be generated only if **SEND_ERROR** is issued in RECEIVE state:

AP_DEALLOC_NORMAL
Primary return code; this return code does not indicate an error.

The partner TP issued DEALLOCATE with **dealloc_type** set to one of the following:

- AP_FLUSH
- AP_SYNC_LEVEL with the synchronization level of the conversation specified as AP_NONE

Remarks

The conversation can be in any state except RESET when the TP issues this verb. The conversation state must be SEND_PENDING if **err_dir** is used.

The local TP sends the error notification immediately to the partner TP; it does not hold the information in the local LU's send buffer.

Upon successful execution of this verb, the conversation is in SEND state for the local TP and in RECEIVE state for the partner TP.

The new state is determined by **primary_rc**. Possible state changes are summarized in the following table.

primary_rc	**New state**
AP_OK	SEND
AP_ALLOCATION_ERROR	RESET
AP_CONV_FAILURE_RETRY	RESET
AP_CONV_FAILURE_NO_RETRY	RESET
AP_DEALLOC_ABEND	RESET
AP_DEALLOC_ABEND_PROG	RESET
AP_DEALLOC_ABEND_SVC	RESET
AP_DEALLOC_ABEND_TIMER	RESET
AP_DEALLOC_NORMAL	RESET
AP_PROG_ERROR_PURGING	RECEIVE
AP_SVC_ERROR_PURGING	RECEIVE

If the conversation is in RECEIVE state when the TP issues **SEND_ERROR**, incoming data is purged by APPC. This data includes:

- Data sent by SEND_DATA.
- Return code indicators.
- Confirmation requests.
- Deallocation requests.

APPC does not purge an incoming request-to-send indicator. APPC replaces purged incoming return code indicators with other return codes. The primary return code AP_OK replaces the following purged return code indicators:

AP_PROG_ERROR_NO_TRUNC

AP_PROG_ERROR_PURGING

AP_PROG_ERROR_TRUNC

AP_SVC_ERROR_NO_TRUNC

AP_SVC_ERROR_PURGING

AP_SVC_ERROR_TRUNC

The primary return code AP_DEALLOC_NORMAL replaces the following purged return code indicators:

AP_ALLOCATION_ERROR

AP_ALLOCATION_FAILURE_NO_RETRY

AP_ALLOCATION_FAILURE_RETRY

AP_CONVERSATION_TYPE_MISMATCH

AP_DEALLOC_ABEND

AP_DEALLOC_ABEND_PROG

AP_DEALLOC_ABEND_SVC

AP_DEALLOC_ABEND_TIMER

AP_PIP_NOT_ALLOWED

AP_PIP_NOT_SPECIFIED_CORRECTLY

AP_SECURITY_NOT_VALID

AP_SYNC_LEVEL_NOT_SUPPORTED

AP_TP_NAME_NOT_RECOGNIZED

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY

AP_TRANS_PGM_NOT_AVAIL_RETRY

When the conversation is in SEND_PENDING state, APPC reports the following return codes to the partner TP based on the value in **err_dir**:

AP_PROG_ERROR_PURGING
  The local TP issued **SEND_ERROR** with RECEIVE as the **err_dir**.
AP_PROG_ERROR_NO_TRUNC
  The local TP issued **SEND_ERROR** with SEND as the **err_dir**.
AP_SVC_ERROR_PURGING
  The local TP issued **SEND_ERROR** with RECEIVE as the **err_dir.**
AP_SVC_ERROR_NO_TRUNC
  The local TP issued **SEND_ERROR** with SEND as the **err_dir**.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

TEST_RTS

The **TEST_RTS** verb determines whether a request-to-send notification has been received from the partner transaction program (TP).

The following structure describes the verb control block (VCB) used by the **TEST_RTS** verb.

```
struct test_rts {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       reserv3;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_TEST_RTS.

opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.

conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter was returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.

reserv3
A reserved field.

Return Codes

AP_OK
Primary return code; the verb executed successfully.

AP_UNSUCCESSFUL
Primary return code; request-to-send notification has not been received.

AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID
Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with **ALLOCATE**, it may indicate that no communications subsystem could be found to support the local logical unit (LU). (For example, the local LU alias specified with **TP_STARTED** is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft® Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONVERSATION_TYPE_MIXED

Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

AP_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

AP_STACK_TOO_SMALL

Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

AP_CONV_BUSY

Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.

AP_THREAD_BLOCKING

Primary return code; the calling thread is already in a blocking call.

AP_UNEXPECTED_DOS_ERROR

Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Remarks

The conversation can be in any state except RESET when the TP issues this verb.

There is no state change.

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TEST_RTS_AND_POST

The **TEST_RTS_AND_POST** verb allows an application, typically a 5250 emulator, to request asynchronous notification when a partner transaction program (TP) requests send direction.

The following structure describes the verb control block (VCB) used by the **TEST_RTS_AND_POST** verb.

```
struct test_rts {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       tp_id[8];
    unsigned long       conv_id;
    unsigned char       reserv3;
    unsigned long       handle;
};
```

Members

opcode
Supplied parameter. Specifies the verb operation code, AP_B_TEST_RTS_AND_POST.
opext
Supplied parameter. Specifies the verb operation extension, AP_BASIC_CONVERSATION.
reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
tp_id
Supplied parameter. Identifies the local TP. The value of this parameter was returned by TP_STARTED in the invoking TP or by RECEIVE_ALLOCATE in the invoked TP.
conv_id
Supplied parameter. Provides the conversation identifier. The value of this parameter was returned by ALLOCATE in the invoking TP or by **RECEIVE_ALLOCATE** in the invoked TP.
reserv3
A reserved field.
handle
Supplied parameter. On Microsoft® Windows® 2000, this field provides the event handle to set.

Return Codes from Initial Verb

AP_OK
Primary return code; the verb executed successfully. Note particularly that a return code of AP_OK from the initial verb does not indicate that **REQUEST_TO_SEND** verb received from the partner TP. It simply indicates that the facility to receive asynchronous notification has been registered.
AP_UNSUCCESSFUL
Primary return code; request-to-send notification has not been received.
AP_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

AP_BAD_CONV_ID

Secondary return code; the value of **conv_id** did not match a conversation identifier assigned by APPC.

AP_BAD_TP_ID

Secondary return code; the value of **tp_id** did not match a TP identifier assigned by APPC.

AP_INVALID_SEMAPHORE_HANDLE

Secondary return code, the value of **handle** was invalid.

AP_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

AP_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

When this return code is used with **ALLOCATE**, it may indicate that no communications subsystem could be found to support the local logical unit (LU). (For example, the local LU alias specified with **TP_STARTED** is incorrect or has not been configured.) Note that if **lu_alias** or **mode_name** is fewer than eight characters, you must ensure that these fields are filled with spaces to the right. This error is returned if these parameters are not filled with spaces, since there is no node available that can satisfy the **ALLOCATE** request.

When **ALLOCATE** produces this return code for a Microsoft Host Integration Server 2004 Client system configured with multiple nodes, there are two secondary return codes as follows:

0xF0000001

Secondary return code; no nodes have been started.

0xF0000002

Secondary return code; at least one node has been started, but the local LU (when **TP_STARTED** is issued) is not configured on any active nodes. The problem could be either of the following:

- The node with the local LU is not started.
- The local LU is not configured.

AP_CONVERSATION_TYPE_MIXED
Primary return code; the TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.
AP_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
AP_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
AP_CONV_BUSY
Primary return code; there can only be one outstanding conversation verb at a time on any conversation. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **conv_id**.
AP_THREAD_BLOCKING
Primary return code; the calling thread is already in a blocking call.
AP_UNEXPECTED_DOS_ERROR
Primary return code; the operating system has returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

Return Codes from Asynchronous Completion

AP_OK
Primary return code; the request-to-send notification has been received from the partner TP.
AP_CANCELLED
The outstanding **TEST_RTS_AND_POST** verb has been terminated. This will occur if the underlying conversation has been deallocated or an AP_TP_ENDED has been issued.
Note that as with **RECEIVE_AND_POST**, the TP is still responsible for correctly terminating the conversation and possibly terminating the TP. Issuing another verb, such as **RECEIVE_IMMEDIATE,** at this point will indicate the reason for the conversation failure.

The conversation can be in any state except RESET when the TP issues this verb. There is no state change.

A common feature of many APPC applications, such as 5250 emulators, is a requirement to detect a partner's request to send.

Currently, this can be done by polling the APPC interface to detect the partner's request. For example, an application can occasionally issue one of the following verbs:

- **TEST_RTS**

Remarks

- **RECEIVE_IMMEDIATE** and check the **rts_rcvd** field
- **SEND_DATA** of zero bytes, again checking the **rts_rcvd** field.

Some of the problems associated with this polling approach are:

- The application must continually interrupt its main work to poll APPC.
- The partner's request is not detected as soon as it becomes available.
- These approaches are processor-intensive.

The **TEST_RTS_AND_POST** verb allows an application running on Windows 2000, typically a 5250 emulator, to request asynchronous notification when the partner TP requests send direction.

An APPC application typically issues the **TEST_RTS_AND_POST** verb while in SEND state and then continues with its main processing. A request for send direction from the partner TP is indicated asynchronously to the application. After dealing with the partner's request, the application typically returns to SEND state, reissues **TEST_RTS_AND_POST**, and continues.

The **TEST_RTS_AND_POST** verb completes synchronously and the return code AP_OK indicates that a request for asynchronous notification has been registered. It is important to emphasize that this does not indicate that request-to-send was received from the partner TP.

When the partner's request to send is received, the asynchronous event completion occurs. It is important to note that this may be before the completion of the local TP's original **TEST_RTS_AND_POST** verb. This will be the case if the partner's request to send was received before the local TP's **TEST_RTS_AND_POST** verb was issued, or while the local TP's **TEST_RTS_AND_POST** verb was being processed.

APPC Extensions for the Windows Environment

This section describes API extensions to Windows Advanced Program-to-Program Communications (APPC) that allow asynchronous communication. Asynchronous communication occurs when a function returns before the request completes. The application is notified later when the request is completed.

Under Microsoft® Windows® 2000, three methods are available for asynchronous communication using the APPC API:

- Message posting using window handles.
- Waiting on Win32® events.
- Using Win32 I/O completion ports.

The first method uses messages posted to a window handle to notify an application of verb completion. This method using window handles and messages was supported on Microsoft Windows 3.x. There is one such window for each APPC application, independent of the number of conversations. Each APPC conversation can have one asynchronous verb outstanding at any time. When a verb completes, the posting to the window takes as parameters the asynchronous task handle returned by the original call and a pointer to the verb control block which has completed, containing the return codes of the verb.

The extensions using window handles and message posting described in this section (WinAsyncAPPC) were designed for all implementations and versions of Microsoft Windows from version 3.0 through the latest versions of Windows 2000. They provided compatibility for Windows programming and optimum application performance in the 16-bit Windows operating environment.

A second method using Win32 events for notification is supported. The extensions using Win32 events described in this section (WinAsyncAPPCEx) operate only on Windows 2000, and offer optimum application performance in the 32-bit Windows operating environment. If an event has been registered with the conversation, then an application can call the Win32 **WaitForSingleObject** or **WaitForMultipleObjects** function to wait to be notified of the completion of the verb.

A third method using Win32 I/O completion ports for notification is supported on Windows 2000. The extensions using I/O completion ports described in this section (WinAsyncAPPCIOCP) operate only on Windows 2000, and offer optimum application performance in the 32-bit Windows operating environment. If an I/O completion port has been created using **CreateIoCompletionPort**, then an application can call the Win32 **GetQueuedCompletionStatus** function to wait to be notified of the completion of the verb.

Windows APPC allows multithreaded Windows-based processes. A process contains one or more threads of execution. All references to threads in this document refer to actual threads in multithreaded Windows environments.

This section provides, for each extension, a definition of the function, syntax, returns, and remarks for using the function.

This section contains:

- WinAsyncAPPC
- WinAsyncAPPCEx
- WinAsyncAPPCIOCP
- WinAPPCCancelAsyncRequest
- WinAPPCCancelBlockingCall
- WinAPPCCleanup
- WinAPPCIsBlocking
- WinAPPCStartup
- WinAPPCSetBlockingHook
- WinAPPCUnhookBlockingHook

WinAsyncAPPC

The **WinAsyncAPPC** function provides an asynchronous entry point for all of the APPC verbs. Use this function instead of the blocking versions of the verbs if you run your application and want to use message posting using Windows handles for asynchronous verb completion.

```
HANDLE WINAPI WinAsyncAPPC(
    HANDLE hWnd,
    long lpVcb
);
```

Parameters

hWnd
A window handle that will be used for message posting to notify an application when an APPC verb completes.
lpVcb
Pointer to the verb control block.

Return Values

The return value specifies whether the asynchronous request was successful. If the function was successful, the return value is an asynchronous task handle. If the function was not successful, a zero is returned.

When this function returns with a successful value, this does not indicate that the APPC call will ultimately return successfully. It only indicates that it was possible for the APPC library to attempt the APPC call asynchronously using message posting for notification.

Remarks

For an example of how to use this verb in transaction programs (TPs), see the send and receive sample TP (SENDRECV.C located in the APPC folder) included in the SDK.

APPC verbs used in basic conversations that can block are as follows:

- ALLOCATE
- CONFIRM
- CONFIRMED
- DEALLOCATE
- FLUSH
- PREPARE_TO_RECEIVE
- RECEIVE_ALLOCATE
- RECEIVE_AND_WAIT
- REQUEST_TO_SEND
- SEND_CONVERSATION
- SEND_DATA
- SEND_ERROR
- TP_ENDED
- TP_STARTED

APPC verbs used in mapped conversations that can block are as follows:

- MC_ALLOCATE
- MC_CONFIRM
- MC_CONFIRMED
- MC_DEALLOCATE
- MC_FLUSH
- MC_PREPARE_TO_RECEIVE
- MC_RECEIVE_AND_WAIT
- MC_REQUEST_TO_SEND
- MC_SEND_CONVERSATION

- MC_SEND_DATA
- MC_SEND_ERROR

When using the synchronous or asynchronous versions of a verb, an application can only have one outstanding function in progress on a conversation at a time. An attempt to initiate a second function results in the error code AP_CONV_BUSY.

The exceptions to the preceding paragraph are:

- RECEIVE_AND_POST
- MC_RECEIVE_AND_POST
- RECEIVE_AND_WAIT
- MC_RECEIVE_AND_WAIT

To allow full use of the asynchronous support, asynchronously issued **RECEIVE_AND_WAIT** and **MC_RECEIVE_AND_WAIT** verbs have been altered to act like the **RECEIVE_AND_POST** and **MC_RECEIVE_AND_POST** verbs. Specifically, while an asynchronous version of one of these verbs is outstanding, the following verbs can be issued on the same conversation:

- DEALLOCATE (AP_ABEND_PROG, AP_ABEND_SVC, or AP_ABEND_TIMER)
- GET_ATTRIBUTES or MC_GET_ATTRIBUTES
- GET_TYPE
- REQUEST_TO_SEND or MC_REQUEST_TO_SEND
- SEND_ERROR or MC_SEND_ERROR
- TEST_RTS or MC_TEST_RTS
- TP_ENDED

This allows an application, in particular, a 5250 emulator, to use an asynchronous **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** to receive data. While the **RECEIVE_AND_POST**, **MC_RECEIVE_AND_POST**, **RECEIVE_AND_WAIT**, or **MC_RECEIVE_AND_WAIT** is outstanding, it can still use **SEND_ERROR** or **MC_SEND_ERROR** and **REQUEST_TO_SEND** or **MC_REQUEST_TO_SEND**. It is recommended that you use this feature for full asynchronous support.

When the asynchronous operation is complete, the application's window *hWnd* receives the message returned by **RegisterWindowMessage** with "WinAsyncAPPC" as the input string. The *wParam* argument contains the asynchronous task handle returned by the original function call. The *lParam* argument contains the original VCB pointer and can be dereferenced to determine the final return code.

As part of the Windows APPC definition, WinAPPCCancelAsyncRequest allows an application to cancel any asynchronous APPC action; but terminates the related conversation or TP as appropriate. Any outstanding operations return with AP_CANCELED as the return code.

If the function returns successfully, a **WinAsyncAPPC** message is posted to the application when the operation completes or the conversation is canceled.

WinAsyncAPPCEx

The **WinAsyncAPPCEx** function provides an asynchronous entry point for all of the APPC verbs. Use this function instead of the blocking versions of the verbs to allow multiple sessions to be handled on the same thread using events. This verb is only supported on Microsoft® Windows® 2000 and uses Win32® events.

```
HANDLE WINAPI WinAsyncAPPCEx(
    HANDLE event_handle,
    long lpVcb
);
```

Parameters

event_handle
  Handle used for event notification using Win32 events.
lpVcb
  Pointer to the verb control block.

Return Values

The return value specifies whether the asynchronous resolution request was successful. If the function was successful, the return value is an asynchronous task handle. If the function was not successful, a zero is returned.

When this function returns with a successful value, this does not indicate that the APPC call will ultimately return successfully. It only indicates that it was possible for the APPC library to attempt the APPC call asynchronously using events for notification.

Remarks

This function is intended for use with **WaitForSingleObject** or **WaitForMultipleObjects** in the Win32 API. These functions are described in the "Reference" section of the Microsoft Platform SDK documentation.

For an example of how to use this verb in multithreaded TPs, see the multithreaded send and receive sample TPs (MRCV.C, MSEND.C, and MSENDRCV.C located in the MSENDRCV folder) included in the SDK.

APPC verbs used in basic conversations that can block are as follows:

- ALLOCATE
- CONFIRM
- CONFIRMED
- DEALLOCATE
- FLUSH
- PREPARE_TO_RECEIVE
- RECEIVE_ALLOCATE
- RECEIVE_AND_WAIT
- REQUEST_TO_SEND
- SEND_CONVERSATION
- SEND_DATA
- SEND_ERROR
- TP_ENDED
- TP_STARTED

APPC verbs used in mapped conversations that can block are as follows:

- MC_ALLOCATE
- MC_CONFIRM
- MC_CONFIRMED
- MC_DEALLOCATE
- MC_FLUSH
- MC_PREPARE_TO_RECEIVE
- MC_RECEIVE_AND_WAIT
- MC_REQUEST_TO_SEND

- MC_SEND_CONVERSATION
- MC_SEND_DATA
- MC_SEND_ERROR
- RECEIVE_ALLOCATE
- TP_ENDED
- TP_STARTED

When using the synchronous or asynchronous versions of a verb, an application can only have one outstanding function in progress on a conversation at a time. An attempt to initiate a second function results in the error code AP_CONV_BUSY.

> **Note** The exceptions to the preceding paragraph are RECEIVE_AND_POST, MC_RECEIVE_AND_POST, RECEIVE_AND_WAIT, and MC_RECEIVE_AND_WAIT.
>
> To allow full use of the asynchronous support, asynchronously issued **RECEIVE_AND_WAIT** and **MC_RECEIVE_AND_WAIT** verbs have been altered to act like the **RECEIVE_AND_POST** and **MC_RECEIVE_AND_POST** verbs. Specifically, while an asynchronous version of one of these verbs is outstanding, the following verbs can be issued on the same conversation:

- DEALLOCATE (AP_ABEND_PROG, AP_ABEND_SVC, or AP_ABEND_TIMER)
- GET_ATTRIBUTES or MC_GET_ATTRIBUTES
- GET_TYPE
- REQUEST_TO_SEND or MC_REQUEST_TO_SEND
- SEND_ERROR or MC_SEND_ERROR
- TEST_RTS or MC_TEST_RTS
- TP_ENDED

> This allows an application, in particular, a server application, to use an asynchronous **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** to receive data. While the **RECEIVE_AND_POST**, **MC_RECEIVE_AND_POST**, **RECEIVE_AND_WAIT**, or **MC_RECEIVE_AND_WAIT** is outstanding, it can still use **SEND_ERROR** or **MC_SEND_ERROR** and **REQUEST_TO_SEND** or **MC_REQUEST_TO_SEND**. It is recommended that you use this feature for full asynchronous support, and in particular, for support of multiple conversations on the same thread.

When the asynchronous operation is complete, the application is notified through the signaling of the event. Upon signaling of the event, examine the APPC primary return code and secondary return code in the verb control block for any error conditions.

WinAsyncAPPCIOCP

The **WinAsyncAPPCIOCP** function provides an asynchronous entry point for all of the APPC verbs. Use this function instead of the blocking versions of the verbs to allow multiple sessions to be handled on the same thread using I/O completion ports. This verb is only supported on Microsoft® Windows® 2000, and uses Win32® I/O completion ports.

```
HANDLE WINAPI WinAsyncAPPCIOCP(
    APPC_IOCP_INFO *iocp_handle,
    long lpVcb
);
```

Parameters

iocp_handle
A pointer to an **APPC_IOCP_INFO** structure used for passing I/O completion port information.
lpVcb
Pointer to the verb control block

The **APPC_IOCP_INFO** structure has the following prototype:

```
typedef struct {
    HANDLE APPC_CompletionPort;
    DWORD APPC_NumberOfBytesTransferred;
    DWORD APPC_CompletionKey;
    LPOVERLAPPED APPC_pOverlapped;
} APPC_IOCP_INFO;
```

APPC_CompletionPort

This supplied parameter is the HANDLE returned by the call to the **CreateIoCompletionPort** function when the I/O completion port is created. The I/O completion port must be created before calling the **WinAsyncAPPCIOCP** function. When the verb completes, the APPC Library calls the **PostQueuedCompletionStatus** function with the remaining fields in the structure as inputs, and these fields are simply passed through to the **GetQueuedCompletionStatus** function issued by the application.

APPC_NumberOfBytesTransferred

This supplied parameter is ignored. When the APPC verb completes, the APPC Library calls the **PostQueuedCompletionStatus** function with this field as an input, and the value returned for the *dwNumberOfBytesTransferred* is simply passed through to the **GetQueuedCompletionStatus** function issued by the application.

APPC_CompletionKey

This supplied parameter is ignored. When the APPC verb completes, the APPC Library calls the **PostQueuedCompletionStatus** function with this field as an input, and the value returned for the *dwCompletionKey* is simply passed through to the **GetQueuedCompletionStatus** function issued by the application.

APPC_pOverlapped

This supplied parameter is ignored. When the APPC verb completes, the APPC Library calls the **PostQueuedCompletionStatus** function with this field as an input, and the value returned for the *lpOverlapped* is simply passed through to the **GetQueuedCompletionStatus** function issued by the application.

Return Values

The return value specifies whether the asynchronous resolution request was successful. If the function was successful, the return value is an asynchronous task handle. If the function was not successful, a zero is returned.

When this function returns with a successful value, this does not indicate that the APPC call will ultimately return successfully. It only indicates that it was possible for the APPC library to attempt the APPC call asynchronously using an I/O completion port for notification.

Remarks

This function is intended for use with **CreateIoCompletionPort** and **GetQueuedCompletionStatus** in the Win32 API. These functions are described in the "Reference" section of the Microsoft Platform SDK documentation.

For an example of how to use this verb in multithreaded TPs, see the multithreaded receive sample TP (MRCVIO located in the SNA\MSENDRCV folder) using I/O completion ports included in the Microsoft Host Integration Server 2004 SDK.

APPC verbs used in basic conversations that can block are as follows:

- ALLOCATE
- CONFIRM
- CONFIRMED
- DEALLOCATE
- FLUSH
- PREPARE_TO_RECEIVE
- RECEIVE_ALLOCATE
- RECEIVE_AND_WAIT
- REQUEST_TO_SEND
- SEND_CONVERSATION
- SEND_DATA
- SEND_ERROR
- TP_ENDED
- TP_STARTED

APPC verbs used in mapped conversations that can block are as follows:

- MC_ALLOCATE
- MC_CONFIRM
- MC_CONFIRMED
- MC_DEALLOCATE
- MC_FLUSH
- MC_PREPARE_TO_RECEIVE
- MC_RECEIVE_AND_WAIT
- MC_REQUEST_TO_SEND
- MC_SEND_CONVERSATION
- MC_SEND_DATA
- MC_SEND_ERROR
- RECEIVE_ALLOCATE
- TP_ENDED
- TP_STARTED

When using the synchronous or asynchronous versions of a verb, an application can only have one outstanding function in progress on a conversation at a time. An attempt to initiate a second function results in the error code AP_CONV_BUSY.

The exceptions to the preceding paragraph are RECEIVE_AND_POST, MC_RECEIVE_AND_POST, RECEIVE_AND_WAIT, and MC_RECEIVE_AND_WAIT.

To allow full use of the asynchronous support, asynchronously issued **RECEIVE_AND_WAIT** and **MC_RECEIVE_AND_WAIT** verbs have been altered to act like the **RECEIVE_AND_POST** and **MC_RECEIVE_AND_POST** verbs. Specifically, while an asynchronous version of one of these verbs is outstanding, the following verbs can be issued on the same conversation:

- DEALLOCATE (AP_ABEND_PROG, AP_ABEND_SVC, or AP_ABEND_TIMER)
- GET_ATTRIBUTES or MC_GET_ATTRIBUTES
- GET_TYPE
- REQUEST_TO_SEND or MC_REQUEST_TO_SEND
- SEND_ERROR or MC_SEND_ERROR
- TEST_RTS or MC_TEST_RTS
- TP_ENDED

This allows an application, in particular, a server application, to use an asynchronous **RECEIVE_AND_WAIT** or **MC_RECEIVE_AND_WAIT** to receive data. While the **RECEIVE_AND_POST**, **MC_RECEIVE_AND_POST**, **RECEIVE_AND_WAIT**, or **MC_RECEIVE_AND_WAIT** is outstanding, it can still use **SEND_ERROR** or **MC_SEND_ERROR** and **REQUEST_TO_SEND** or

MC_REQUEST_TO_SEND. It is recommended that you use this feature for full asynchronous support, and in particular, for support of multiple conversations on the same thread.

When the asynchronous operation is complete, the application is notified through the **GetQueuedCompletionStatus** function. Upon I/O completion, examine the APPC primary return code and secondary return code in the verb control block for any error conditions.

WinAPPCCancelAsyncRequest

The **WinAPPCCancelAsyncRequest** function cancels an outstanding WinAsyncAPPC-based request.

```
int WINAPI WinAPPCCancelAsyncRequest(
    HANDLE hAsyncTaskID
);
```

Parameters

hAsyncTaskID
Supplied parameter. Specifies the asynchronous task to be canceled.

Return Values

The return value specifies whether the asynchronous request was canceled. If the value is zero, the request was canceled. Otherwise, the value is one of the following:

WAPPCINVALID
An error code indicating that the specified asynchronous task identifier was invalid.
WAPPCALREADY
An error code indicating that the asynchronous routine being canceled has already completed.

Remarks

An asynchronous task previously initiated by issuing one of the **WinAsyncAPPC**, **WinAsyncAPPCEx**, or **WinAsyncAPPCIOCP** functions can be canceled prior to completion by issuing the **WinAPPCCancelAsyncRequest** function, specifying the asynchronous task identifier as returned by the initial function in *hAsyncTaskID*.

If the outstanding verb relates to a conversation (for example, SEND_DATA or RECEIVE_AND_WAIT), the verb is purged and the session is closed. If the verb relates to a TP (for example, RECEIVE_ALLOCATE or TP_STARTED), the TP is ended. In both cases, while the implementation closes conversations and sessions as cleanly as possible, it does not flush send buffers, wait for confirmations, and so on. This call is synchronous, and after the processing described above is complete, a completion message is posted for the canceled verb.

If an attempt to cancel an existing asynchronous **WinAsyncAPPC** routine fails with an error code of WAPPCALREADY, one of two things has occurred. Either the original routine has already completed and the application has dealt with the resulting message, or the original routine has already completed and the resulting message is still waiting in the application window queue.

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WinAPPCCancelBlockingCall

The **WinAPPCCancelBlockingCall** function cancels any outstanding blocking operation for its thread. Any outstanding blocked call canceled will cause an error code of WAPPCCANCEL to be generated.

```
BOOL WINAPI WinAPPCCancelBlockingCall(void);
```

Return Values

The return value specifies whether the cancellation request was successful. If the value is zero, the request was canceled. Otherwise, the value is the following:

WAPPCINVALID
An error code indicating that there is no outstanding blocking call.

Remarks

If the outstanding verb relates to a conversation (for example, SEND_DATA or RECEIVE_AND_WAIT), the verb is purged and the session is closed. If the verb relates to a TP (for example, RECEIVE_ALLOCATE or TP_STARTED), the TP is ended. In both cases, while the implementation brings down conversations and sessions as cleanly as possible, it does not flush send buffers, wait for confirmations, and so on. This call is synchronous and after the processing described above is complete, the function is finished.

In Microsoft® Windows® 2000, a multithreaded application can have multiple blocking operations outstanding, but only one per thread. To distinguish between multiple outstanding calls, **WinAPPCCancelBlockingCall** cancels the outstanding operation on the current, or calling, application thread if one exists; otherwise, it fails. By default in Windows 2000, Windows APPC suspends the calling application thread while an operation is outstanding. As a result, the thread on which the blocking operation was initiated will not regain control (and therefore, will not be able to issue a call to **WinAPPCCancelBlockingCall**) unless a blocking hook is registered for the thread using WinAPPCSetBlockingHook.

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WinAPPCCleanup

The **WinAPPCCleanup** function terminates and deregisters an application from a Windows APPC implementation.

```
BOOL WINAPI WinAPPCCleanup(void);
```

Return Values

The return value specifies whether the deregistration was successful. If the value is nonzero, the application was successfully deregistered. The application was not deregistered if a value of zero is returned.

Remarks

Use **WinAPPCCleanup** to indicate deregistration of a Windows APPC application from a Windows APPC implementation.

Conversations that are still active will be terminated and TPs ended. This function is equivalent to issuing TP_ENDED (HARD) on all TPs owned by the application.

See Also

WinAPPCStartup

WinAPPCIsBlocking

The **WinAPPCIsBlocking** function determines if a thread is executing while waiting for a previous blocking call to finish.

```
BOOL WINAPI WinAPPCIsBlocking(void);
```

Return Values

The return value specifies the outcome of the function. If the value is nonzero, there is an outstanding blocking call awaiting completion. A zero indicates the absence of an outstanding blocking call.

Remarks

Although a call issued on a blocking function appears to an application as though it blocks, the Windows APPC DLL has to relinquish the processor to allow other applications to run. This means that it is possible for the application that issued the blocking call to be re-entered, depending on the message(s) it receives. In this instance, the **WinAPPCIsBlocking** call can be used to determine whether the application task currently has been re-entered while waiting for an outstanding blocking call to finish. Note that Windows APPC prohibits more than one outstanding blocking call per thread.

The Windows APPC DLL prohibits more than one blocking call per thread and returns AP_THREAD_BLOCKING if this occurs.

See Also

WinAPPCSetBlockingHook

WinAPPCUnhookBlockingHook

WinAPPCCancelBlockingCall

WinAPPCStartup

The **WinAPPCStartup** function allows an application to specify the version of Windows APPC required and to retrieve details of the specific Windows APPC implementation. An application must call this function to register itself with a Windows APPC implementation before issuing any further Windows APPC calls.

```
int WINAPI WinAPPCStartup(
    WORD wVersionRequired,
    LPWAPPCDATA lpAPPCData
);

typedef struct {
    WORD wVersion;
    char szDescription[WAPPCDESCRIPTION_LEN+1];
} WAPPCDATA, FAR * LPWAPPCDATA;

where WAPPCDESCRIPTION_LEN is defined as 127
```

Parameters

wVersionRequired
Specifies the version of Windows APPC support required. The high-order byte specifies the minor version (revision) number; the low-order byte specifies the major version number. The current version of the Windows APPC API is 1.0.

lpAPPCData
Pointer to a returned structure containing a Windows APPC version number and a description of the Windows APPC implementation.

Return Values

The return value specifies whether the application was registered successfully and whether the Windows APPC implementation can support the specified version number. If the value is zero, it was registered successfully and the specified version can be supported. Otherwise, the return value is one of the following:

WAPPCSYSNOTREADY
The underlying network subsystem is not ready for network communication.

WAPPCVERNOTSUPPORTED
The version of Windows APPC support requested is not provided by this particular Windows APPC implementation.

WAPPCINVALID
The Windows APPC version specified by the application is not supported by this DLL.

Remarks

To support future Windows APPC implementations and applications that may have functionality differences from Windows APPC version 1.0, a negotiation takes place in **WinAPPCStartup**. An application passes to **WinAPPCStartup** the Windows APPC version that it can use. If this version is lower than the lowest version supported by the Windows APPC DLL, the DLL cannot support the application and **WinAPPCStartup** fails. If the version is not lower, however, the call succeeds and returns the highest version of Windows APPC supported by the DLL. If this version is lower than the lowest version supported by the application, the application either fails its initialization or attempts to find another Windows APPC DLL on the system.

This negotiation allows both a Windows APPC DLL and a Windows APPC application to support a range of Windows APPC versions. An application can successfully use a DLL if there is any overlap in the versions. The following table illustrates how **WinAPPCStartup** works in conjunction with different application and DLL versions.

Application versions	DLL versions	To WinAPPCStartup	From WinAPPCStartup	Result
1.0	1.0	1.0	1.0	Use 1.0
1.0, 2.0	1.0	2.0	1.0	Use 1.0
1.0	1.0, 2.0	1.0	2.0	Use 1.0
1.0	2.0, 3.0	1.0	WAPPCINVALID	Fail
2.0, 3.0	1.0	3.0	1.0	App Fails
1.0, 2.0, 3.0	1.0, 2.0, 3.0	3.0	3.0	Use 3.0

Details of the actual Windows APPC implementation are described in the **WAPPCDATA** structure defined as follows that is returned by **WinAPPCStartup**:

```
typedef struct tagWAPPCDDATA { WORD wVersion;
char szDescription[WAPPCDESCRIPTION_LEN+1];
} WAPPCDATA, FAR *LPWAPPCDATA;
```

The structure members are as follows:

wVersion
The highest APPC version number supported by the Windows APPC DLL.
szDescription
A descriptive string describing the WinAPPC implementation.

After it makes its last Windows APPC call, an application should call the WinAPPCCleanup routine.

Each Windows APPC implementation must make a **WinAPPCStartup** call before issuing any other Windows APPC calls.

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WinAPPCSetBlockingHook

The **WinAPPCSetBlockingHook** function allows a Windows APPC implementation to block APPC function calls by means of a new function. By default in Microsoft Windows 2000, blocking calls suspend the calling application's thread until the request is finished.

```
FARPROC WINAPI WinAPPCSetBlockingHook (
    FARPROC lpBlockFunc
);
```

Parameters

lpBlockFunc
Specifies the procedure instance address of the blocking function to be installed.

Return Values

The return value points to the procedure instance of the previously installed blocking function. The application or library that calls **WinAPPCSetBlockingHook** should save this return value so that it can be restored if needed. (If nesting is not important, the application can simply discard the value returned by **WinAPPCSetBlockingHook** and eventually use WinAPPCUnhookBlockingHook to restore the default mechanism.)

Remarks

A Windows APPC implementation has a default mechanism by which blocking APPC functions are implemented. This function gives the application the ability to execute its own function at blocking time in place of the default function.

The default blocking function is equivalent to:

```
BOOL DefaultBlockingHook (void)  {
    MSG msg;
    /* get the next message if any */
    if ( PeekMessage (&msg,0,0,PM_NOREMOVE)  )  {
        if ( msg.message = = WM_QUIT  )
            return FALSE;   // let app process WM_QUIT
        PeekMessage (&msg,0,0,PM_REMOVE) ;
        TranslateMessage (&msg) ;
        DispatchMessage (&msg) ;
    }
    /* TRUE if no WM_QUIT received */
    return TRUE;
}
```

A blocking function must return FALSE if it receives a WM_QUIT message so Windows APPC can return control to the application to process the message and terminate gracefully. Otherwise, the function should return TRUE.

This function is implemented on a per-thread basis. It provides for a particular thread to replace the blocking mechanism without affecting other threads.

The **WinAPPCSetBlockingHook** function is provided to support those applications that require more complex message processing—for example, those employing the multiple document interface (MDI) model.

See Also

WinAPPCIsBlocking

WinAPPCCancelBlockingCall

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WinAPPCUnhookBlockingHook

The **WinAPPCUnhookBlockingHook** function removes any previous blocking hook that has been installed and reinstalls the default blocking mechanism.

```
BOOL WINAPI WinAPPCUnhookBlockingHook(void);
```

Return Values

The return value specifies the outcome of the function. It is nonzero if the default mechanism is successfully reinstalled. The value is zero if the mechanism did not reinstall.

See Also

WinAPPCSetBlockingHook

Host Integration Server 2004 Enhancements to the Windows Environment

This section describes the extensions to Windows® Advanced Program-to-Program Communications (APPC) and the Common Service Verb (CSV) API that are specific to Microsoft® Host Integration Server 2004.

The GetAppcConfig function takes a local logical unit (LU) and returns the remote LUs that are accessible to the user through that LU. If left blank, and a default local LU has been configured, the user's default local LU will be used. In all instances, if one of the returned remote LUs is the user's default, it is indicated as such.

The call is asynchronous and completion is normally signaled by the posting of a Microsoft Windows message. However, an alternative completion mechanism is provided for console applications.

The GetAppcReturnCode and GetCsvReturnCode functions convert the primary and secondary return codes in the verb control block (VCB) to a printable string. These functions provide a standard set of error strings for use by applications.

For each extension, this section provides a definition of the function, syntax, returns, and remarks for using the function.

This section contains:

- GetAppcConfig
- GetAppcReturnCode
- GetCsvReturnCode

GetAppcConfig

The **GetAppcConfig** function provides an asynchronous entry point for retrieving the remote systems to which a particular local LU can connect.

```
HANDLE WINAPI GetAppcConfig(
    HANDLE hWnd,
    LPSTR pLocalLu,
    LPSTR pMode,
    LPINT pNumRemLu,
    INT iMaxRemLu,
    PSTR pRemLu,
    LPINT pAsyncRetCode
);
```

Parameters

hWnd
Supplied parameter. Contains the handle of the window that is to receive an asynchronous completion message when the call has completed. If non-null, the completion message will be posted to this window handle. In this case, *pAsyncRetCode* (the last parameter) must be null. Asynchronous message completion is the recommended approach for Windows applications to use this function.

pLocalLu
Supplied parameter. Specifies the address of a buffer containing the local LU name for which information is returned. This local LU name must be specified as follows:

- Nonpadded
- Null-terminated
- ASCII string
- Maximum length of eight bytes (excluding the terminator)

To request that the user's default local LU be used, the buffer should contain eight spaces followed by a null.

pMode
Supplied parameter. Specifies the address of a buffer containing the mode name for which information is returned. In Microsoft Host Integration Server, this parameter is not used, but for compatibility with earlier versions of SNA Server a mode name must be specified as follows:

- Nonpadded
- Null-terminated
- ASCII string
- Maximum length of eight bytes (excluding the terminator)

pNumRemLu
Supplied parameter. Specifies the address of an integer variable that when the function completes will contain the number of remote LUs that would have been returned, had the buffer specified by *pRemLu* been large enough to accommodate all of the remote LUs.

iMaxRemLu
Supplied parameter. Specifies the number of remote LU names that can be held by the buffer indicated by *pRemLu*.

pRemLu
Supplied parameter. Specifies the address of the buffer that will hold the remote LU names after the function completes. The information will be returned as an array of strings. Each remote LU name will be stored in the buffer as follows:

- Nonpadded
- Null-terminated
- ASCII string
- Maximum length of eight bytes (excluding the terminator)

The strings start every nine bytes in the buffer, and thus (*pRemLu* + (*i*–1)*9) gives the start of the *i*th string. In the case where the buffer is too small to hold all the names, only *iMaxRemLu* strings will be returned.

pAsyncRetCode

Supplied parameter. Specifies the address of an integer variable used to store the return code from this function, if the supplied address is non-null. The return codes will be the same as those returned by an asynchronous completion message. While the call is completing, the value of this variable will be APPC_CFG_PENDING. When this asynchronous call is completed, the value of this variable will contain some return code other than APPC_CFG_PENDING.

This variable is used by polling for completion when asynchronous message completion to a window handle is not used.

Note that if *pAsyncRetCode* is used, *hWnd* must be null.

Return Values

The meaning of the immediate return value depends on whether or not the asynchronous request was accepted. To test for acceptance, evaluate the expression:

(<*Returned Handle*> & APPC_CFG_SUCCESS)

If the expression is FALSE, the request was rejected. The return value is then one of the synchronous return codes in the following list. If the expression is TRUE, the request was accepted, and one of the following cases will apply.

- If *hWnd* was non-null, a completion message will arrive in the following form:

Message parameter	Description
hWnd	The handle of the target window. This value is the same as the value passed in *hWnd* on the initial call.
uMsg	Matches the number returned by a call to **RegisterWindowMessage**, with WinAppcCfg used as the identifying string. This string is available by the **#define WIN_APPC_CFG_COMPLETION_MSG**.
wParam	Matches the *HANDLE* returned from the initial call. It is used as a correlator.
lParam	Contains one of the asynchronous return codes in the following list.

- If *pAsyncRetCode* was non-null, then the specified integer variable will be set to APPC_CFG_PENDING. After this function completes asynchronously, its value will change to one of the asynchronous return codes listed below.

Synchronous Return Codes

APPC_CFG_ERROR_NO_APPC_INIT
The Windows APPC library needs to be initialized by a call to WinAPPCStartup before calling **GetAppcConfig** and this has not been done.

APPC_CFG_ERROR_INVALID_HWND
The handle passed in *hWnd* was non-null, yet not a valid window handle.

APPC_CFG_ERROR_BAD_POINTER
The *hWnd* parameter was null, indicating that completion was signaled by setting the integer variable pointed to by *pAsyncRetCode*, but *pAsyncRetCode* was not a valid pointer.

APPC_CFG_ERROR_UNCLEAR_COMPLETION_MODE
Both *hWnd* and *pAsyncCompletion* were non-null, so **GetAppcConfig** was unable to decide how completion should be signaled.

APPC_CFG_ERROR_TOO_MANY_REQUESTS
Too many **GetAppcConfig** calls are already being processed (currently, this indicates 16 requests are outstanding). Try the call again after a delay. For the Microsoft Windows version 3.*x* system, you must yield during this period.

APPC_CFG_ERROR_GENERAL_FAILURE
An unexpected error occurred, probably of a system nature.

Asynchronous Return Codes

APPC_CFG_SUCCESS_NO_DEFAULT_REMOTE
The configuration information has been retrieved, and either no default remote LU was defined or it was not accessible by the specified local LU.

APPC_CFG_SUCCESS_DEFAULT_REMOTE
The configuration information has been retrieved, and there is a default remote LU that is accessible by the specified local LU.

APPC_CFG_ERROR_NO_DEFAULT_LOCAL_LU
An attempt was made to retrieve remote LUs partnered with the default local LU, but no default local LU was configured.

APPC_CFG_ERROR_BAD_LOCAL_LU
The local LU specified is either not configured, or is not valid for the calling verb.

APPC_CFG_ERROR_GENERAL_FAILURE
An unexpected error occurred, probably of a system nature.

Remarks

WinAPPCStartup must be called before using **GetAppcConfig**.

Whether an error code represents success or failure can be determined by evaluating either (*RetCode&* APPC_CFG_SUCCESS) to test for success or (*RetCode&* APPC_CFG_FAILURE) to test for failure.

The following code fragment shows how a console application can test completion:

```
while (*pAsyncRetCode == APPC_CFG_PENDING)
{
    sleep(250);
}
```

GetAppcReturnCode

The **GetAppcReturnCode** function converts the primary and secondary return codes in the verb control block to a printable string. This function provides a standard set of error strings for use by APPC applications such as 5250 emulators.

```
int WINAPI GetAppcReturnCode(
    struct appc_hdr FAR * vpb,
    UINT buffer_length,
    unsigned char FAR * buffer_addr
);
```

Parameters

vpb
Supplied parameter. Specifies the address of the verb control block.

buffer_length
Supplied parameter. Specifies the length of the buffer pointed to by *buffer_addr*. The recommended length is 256.

buffer_addr
Supplied parameter. Specifies the address of the buffer that will hold the formatted, null-terminated string.

Return Values

The **GetAppcReturnCode** function returns a positive value on success that indicates the length of the error string passed back in *buffer_addr*.

A return value of zero indicates an error. On Microsoft® Windows® 2000 a call to **GetLastError** provides the actual error return code as follows:

0x20000001
The parameters are invalid; the function could not read from the specified verb control block or could not write to the specified buffer.

0x20000002
The specified buffer is too small.

0x20000003
The APPC string library APPCST32.DLL could not be loaded.

Remarks

The descriptive error string returned in *buffer_addr* does not terminate with a new line character (**\n**).

The descriptive error strings are contained in APPCST32.DLL and can be customized for different languages.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

GetCsvReturnCode

The **GetCsvReturnCode** function converts the primary and secondary return codes in the verb control block to a printable string. This function provides a standard set of error strings for use by applications using common service verbs (CSVs).

```
int WINAPI GetCsvReturnCode(
    struct csv_hdr FAR * vpb,
    UINT buffer_length,
    unsigned char FAR * buffer_addr
);
```

Parameters

vpb
Supplied parameter. Specifies the address of the verb control block.

buffer_length
Supplied parameter. Specifies the length of the buffer pointed to by *buffer_addr*. The recommended length is 256.

buffer_addr
Supplied parameter. Specifies the address of the buffer that will hold the formatted, null-terminated string when the function completes.

Return Values

The **GetCsvReturnCode** function returns a positive value on success that indicates the length of the error string passed back in *buffer_addr*.

A return value of zero indicates an error. On Microsoft® Windows® 2000 a call to **GetLastError** provides the actual error return code as follows:

0x20000001
The parameters are invalid; the function could not read from the specified verb parameter block or could not write to the specified buffer.

0x20000002
The specified buffer is too small.

0x20000003
The CSV string library CSVST32.DLL could not be loaded.

Remarks

The descriptive error string returned in *buffer_addr* does not terminate with a newline character (**\n**).

The descriptive error strings are contained in CSVST32.DLL and can be customized for different languages.

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Common Service Verbs

This section describes each of the common service verbs (CSVs) and provides:

- A definition of the verb.
- The structure that defines the verb control block (VCB) used by the verb. The structure is declared in the WINCSV.H file.
- The parameters (VCB fields) supplied to and returned by the verb. A description of each parameter is provided, along with its possible values and other information.
- Additional information describing the use of the verb.

Most parameters supplied to and returned by CSVs are hexadecimal values. To simplify coding, these values are represented by meaningful symbolic constants, which are established by **#define** statements in the header file WINCSV.H. For example, the **opcode** (operation code) parameter for CONVERT is the hexadecimal value represented by the symbolic constant SV_CONVERT. Use only the symbolic constants when programming CSVs.

This section contains:

- CONVERT
- COPY_TRACE_TO_FILE
- DEFINE_TRACE
- GET_CP_CONVERT_TABLE
- LOG_MESSAGE
- TRANSFER_MS_DATA

CONVERT

The **CONVERT** verb translates an ASCII character string to EBCDIC or an EBCDIC character string to ASCII. The string to be converted is called the source string. The converted string is called the target string.

The following structure describes the verb control block (VCB) used by the **CONVERT** verb.

```
struct convert {
    unsigned short       opcode;
    unsigned char        opext;
    unsigned char        reserv2;
    unsigned short       primary_rc;
    unsigned long        secondary_rc;
    unsigned char        direction;
    unsigned char        char_set;
    unsigned short       len;
    unsigned char FAR *  source;
    unsigned char FAR *  target;
};
```

Members

opcode
Supplied parameter. The verb identifying the operation code, SV_CONVERT.
opext
A reserved field.
reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
direction
Supplied parameter. Specifies the direction of the conversion. To convert from ASCII to EBCDIC, use SV_ASCII_TO_EBCDIC. To convert from EBCDIC to ASCII, use SV_EBCDIC_TO_ASCII.
char_set
Supplied parameter. Specifies the character set to use in converting the source string. Allowed values include SV_A (type A character set), SV_AE (type AE character set), and SV_G (user-defined type G character set).
len
Supplied parameter. Specifies the number of characters to be converted.

This length plus the offset from the beginning of the source or target buffer must not exceed the segment boundary.

source
Supplied parameter. Specifies the address of the buffer containing the character string to be converted.
target
Supplied parameter. Specifies the address of the buffer to contain the converted character string.

This buffer can overlap or coincide with the buffer pointed to by the **source** parameter. In this case, the converted data string overwrites the source data string.

Return Codes

SV_OK
Primary return code; the verb executed successfully.
SV_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

SV_CONVERSION_ERROR

Secondary return code; one or more characters in the source string were not found in the conversion table. These characters were converted to nulls (0x00). The verb still executed.

SV_INVALID_CHARACTER_SET

Secondary return code; the **char_set** parameter contained an invalid value.

SV_INVALID_DATA_SEGMENT

Secondary return code; the data buffer containing the source or target string did not fit in one segment, or the target segment was not a read/write segment.

SV_INVALID_DIRECTION

Secondary return code; the direction contained an invalid value.

SV_INVALID_FIRST_CHARACTER

Secondary return code; the first character of a type A source string was invalid.

SV_TABLE_ERROR

Secondary return code; one of the following occurred:

- The file containing the user-written type G conversion table was not specified by the environment variable CSVTBLG.
- The table was not in the correct format.
- The file specified by the CSVTBLG variable was not found.

SV_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

SV_INVALID_VERB
Primary return code; the **opcode** parameter did not match the operation code of any verb. No verb executed.

SV_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

SV_UNEXPECTED_DOS_ERROR
Primary return code; one of the following conditions occurred:

- The Microsoft® Windows® 2000 system encountered an error while processing the verb. The operating system return code was returned through the secondary return code. If the problem persists, contact the system administrator for corrective action.
- A CSV was issued from a message loop that was invoked by another application issuing a Windows **SendMessage** function call, rather than the more common Windows **PostMessage** function call. Verb processing cannot take place.
- A CSV was issued when **SendMessage** invoked your application. You can determine whether your application has been invoked with **SendMessage** by using the **InSendMessage** Windows API function call.

Remarks

The type A character set consists of:

- Uppercase letters.
- Numerals 0 through 9.
- Special characters $, #, @, and space.

This character set is supported by a system-supplied type A conversion table.

The first character of the source string must be an uppercase letter or the special character $, #, or @. Spaces are allowed only in trailing positions. Lowercase ASCII letters are translated to uppercase EBCDIC letters when the direction is ASCII to EBCDIC.

The type AE character set consists of:

- Uppercase letters.
- Lowercase letters.
- Numerals 0 through 9.
- Special characters $, #, @, period, and space.

This character set is supported by a system-supplied type AE conversion table.

The first character of the source string can be any character in the character set, except the space. Spaces are allowed only in trailing positions.

During conversion, embedded blanks (including blanks in the first position) are converted to 0x00. Although such a conversion will complete, CONVERSION_ERROR is returned as the secondary return code, indicating that the CSV library has completed an irreversible conversion on the supplied data.

For Windows 2000 a description of COMTBLG should point to the Windows 2000 registry under **\SnaBase\Parameters\Client**.

The data for a type G conversion table must be an ASCII file 32 lines long. Each line must consist of 32 hexadecimal digits, representing 16 characters, and be terminated by a carriage return and line feed. The first 16 lines (256 characters) specify the EBCDIC characters to which ASCII characters are converted; the remaining 16 lines specify the ASCII characters to which EBCDIC characters are converted.

The hexadecimal digits A through F can be either uppercase or lowercase. However, you may want to make these digits uppercase to ensure compatibility with IBM ES for OS/2 version 1.0.

> **Note** You can use GET_CP_CONVERT_TABLE to build a type G user-written conversion table in memory, and then store the table in a file.

COPY_TRACE_TO_FILE

The **COPY_TRACE_TO_FILE** verb concatenates individual API/link service trace files to form a single file.

The following structure describes the verb control block (VCB) used by the **COPY_TRACE_TO_FILE** verb.

```
struct copy_trace_to_file {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       reserv3[8];
    unsigned char       file_name[64];
    unsigned char       file_option;
    unsigned char       reserv4[12];
};
```

Members

opcode
Supplied parameter. The verb identifying the operation code, SV_COPY_TRACE_TO_FILE.
opext
A reserved field.
reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
reserv3
A reserved field.
file_name
Supplied parameter. Specifies the name of the file to which trace data is to be copied. This parameter is a 64-byte character string, and it can include a path. If the name is fewer than 64 bytes, use spaces to pad it on the right.
file_option
Supplied parameter. Specifies the output file copy option:

- Use SV_NEW to copy the trace only if the specified file does not already exist.
- Use SV_OVERWRITE to copy the trace to an existing file, overwriting the current data. The size of the file is increased if necessary; and the file is created if it does not already exist.

reserv4
The address at which supplied data resides.

Return Codes

SV_OK
Primary return code; the verb executed successfully.
SV_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

SV_INVALID_FILE_OPTION

Secondary return code; a value other than SV_NEW or SV_OVERWRITE was specified for **file_option**.

SV_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

SV_COPY_TRACE_IN_PROGRESS

Secondary return code; a previously issued **COPY_TRACE_TO_FILE** verb is still in progress.

SV_TRACE_FILE_EMPTY

Secondary return code; there is no data in the trace files.

SV_TRACE_NOT_STOPPED

Secondary return code; a trace was in progress when the verb was issued.

SV_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
SV_FILE_ALREADY_EXISTS
Primary return code; when the SV_NEW file option was used, the file name specified was the name of an existing file.
SV_INVALID_VERB
Primary return code; the **opcode** parameter did not match the operation code of any verb. No verb executed.
SV_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
SV_OUTPUT_DEVICE_FULL
Primary return code; there is insufficient space on the device where the output file resides. Retry the operation after freeing additional disk space.
SV_UNEXPECTED_DOS_ERROR
Primary return code; one of the following conditions occurred:

- The Microsoft® Windows® 2000 system encountered an error while processing the verb. The operating system return code was returned through the secondary return code. If the problem persists, contact the system administrator for corrective action.
- A CSV was issued from a message loop that was invoked by another application issuing a Windows **SendMessage** function call, rather than the more common Windows **PostMessage** function call. Verb processing cannot take place.
- A CSV was issued when **SendMessage** invoked your application. You can determine whether your application has been invoked with **SendMessage** by using the **InSendMessage** Windows API function call.

Remarks

There are two API/link-service trace files. The files are used alternately; tracing switches from one file to the other when one file is full (larger than 250K). When **COPY_TRACE_TO_FILE** is called, these trace files are concatenated and copied to a single file, the name of which is specified as a parameter to the call.

API/link-service tracing is stopped before issuing the verb, and restarted after the copy is complete. The trace files are reset when this verb is successfully completed.

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DEFINE_TRACE

The **DEFINE_TRACE** verb enables or disables tracing for specified APIs and controls the amount of tracing.

The following structure describes the verb control block (VCB) used by the **DEFINE_TRACE** verb.

```
struct define_trace {
    unsigned short      opcode;
    unsigned char       opext;
    unsigned char       reserv2;
    unsigned short      primary_rc;
    unsigned long       secondary_rc;
    unsigned char       reserv3[8];
    unsigned char       dt_set;
    unsigned char       appc;
    unsigned char       reserv4;
    unsigned char       srpi;
    unsigned char       sdlc;
    unsigned char       tkn_rng_dlc;
    unsigned char       pcnet_dlc;
    unsigned char       dft;
    unsigned char       acdi;
    unsigned char       reserv5;
    unsigned char       ehllapi;
    unsigned char       x25_api;
    unsigned char       x25_dlc;
    unsigned char       twinax;
    unsigned char       reserv6;
    unsigned char       lua_api;
    unsigned char       etherand;
    unsigned char       subsym;
    unsigned char       reserv7[8];
    unsigned char       reset_trc;
    unsigned short      trunc;
    unsigned short      strg_size;
    unsigned char       reserv8;
    unsigned char       phys_link[8];
    unsigned char       reserv9[56];
};
```

Members

opcode
Supplied parameter. The verb identifying the operation code, SV_DEFINE_TRACE.

opext
A reserved field.

reserv2
A reserved field.

primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.

reserv3
A reserved field.

dt_set
Supplied parameter. Sets the trace state.

- Use SV_ON to enable tracing for a particular API if the parameter pertaining to the API (such as **appc** or **comm_serv**) is set to SV_CHANGE.
- Use SV_OFF to disable tracing for a particular API if the parameter pertaining to the API is set to SV_CHANGE.

appc

Supplied parameter. Indicates whether tracing of APPC is desired.

- Use SV_CHANGE to enable or disable tracing for APPC, depending on the **dt_set** parameter.
- Use SV_IGNORE to leave tracing in its current state for APPC.

The allowed values turn bit 0 on or off; bits 1 through 7 are reserved.

reserv4
A reserved field.
srpi
Supplied parameter. Indicates whether tracing of SRPI is desired.

- Use SV_CHANGE to enable or disable tracing for APPC, depending on the **dt_set** parameter.
- Use SV_IGNORE to leave tracing in its current state for APPC.

sdlc
A reserved field.
tkn_rng_dlc
A reserved field.
pcnet_dlc
A reserved field.
dft
A reserved field.
acdi
A reserved field.
reserv5
A reserved field.
comm_serv
Supplied parameter. Indicates whether tracing of COMM_SERV_API is desired.

- Use SV_CHANGE to enable or disable tracing for APPC, depending on the **dt_set** parameter.
- Use SV_IGNORE to leave tracing in its current state for APPC.

ehllapi
A reserved field.
x25_api
A reserved field.
x25_dlc
A reserved field.
twinax
A reserved field.
reserv6
A reserved field.
lua_api
A reserved field.
etherand
A reserved field.
subsym
A reserved field.
reserv7
A reserved field.
reset_trc
Supplied parameter. Indicates whether the trace file pointer should be reset.

- Use SV_NO to not reset the trace file pointer to the start of the trace file. Previous trace records are not overwritten.
- Use SV_YES to reset the trace file pointer to the start of the trace file. Previous trace records are overwritten.

trunc
Supplied parameter. Specifies the maximum number of bytes for each trace record. Excess bytes are truncated. Set this value to zero if you do not want truncation.
strg_size
A reserved field.
reserv8

A reserved field.

phys_link

A reserved field.

reserv9

A reserved field.

Return Codes

SV_OK

Primary return code; the verb executed successfully.

SV_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

SV_INVALID_RESET_TRACE

Secondary return code; the **reset_trc** parameter contained an invalid value.

SV_INVALID_SET

Secondary return code; the **dt_set** parameter contained an invalid value.

SV_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

SV_COPY_TRACE_IN_PROGRESS

Secondary return code; a previously issued COPY_TRACE_TO_FILE is still in progress. Traces cannot be active while using **DEFINE_TRACE**.

SV_COMM_SUBSYSTEM_NOT_LOADED

Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

SV_INVALID_VERB

Primary return code; the **opcode** parameter did not match the operation code of any verb. No verb executed.

SV_INVALID_VERB_SEGMENT

Primary return code; the VCB extended beyond the end of the data segment.

SV_UNEXPECTED_DOS_ERROR

Primary return code; one of the following conditions occurred:

- The Microsoft® Windows® 2000 system encountered an error while processing the verb. The operating system return code was returned through the secondary return code. If the problem persists, contact the system administrator for corrective action.
- A CSV was issued from a message loop that was invoked by another application issuing a Windows **SendMessage** function call, rather than the more common Windows **PostMessage** function call. Verb processing cannot take place.
- A CSV was issued when **SendMessage** invoked your application. You can determine whether your application has been invoked with **SendMessage** by using the **InSendMessage** Windows API function call.

Remarks

For information on how to run and use traces, see the appropriate manual for your product.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

GET_CP_CONVERT_TABLE

The **GET_CP_CONVERT_TABLE** verb creates and returns a 256-byte conversion table to translate character strings from a source code page to a target code page.

The following structure describes the verb control block (VCB) used by the **GET_CP_CONVERT_TABLE** verb.

```
struct get_cp_convert_table {
    unsigned short       opcode;
    unsigned char        opext;
    unsigned char        reserv2;
    unsigned short       primary_rc;
    unsigned long        secondary_rc;
    unsigned char        reserv3[8];
    unsigned short       source_cp;
    unsigned short       target_cp;
    unsigned char FAR *  conv_tbl_addr;
    unsigned char        char_not_fnd;
    unsigned char        substitute_char;
};
```

Members

opcode
Supplied parameter. The verb identifying the operation code, SV_GET_CP_CONVERT_TABLE.
opext
A reserved field.
reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
reserv3
A reserved field.
source_cp
Supplied parameter. Specifies the source code page from which characters are converted. The allowed code pages (decimal values) are as follows:

- ASCII 437, 850, 860, 863, 865
- EBCDIC 037, 273, 277, 278, 280, 284, 285, 297, 500

User-defined code pages in the range from 65280 through 65535 are also allowed.

ASCII code pages are sometimes referred to as PC code pages; EBCDIC code pages are sometimes referred to as host code pages.

target_cp
Supplied parameter. Specifies the target code page to which characters are converted. For allowed code pages, see the preceding definition for **source_cp**.
conv_tbl_addr
Supplied parameter. Specifies the address of the buffer to contain the 256-byte conversion table. The buffer must be in a writable segment and long enough to contain the table.
char_not_fnd
Supplied parameter. Specifies the action to take if a character in the source code page does not exist in the target code page:

- Use SV_ROUND_TRIP to store a unique value in the conversion table for each source code page character.
- Use SV_SUBSTITUTE to store a substitute character (specified by **substitute_char**) in the conversion table.

substitute_char
Supplied parameter. Specifies the character to store in the conversion table when a character from the source code page has no equivalent in the target code page.

Return Codes

SV_OK
 Primary return code; the verb executed successfully.
SV_PARAMETER_CHECK
 Primary return code; the verb did not execute because of a parameter error.

SV_INVALID_CHAR_NOT_FOUND

Secondary return code; the **char_not_fnd** parameter contained an invalid value.

SV_INVALID_DATA_SEGMENT

Secondary return code; the 256-byte area specified for the conversion table extended beyond the segment boundary, or the segment was not writable.

SV_INVALID_SOURCE_CODE_PAGE

Secondary return code; the code page specified by **source_cp** is not supported.

SV_INVALID_TARGET_CODE_PAGE

Secondary return code; the code page specified by **target_cp** is not supported.

SV_COMM_SUBSYSTEM_NOT_LOADED
 Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
SV_INVALID_VERB
 Primary return code; the **opcode** parameter did not match the operation code of any verb. No verb executed.
SV_INVALID_VERB_SEGMENT
 Primary return code; the VCB extended beyond the end of the data segment.
SV_UNEXPECTED_DOS_ERROR
 Primary return code; one of the following conditions occurred:

- The Microsoft® Windows® 2000 system encountered an error while processing the verb. The operating system return code was returned through the secondary return code. If the problem persists, contact the system administrator for corrective action.
- A CSV was issued from a message loop that was invoked by another application issuing a Windows **SendMessage** function call, rather than the more common Windows **PostMessage** function call. Verb processing cannot take place.
- A CSV was issued when **SendMessage** invoked your application. You can determine whether your application has been invoked with **SendMessage** by using the **InSendMessage** Windows API function call.

Remarks

The type A character set consists of:

- Uppercase letters.
- Numerals 0 through 9.
- Special characters $, #, @, and space.

This character set is supported by a system-supplied type A conversion table.

The first character of the source string must be an uppercase letter or the special character $, #, or @. Spaces are allowed only in trailing positions. Lowercase ASCII letters are translated to uppercase EBCDIC letters when the direction is ASCII to EBCDIC.

The type AE character set consists of:

- Uppercase letters.
- Lowercase letters.
- Numerals 0 through 9.
- Special characters $, #, @, period, and space.

This character set is supported by a system-supplied type AE conversion table.

The first character of the source string can be any character in the character set except the space.

During conversion, embedded blanks (including blanks in the first position) are converted to 0x00. Although such a conversion will complete, CONVERSION_ERROR is returned as the secondary return code, indicating that the CSV library has completed an irreversible conversion on the supplied data.

For Windows 2000, a description of COMTBLG should point to the Windows 2000 registry under **\SnaBase\Parameters\Client**. For the OS/2 operating system, the directory and file containing the table must be specified by the environment variable COMTBLG. (If the file is not found, the system returns the SV_TABLE_ERROR parameter check.).

The SV_ROUND_TRIP value for **char_not_fnd** is useful only if you build a second conversion table to convert between the same two code pages in the reverse direction. If you specify the SV_ROUND_TRIP value in building both conversion tables, any character translated from one code page to the other and then back will be unchanged.

When using the SV_SUBSTITUTE value for **char_not_fnd**, converting the translated character string back to the original code page will not necessarily re-create the original character string.

Use **substitute_char** only if **char_not_fnd** is set to SV_SUBSTITUTE.

The value stored in the conversion table is the ASCII value associated with the character. If the table is used for conversion from ASCII to EBCDIC, the character that appears in the converted string is the character associated with the numeric EBCDIC value rather than ASCII.

For example, if you supply the underscore (_) character (ASCII value F6) while creating an ASCII to EBCDIC conversion table, the character that appears in the converted strings will be 6, the character associated with the value F6 in EBCDIC. To use the _ character as the substitute character in an ASCII to EBCDIC conversion table, you should supply the value E1 (the value associated with the _ character in EBCDIC) rather than the actual character.

A code page is a table that associates specific ASCII or EBCDIC values with specific characters. If a character from the source code page does not exist in the target code page, the translated (target) string differs from the original (source) string.

LOG_MESSAGE

For OS/2 only, the **LOG_MESSAGE** verb records a message in the error log file and optionally displays the message on the user's screen. This verb is included for compatibility with existing applications.

The following structure describes the verb control block (VCB) used by the **LOG_MESSAGE** verb.

```
struct log_message {
    unsigned short       opcode;
    unsigned char        opext;
    unsigned char        reserv2;
    unsigned short       primary_rc;
    unsigned long        secondary_rc;
    unsigned short       msg_num;
    unsigned char        origntr_id[8];
    unsigned char        msg_file_name[3];
    unsigned char        msg_act;
    unsigned short       msg_ins_len;
    unsigned char FAR *  msg_ins_ptr;
};
```

Members

opcode
Supplied parameter. The verb identifying the operation code, SV_LOG_MESSAGE.
opext
A reserved field.
reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
msg_num
Supplied parameter. Specifies the number of the message in the message file specified by **msg_file_name**.
origntr_id
Supplied parameter. Specifies the name of the component issuing **LOG_MESSAGE** or an 8-byte, user-supplied string.
msg_file_name
Supplied parameter. Specifies the name of the file containing the message to be logged.
msg_act
Supplied parameter. Specifies the action to be taken when processing the message:

- Use SV_INTRV to log the intervention with a severity level of 12 and display the message on the user's screen. The user must press a key to remove the message from the screen.
- Use SV_NO_INTRV to log the intervention with a severity level of 12 but not display the message.

msg_ins_len
Supplied parameter. Specifies the length of data to be inserted into the message. Set this parameter to zero if no data is to be inserted.
msg_ins_ptr
Supplied parameter. Specifies the address of the data to be inserted into the message.

Use this parameter only if **msg_ins_len** is greater than zero.

Return Codes

SV_OK
Primary return code; the verb executed successfully.
SV_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

SV_INVALID_DATA_SEGMENT

Secondary return code; the data that was to be inserted into the message extended beyond the segment boundary.

SV_INVALID_MESSAGE_ACTION

Secondary return code; the **msg_act** parameter contained an invalid value.

SV_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
SV_INVALID_VERB
Primary return code; the **opcode** parameter did not match the operation code of any verb. No verb executed.
SV_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
SV_UNEXPECTED_DOS_ERROR
Primary return code; one of the following conditions occurred:

- The Microsoft® Windows® 2000 system encountered an error while processing the verb. The operating system return code was returned through the secondary return code. If the problem persists, contact the system administrator for corrective action.
- A CSV was issued from a message loop that was invoked by another application issuing a Windows **SendMessage** function call, rather than the more common Windows **PostMessage** function call. Verb processing cannot take place.
- A CSV was issued when **SendMessage** invoked your application. You can determine whether your application has been invoked with **SendMessage** by using the **InSendMessage** Windows API function call.

Remarks

The value for **msg_file_name** must be three characters long. Pad with spaces if necessary. The .MSG extension is added automatically.

The total length of **msg_ins_len**, including header information (40 bytes), message text, and inserted data, should not exceed 256 bytes. If the length is greater than 256 bytes, the communication system will attempt to log only the header information and inserted text; the message text will be left out.

When you create the log message file, you can specify where in the message the additional data is to be inserted. Further information is provided below.

The data for **msg_ins_ptr** consists of a series of up to nine null-terminated strings. (Because IBM OS/2 ES version 1.0 supports only three data strings, you may want to limit the inserted text to three strings to ensure compatibility.)

Creating a Message File

If you want to create your own message file, you must use the utility MKMSGF.

The first three characters of the message number must match the three-character name of the log message file. These three characters are declared at the top of the file as well.

The system finds the message file as follows:

- If you use your own message file, the system assumes the file is in the same directory as your program's executable file.
- If you use the default message file, COM.MSG, the system finds the file automatically, provided the SnaBase for Microsoft Host Integration Server 2004 is loaded.
- If you use the default message file without loading the previously-mentioned software, the system expects DPATH to indicate the path to the message file. This applies only to the Windows version 3.*x* and OS/2 operating systems.

TRANSFER_MS_DATA

The **TRANSFER_MS_DATA** verb builds an SNA request unit containing Network Management Vector Transport (NMVT) data. The verb can send the NMVT data to NetView for centralized problem diagnosis and resolution. The data is logged in the local audit file.

The following structure describes the verb control block (VCB) used by the **TRANSFER_MS_DATA** verb.

```
struct transfer_ms_data {
    unsigned short       opcode;
    unsigned char        data_type;
    unsigned char        reserv2;
    unsigned short       primary_rc;
    unsigned long        secondary_rc;
    unsigned char        options;
    unsigned char        reserv3;
    unsigned char        origntr_id[8];
    unsigned short       dlen;
    unsigned char FAR *  dptr;
};
```

Members

opcode
Supplied parameter. The verb identifying the operation code, SV_TRANSFER_MS_DATA.
data_type
Supplied parameter. Specifies the type of data provided by this verb:

- Use SV_NMVT to generate an NMVT (including the NS header, the major network management vector, and subvectors).
- Use SV_ALERT_SUBVECTORS to generate an RU containing data for an alert in the appropriate format, without the NS header or major NMVT vector.
- Use SV_PDSTATS_SUBVECTORS to generate an RU containing data for problem determination statistics in the appropriate format, without the NS header or major NMVT vector.
- Use SV_USER_DEFINED to generate user-defined data; this data is recorded in the error log but cannot be sent on the systems services control point-physical unit (SSCP-PU) session on the connection configured for diagnostics.

reserv2
A reserved field.
primary_rc
Returned parameter. Specifies the primary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
secondary_rc
Returned parameter. Specifies the secondary return code set by APPC at the completion of the verb. The valid return codes vary depending on the APPC verb issued. See Return Codes for valid error codes for this verb.
options
Supplied parameter. Specifies the desired options by turning individual bits on or off. (Bits 1, 2, and 3 are ignored if **data_type** is set to SV_USER_DEFINED.) See the Remarks section.
reserv3
A reserved field.
origntr_id
Supplied parameter. Specifies the name of the component issuing **TRANSFER_MS_DATA**. This parameter is optional. Set it to 0x00 if you want the system to ignore it.
dlen
Supplied parameter. Specifies the length of data to be supplied to this verb. The total length of the data (user-supplied data and any added headers or subvectors) must fit into one RU. The maximum RU length is 512 bytes.
dptr
Supplied parameter. Specifies the address of the data to be sent.

Return Codes

SV_OK
Primary return code; the verb executed successfully.
SV_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

SV_DATA_EXCEEDS_RU_SIZE

Secondary return code; the data to be sent was too long. The length of the user-supplied data plus headers and added subvectors must fit in a single RU that is not more than 512 bytes long.

SV_INVALID_DATA_SEGMENT

Secondary return code; the buffer pointed to by **dptr** was not a readable segment or extended beyond the segment boundary.

SV_INVALID_DATA_TYPE

Secondary return code; the **data_type** parameter contained an invalid value.

SV_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

SV_SSCP_PU_SESSION_NOT_ACTIVE

Secondary return code; the NMVT was not sent; either the SSCP-PU session was not active, the node configured to receive diagnostic information was not active, or no network management connection was configured.

SV_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

SV_INVALID_VERB
Primary return code; the **opcode** parameter did not match the operation code of any verb. No verb executed.

SV_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

SV_UNEXPECTED_DOS_ERROR
Primary return code; one of the following conditions occurred:

- The Microsoft® Windows® 2000 system encountered an error while processing the verb. The operating system return code was returned through the secondary return code. If the problem persists, contact the system administrator for corrective action.
- A CSV was issued from a message loop that was invoked by another application issuing a Windows **SendMessage** function call, rather than the more common Windows **PostMessage** function call. Verb processing cannot take place.
- A CSV was issued when **SendMessage** invoked your application. You can determine whether your application has been invoked with **SendMessage** by using the **InSendMessage** Windows API function call.

SV_CANCELLED
Primary return code; this code is returned for an asynchronous verb when it has been shut down by a WinCSVCleanup call.

SV_SERVER_RESOURCE_NOT_FOUND
Primary return code; no communication server was found that could provide the requested function.

SV_SERVER_RESOURCES_LOST
Primary return code; the communications server that was providing the function was lost due to a connection failure.

SV_SERVER_CONN_FAILURE

Secondary return code; the connection to the server was lost due to physical path problems; for example, the server may have been powered off.

SV_THREAD_BLOCKING
Primary return code; this verb exceeds the maximum number of simultaneous synchronous verbs allowed.

Remarks

To specify options, turn bits on or off as follows:

Bit	Description
0	TIME_STAMP_SUBVECTOR. Adds date/time subvector to data. Allowed values include SV_ADD and SV_NO_ADD.
1	PRODUCT_SET_ID_SUBVECTOR. Adds Product_Set_ID subvector to data. This allows network management services to identify the sender of an alert. Allowed values include SV_ADD and SV_NO_ADD.
2	SSCP_PU_SESSION. Sends the data on the SSCP-PU session on the connection configured for diagnostics if the session is active. (The data is added to the error log regardless of whether it is sent on the session or whether SV_STATE_CHECK or SV_COMM_SUBSYSTEM_NOT_LOADED is returned.) Allowed values include SV_SEND and SV_NO_SEND.

3	LOCAL_LOGGING. Logs local alerts that are retrieved from the error log and forwarded to the host. This option is valid only when **data_type** SV_NMVT or **data_type** SV_ALERT_SUBVECTORS with option SV_SEND is specified. Allowed values include SV_LOG and SV_NO_LOG.
4 through 7	Reserved

CSV Extensions for the Windows Environment

This section describes API extensions to the Windows® Common Service Verb (CSV) API. Windows CSV allows multithreaded Microsoft® Windows-based processes. Multithreading is the running of several processes in rapid sequence within a single program. A process contains one or more threads of execution. All references to threads in this document refer to actual threads in multithreaded Windows environments.

For each extension, this section provides a definition of the function, syntax, returns, and remarks for using the function.

This section contains:

- WinAsyncCSV
- WinCSVCleanup
- WinCSVStartup

WinAsyncCSV

The **WinAsyncCSV** function provides an asynchronous entry point for TRANSFER_MS_DATA only. If this function is used for any other verb, the behavior will be synchronous. This function was used instead of the blocking version of the verb under Microsoft Windows version 3.*x*. Windows version 3.x is no longer supported.

HANDLE WINAPI WinAsyncCSV(

```
      HWND hWnd,
      long lpVcb
  );
```

Parameters

hWnd
Handle of window to receive message.

lpVcb
Pointer to the verb control block.

Return Values

The return value specifies whether the asynchronous resolution request was successful. If the function was successful, the return value is an asynchronous task handle. If the function was not successful, a zero is returned.

Remarks

When the asynchronous operation is complete, the application's window *hWnd* receives the message returned by **RegisterWindowMessage** with "WinAsyncCSV" as the input string. The *wParam* argument contains the asynchronous task handle returned by the original function call. The *lParam* argument contains the original VCB pointer and can be dereferenced to determine the final return code.

If the function returns successfully, a "WinAsyncCSV" message will be posted to the application when the operation completes or the conversation is canceled.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

WinCSVCleanup

The **WinCSVCleanup** function terminates and deregisters an application from a Windows® CSV implementation.

```
BOOL WINAPI WinCSVCleanup(void);
```

Return Values

The return value specifies whether the deregistration was successful. If the value is nonzero, the application was successfully deregistered. The application was not deregistered if a value of zero is returned.

Remarks

Use **WinCSVCleanup** to indicate deregistration of a Windows CSV application from a Windows CSV implementation. This function can be used, for example, to free up resources allocated to the specific application.

WinCSVStartup

The **WinCSVStartup** function allows an application to specify the version of Windows® CSV required and to retrieve details of the specific Windows CSV implementation. This function must be called by an application to register itself with a Windows CSV implementation before issuing any further Windows CSV calls.

```
int WINAPI WinCSVStartup(
    WORD wVersionRequired,
    LPWCSVDATA lpwcsvdata
);
```

Parameters

wVersionRequired
Specifies the version of Windows CSV support required. The high-order byte specifies the minor version (revision) number; the low-order byte specifies the major version number. The current version of the Windows CSV API is 1.0.

lpwcsvdata
A pointer to the CSV data structure. The **CSVDATA** structure is defined as follows:

```
typedef struct tagWCSVDATA {
    WORD wVersion;
    char szDescription[WCSVDESCRIPTION_LEN+1];
}  CSVDATA, FAR * LPWCSVCDATA;
```

where **WCSVDESCRIPTION** is defined to be 127 and the structure members are as follows:

wVersion

The version of Windows CSV supported. The high-order byte specifies the minor version (revision) number; the low-order byte specifies the major version number.

szDescription

A description string identifying the vendor of the Windows CSV DLL.

This **CVSDATA** structure provides information about the underlying Windows CSV DLL implementation. The first *wVersion* field has the same structure as the *wVersionRequired* parameter, and the *szDescription* field contains a string identifying the vendor of the Windows CSV DLL. The description field is only meant to provide a display string for the application and should not be used to programmatically distinguish between Windows CSV implementations.

Return Values

The return value specifies whether the application was registered successfully and whether the Windows CSV implementation can support the specified version number. If the value is zero, it was registered successfully. Otherwise, the return value is one of the following:

WCSVSYSNOTREADY
Indicates that the underlying network subsystem is not ready for network communication.

WCSVVERNOTSUPPORTED
The version of Windows CSV support requested is not provided by this particular Windows CSV implementation.

WCSVINVALID
The Windows CSV version specified by the application is not supported by this DLL.

Remarks

To support future Windows CSV implementations and applications that may have functionality differences from Windows CSV version 1.0, a negotiation takes place in **WinCSVStartup**. An application passes to **WinCSVStartup** the Windows CSV version that it can use. If this version is lower than the lowest version supported by the Windows CSV DLL, the DLL cannot support the application and **WinCSVStartup** fails. If the version is not lower, however, the call succeeds and returns the highest version of Windows CSV supported by the DLL. If this version is lower than the lowest version supported by the application, the application either fails its initialization or attempts to find another Windows CSV DLL on the system.

This negotiation allows both a Windows CSV DLL and a Windows CSV application to support a range of Windows CSV versions. An application can successfully use a DLL if there is any overlap in the versions. The following table illustrates how **WinCSVStartup** works in conjunction with different application and DLL versions.

Application versions	DLL versions	To WinCSVStartup	From WinCSVStartup	Result
1.0	1.0	1.0	1.0	Use 1.0
1.0, 2.0	1.0	2.0	1.0	Use 1.0
1.0	1.0, 2.0	1.0	2.0	Use 1.0
1.0	2.0, 3.0	1.0	WCSVINVALID	Fail
2.0, 3.0	1.0	3.0	1.0	App Fails
1.0, 2.0, 3.0	1.0, 2.0, 3.0	3.0	3.0	Use 3.0

After making its last Windows CSV call, an application should call WinCSVCleanup.

Each Windows CSV implementation must make a **WinCSVStartup** call before issuing any other Windows CSV calls. Consequently, this function can be used for initialization purposes.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Common APPC Return Codes

This section describes the primary and, if applicable, secondary return codes for the Advanced Program-to-Program Communications (APPC) verbs. The return codes are listed in hexadecimal order.

This section contains:

- Primary APPC Return Codes
- Secondary APPC Return Codes

Primary APPC Return Codes

0000

AP_OK
The verb executed successfully.

0001

AP_PARAMETER_CHECK
The verb did not execute because of a parameter error.

0002

AP_STATE_CHECK
The verb did not execute because it was issued in an invalid state.

0003

AP_ALLOCATION_ERROR
APPC failed to allocate a conversation. The conversation state is set to RESET.

This code can be returned through a verb issued after ALLOCATE or MC_ALLOCATE.

0005

AP_DEALLOC_ABEND (for a mapped conversation)
The conversation has been deallocated for one of the following reasons:

- The partner transaction program (TP) issued MC_DEALLOCATE with **dealloc_type** set to AP_ABEND.
- The partner TP encountered an ABEND, causing the partner logical unit (LU) to send an **MC_DEALLOCATE** request.

0006

AP_DEALLOC_ABEND_PROG (for a basic conversation)
The conversation has been deallocated for one of the following reasons:

- The partner TP issued DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG.
- The partner TP encountered an ABEND, causing the partner LU to send a **DEALLOCATE** request.

0007

AP_DEALLOC_ABEND_SVC (for a basic conversation)
The conversation has been deallocated because the partner TP issued DEALLOCATE with **dealloc_type** set to AP_ABEND_SVC.

0008

AP_DEALLOC_ABEND_TIMER (for a basic conversation)
The conversation has been deallocated because the partner TP issued DEALLOCATE with **dealloc_type** set to AP_ABEND_TIMER.

0009

AP_DEALLOC_NORMAL
The partner TP has deallocated the conversation without requesting confirmation.

000C

AP_PROG_ERROR_NO_TRUNC
The partner TP has issued one of the following verbs while the conversation was in SEND state:

- SEND_ERROR with **err_type** set to AP_PROG
- MC_SEND_ERROR

Data was not truncated.

000F

AP_CONV_FAILURE_RETRY
The conversation was terminated because of a temporary error. Restart the TP to see if the problem occurs again. If it does, the

system administrator should examine the error log to determine the cause of the error.

0010

AP_CONV_FAILURE_NO_RETRY
The conversation was terminated because of a permanent condition, such as a session protocol error. The system administrator should examine the system error log to determine the cause of the error. Do not retry the conversation until the error has been corrected.

0011

AP_SVC_ERROR_NO_TRUNC
While in SEND state, the partner TP (or partner LU) issued SEND_ERROR with **err_type** set to AP_SVC. Data was not truncated.

0012

AP_PROG_ERROR_TRUNC/AP_SVC_ERROR_TRUNC
In SEND state, after sending an incomplete logical record, the partner TP issued SEND_ERROR. The local TP may have received the first part of the logical record.

0013

AP_SVC_ERROR_PURGING
The partner TP (or partner LU) issued SEND_ERROR with **err_type** set to AP_SVC while in RECEIVE, PENDING_POST, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state. Data sent to the partner TP may have been purged.

0014

AP_UNSUCCESSFUL
No data is immediately available from the partner TP.

0017

AP_CNOS_LOCAL_RACE_REJECT
APPC is currently processing a CNOS verb issued by a local LU.

0018

AP_CNOS_PARTNER_LU_REJECT
The partner LU rejected a CNOS request from the local LU.

0019

AP_CONVERSATION_TYPE_MIXED
The TP has issued both basic and mapped conversation verbs. Only one type can be issued in a single conversation.

0021

AP_CANCELED
The local TP issued one of the following verbs, which canceled RECEIVE_AND_POST or MC_RECEIVE_AND_POST:

- DEALLOCATE with **dealloc_type** set to AP_ABEND_PROG, AP_ABEND_SVC, or AP_ABEND_TIMER
- MC_DEALLOCATE with **dealloc_type** set to AP_ABEND
- SEND_ERROR or MC_SEND_ERROR
- TP_ENDED

Issuing one of these verbs causes the semaphore to be cleared.

F002

AP_TP_BUSY
The local TP has issued a call to APPC while APPC was processing another call for the same TP. This can occur if the local TP has multiple threads, and more than one thread is issuing APPC calls using the same **tp_id**.

F003

AP_COMM_SUBSYSTEM_ABENDED
Indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the TP and the PU 2.1 node has been broken (a LAN error).

- The SnaBase at the TP's computer encountered an ABEND.

The system administrator should examine the error log to determine the reason for the ABEND.

F004

AP_COMM_SUBSYSTEM_NOT_LOADED
A required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

F005

AP_CONV_BUSY
There can only be one outstanding conversation verb at a time on any conversation.

F006

AP_THREAD_BLOCKING
The calling thread is already in a blocking call.

F008

AP_INVALID_VERB_SEGMENT
The verb control block (VCB) extended beyond the end of the data segment.

F011

AP_UNEXPECTED_DOS_ERROR
The operating system returned an error to APPC while processing an APPC call from the local TP. The operating system return code is returned through the **secondary_rc**. It appears in Intel byte-swapped order. If the problem persists, consult the system administrator.

F015

AP_STACK_TOO_SMALL
The stack size of the application is too small to execute the verb. Increase the stack size of your application.

F020

AP_INVALID_KEY
The supplied **key** was incorrect.

Secondary APPC Return Codes

00000000

AP_CNOS_ACCEPTED
APPC accepts the session lines and responsibility as specified.

00000001

AP_BAD_TP_ID
The value of **tp_id** did not match a transaction program (TP) identifier assigned by APPC.

00000002

AP_BAD_CONV_ID
The value of **conv_id** did not match a conversation identifier assigned by APPC.

00000003

AP_BAD_LU_ALIAS
APPC cannot find the specified **lu_alias** among those defined.

000000C4

AP_RCV_IMMD_BAD_FILL (for a basic conversation)
The **fill** parameter was set to an invalid value.

00000004

AP_ALLOCATION_FAILURE_NO_RETRY
The conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

00000005

AP_ALLOCATION_FAILURE_RETRY
The conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

00000006

AP_INVALID_DATA_SEGMENT
The program initiation parameters (PIP) data was longer than the allocated data segment, or the address of the PIP data buffer was wrong.

00000007

AP_CNOS_NEGOTIATED
APPC accepts the session limits and responsibility as negotiable by the partner logical unit (LU). Values that can be negotiated are:

plu_mode_session_limit

min_conwinners_source

min_conwinners_target

responsible

drain_target

000000D7

AP_BAD_RETURN_STATUS_WITH_DATA
The specified **rtn_status** value was not recognized by APPC.

00000011

AP_BAD_CONV_TYPE (for a basic conversation)
The value specified for **conv_type** was invalid.

00000012

AP_BAD_SYNC_LEVEL
The value specified for **sync_level** was invalid.

00000013

AP_BAD_SECURITY
The value specified for **security** was invalid.

00000014

AP_BAD_RETURN_CONTROL
The value specified for **rtn_ctl** was invalid.

00000016

AP_PIP_LEN_INCORRECT
The value of **pip_dlen** was greater than 32767.

00000017

AP_NO_USE_OF_SNASVCMG (for a mapped conversation)
SNASVCMG is not a valid value for **mode_name**.

00000018

AP_UNKNOWN_PARTNER_MODE
The value specified for **mode_name** was invalid.

00000031

AP_CONFIRM_ON_SYNC_LEVEL_NONE
The local TP attempted to use CONFIRM or MC_CONFIRM in a conversation with a synchronization level of AP_NONE. The synchronization level, established by ALLOCATE or MC_ALLOCATE, must be AP_CONFIRM_SYNC_LEVEL.

00000032

AP_CONFIRM_BAD_STATE
The conversation was not in SEND state.

00000033

AP_CONFIRM_NOT_LL_BDY
The conversation for the local TP was in SEND state, and the local TP did not finish sending a logical record.

00000051

AP_DEALLOC_BAD_TYPE
The **dealloc_type** parameter was not set to a valid value.

00000052

AP_DEALLOC_FLUSH_BAD_STATE
The conversation was not in SEND state and the TP attempted to flush the send buffer. This attempt occurred because the value of **dealloc_type** was AP_FLUSH or because the value of **dealloc_type** was AP_SYNC_LEVEL and the synchronization level of the conversation was AP_NONE. In either case, the conversation must be in SEND state.

00000053

AP_DEALLOC_CONFIRM_BAD_STATE
The conversation was not in SEND state, and the TP attempted to flush the send buffer and send a confirmation request.

00000055

AP_DEALLOC_NOT_LL_BDY (for a basic conversation)
The conversation was in SEND state, and the TP did not finish sending a logical record. The **dealloc_type** parameter was set to AP_SYNC_LEVEL or AP_FLUSH.

00000057

AP_DEALLOC_LOG_LL_WRONG
The LL field of the general data stream (GDS) error log variable did not match the actual length of the log data.

00000061

AP_FLUSH_NOT_SEND_STATE
The conversation was not in SEND state.

000000A1

AP_P_TO_R_INVALID_TYPE
The **ptr_type** parameter was not set to a valid value.

000000A2

AP_P_TO_R_NOT_LL_BDY
The local TP did not finish sending a logical record.

000000A3

AP_P_TO_R_NOT_SEND_STATE
The conversation was not in SEND state.

000000B1

AP_RCV_AND_WAIT_BAD_STATE
The conversation was not in RECEIVE or SEND state when the TP issued this verb.

000000B2

AP_RCV_AND_WAIT_NOT_LL_BDY (for a basic conversation)
The conversation was in SEND state; the TP began but did not finish sending a logical record.

000000B5

AP_RCV_AND_WAIT_BAD_FILL (for a basic conversation)
The **fill** parameter was set to an invalid value.

000000C1

AP_RCV_IMMD_BAD_STATE
The conversation was not in RECEIVE state.

000000D1

AP_RCV_AND_POST_BAD_STATE
The conversation was not in RECEIVE or SEND state when the TP issued this verb.

000000D2

AP_RCV_AND_POST_NOT_LL_BDY
The conversation was in SEND state; the TP began but did not finish sending a logical record.

000000D5

AP_RCV_AND_POST_BAD_FILL
The **fill** parameter was set to an invalid value.

000000D6

AP_INVALID_SEMAPHORE_HANDLE
The address of the RAM semaphore or system semaphore handle was invalid.

> **Note** APPC cannot trap all invalid semaphore handles. If the TP passes a bad RAM semaphore handle, a protection violation results.

000000D7

AP_BAD_RETURN_STATUS_WITH_DATA
The specified **rtn_status** value was not recognized by APPC.

000000E1

AP_R_T_S_BAD_STATE
The conversation is not in an allowed state when the TP issued this verb.

000000F1

AP_BAD_LL (for a basic conversation)
The logical record length field of a logical record contained an invalid value — 0x0000, 0x0001, 0x8000, or 0x8001. See About Transaction Programs for information on logical records.

000000F2

AP_SEND_DATA_NOT_SEND_STATE
The local TP issued SEND_DATA or MC_SEND_DATA, but the conversation was not in SEND state.

000000F5

AP_SEND_DATA_CONFIRM_ON_SYNC_NONE
The type CONFIRM is not permitted for a conversation that was allocated with a **sync_level** of NONE.

000000F6

AP_SEND_DATA_NOT_LL_BDY (for a basic conversation)
The TP started but did not finish sending a logical record. This occurs only when **type** is one of the following:

AP_SEND_DATA_CONFIRM

AP_SEND_DATA_DEALLOC_FLUSH

AP_SEND_DATA_DEALLOC_SYNC_LEVEL

AP_SEND_DATA_P_TO_R_FLUSH

AP_SEND_DATA_P_TO_R_SYNC_LEVEL

00000102

AP_SEND_ERROR_LOG_LL_WRONG (for a basic conversation)
The LL field of the error log GDS variable did not match the actual length of the data.

00000103

AP_SEND_ERROR_BAD_TYPE (for a basic conversation)
The value of **err_type** was invalid.

00000105

AP_BAD_ERROR_DIRECTION
The specified **err_dir** was not recognized by APPC.

00000150

AP_CNOS_IMPLICIT_PARALLEL
APPC does not permit a program to change the session limit for a mode other than SNASVCMG mode for the implicit partner template when the template specifies parallel sessions. (The term "template" is used because many of the actual values are yet to be filled in.)

00000151

AP_CANT_RAISE_LIMITS
APPC does not permit setting session limits to a nonzero value unless the limits currently are zero.

00000152

AP_AUTOACT_EXCEEDS_SESSLIM
On the CNOS verb, the value for **auto_activate** is greater than the value for **partner_lu_mode_session_limit**.

00000153

AP_ALL_MODE_MUST_RESET
APPC does not permit a nonzero session limit when **mode_name_select** indicates ALL.

00000154

AP_BAD_SNASVCMG_LIMITS
Your program specified invalid settings for the **partner_lu_mode_session_limit**, **min_conwinners_source**, or **min_conwinners_target** parameters when **mode_name** was supplied.

00000155

AP_MIN_GT_TOTAL
The sum of **min_conwinners_source** and **min_conwinners_target** specifies a number greater than **partner_lu_mode_session_limit**.

00000156

AP_MODE_CLOSED
The local LU cannot negotiate a nonzero session limit because the local maximum session limit at the partner LU is zero.

00000156

AP_CNOS_MODE_CLOSED
The local LU cannot negotiate a nonzero session limit because the local maximum session limit at the partner LU is zero.

00000157

AP_CNOS_MODE_NAME_REJECT
The partner LU does not recognize the specified mode name.

00000159

AP_RESET_SNA_DRAINS
The SNASVCMG mode does not support the **drain** parameter values.

0000015A

AP_SINGLE_NOT_SRC_RESP
For a single-session CNOS verb, APPC permits only the local (source) LU to be responsible for deactivating sessions.

0000015B

AP_BAD_PARTNER_LU_ALIAS
APPC did not recognize the supplied **partner_lu_alias**.

0000015C

AP_EXCEEDS_MAX_ALLOWED
Your program issued a CNOS verb, specifying a **partner_lu_mode_session_limit** number and **set_negotiable** (NO).

0000015D

AP_CHANGE_SRC_DRAINS
APPC does not permit **mode_name_select** (ONE) and **drain_source** (YES) when **drain_source** (NO) is currently in effect for the specified mode.

0000015E

AP_LU_DETACHED
A command reset the definition of the local LU before the CNOS verb tried to specify the LU.

0000015F

AP_CNOS_COMMAND_RACE_REJECT
The local LU is currently processing a CNOS verb issued by the partner LU.

00000167

AP_SNASVCMG_RESET_NOT_ALLOWED
Your local program attempted to issue the CNOS verbs for the mode named SNASVCMG, specifying a session limit of zero.

000001B4

AP_DISPLAY_INFO_EXCEEDS_LENGTH
The returned DISPLAY information did not fit in the buffer.

000001B5

DISPLAY_INVALID_CONSTANT
The value supplied for NUM_SECTIONS or INIT_SEC_LEN is invalid.

00000506

AP_UNDEFINED_TP_NAME
In the configuration file for your application, APPC could not find an invokable TP name matching the value of **tp_name**.

00000509

AP_ALLOCATE_NOT_PENDING
APPC did not find an incoming allocate (from the invoking TP) to match the value of **tp_name**, supplied by RECEIVE_ALLOCATE. **RECEIVE_ALLOCATE** waited for the incoming allocate and eventually timed out.

00000519

AP_CPSVCMG_MODE_NOT_ALLOWED
The mode named CPSVCMG cannot be specified as the **mode_name** on the deactivate session verb.

00000525

AP_INVALID_PROCESS
The process issuing RECEIVE_ALLOCATE was different from the one started by APPC.

080F6051

AP_SECURITY_NOT_VALID
The user identifier or password specified in the allocation request was not accepted by the partner LU.

084B6031

AP_TRANS_PGM_NOT_AVAIL_RETRY
The remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a time-out. The reason for the error may be logged on the remote node. Retry the allocation.

084C0000

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY
The remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

10086021

AP_TP_NAME_NOT_RECOGNIZED
The partner LU does not recognize the TP name specified in the allocation request.

10086031

AP_PIP_NOT_ALLOWED
The allocation request specified PIP data, but either the partner TP does not require this data, or the partner LU does not support it.

10086032

AP_PIP_NOT_SPECIFIED_CORRECTLY
The partner TP requires PIP data, but the allocation request specified either no PIP data or an incorrect number of parameters.

10086034

AP_CONVERSATION_TYPE_MISMATCH
The partner LU or TP does not support the conversation type (basic or mapped) specified in the allocation request.

10086041

AP_SYNC_LEVEL_NOT_SUPPORTED
The partner TP does not support the **sync_level** (AP_NONE or AP_CONFIRM_SYNC_LEVEL) specified in the allocation request, or the **sync_level** was not recognized.

Common CSV Return Codes

This section describes the primary and, if applicable, secondary return codes for the Microsoft® Windows® Common Service Verb (CSV) API. The return codes are listed in hexadecimal order.

This section contains:

- Primary CSV Return Codes
- Secondary CSV Return Codes

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Primary CSV Return Codes

0000

SV_OK
The verb executed successfully.

0001

SV_PARAMETER_CHECK
The verb did not execute because of a parameter error.

0002

SV_STATE_CHECK
The verb did not execute because it was issued in an invalid state.

0021

SV_CANCELLED
This code is returned for an asynchronous verb when it has been shut down by a WinCSVCleanup call.

0030

SV_FILE_ALREADY_EXISTS
When the SV_NEW file option was used, the file name specified was the name of an existing file.

0031

SV_OUTPUT_DEVICE_FULL
There is insufficient space on the device where the output file resides. Retry the operation after freeing additional disk space.

F006

SV_THREAD_BLOCKING
This verb exceeds the maximum number of simultaneous synchronous verbs allowed.

F008

SV_INVALID_VERB_SEGMENT
The verb control block (VCB) extended beyond the end of the data segment.

F011

SV_UNEXPECTED_DOS_ERROR
One of the following conditions occurred:

- The Microsoft® Windows® 2000 system encountered an error while processing the verb. The operating system return code was returned through the secondary return code. If the problem persists, contact the system administrator for corrective action.
- A CSV was issued from a message loop that was invoked by another application issuing a Windows environment **SendMessage** function call, rather than the more common Windows environment **PostMessage** function call. Verb processing cannot take place.
- A CSV was issued when **SendMessage** invoked your application. You can determine whether your application has been invoked with **SendMessage** by using the **InSendMessage** Windows API function call.

F012

SV_COMM_SUBSYSTEM_NOT_LOADED
A required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

F024

SV_SERVER_RESOURCE_NOT_FOUND
No communication server was found that could provide the requested function.

F026

SV_SERVER_RESOURCE_LOST

The communications server that was providing the function was lost due to a connection failure.

FFFF

SV_INVALID_VERB

The **opcode** parameter did not match the operation code of any verb. No verb executed.

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Secondary CSV Return Codes

00000006

SV_INVALID_DATA_SEGMENT
The data buffer containing the source or target string did not fit in one segment, or the target segment was not a read/write segment. This applies only to the Microsoft® Windows® and OS/2 systems.

00000301

SV_SSCP_PU_SESSION_NOT_ACTIVE
The Network Management Vector Transport (NMVT) was not sent; either the system services control point-physical unit (SSCP-PU) session was not active, the node configured to receive diagnostic information was not active, or no network management connection was configured.

00000302

SV_DATA_EXCEEDS_RU_SIZE
The data to be sent was too long. The length of the user-supplied data plus headers and added subvectors must fit in a single request unit (RU) that is not more than 512 bytes long.

00000303

SV_INVALID_DATA_TYPE
The **data_type** parameter contained an invalid value.

00000401

SV_INVALID_DIRECTION
The **direction** parameter contained an invalid value.

00000402

SV_INVALID_CHARACTER_SET
The **char_set** parameter contained an invalid value.

00000404

SV_INVALID_FIRST_CHARACTER
The first character of a type A source string was invalid.

00000405

SV_TABLE_ERROR
One of the following occurred:

- The file containing the user-written type G conversion table was not specified by the environment variable CSVTBLG.
- The table was not in the correct format.
- The file specified by the CSVTBLG variable was not found.

00000406

SV_CONVERSION_ERROR
One or more characters in the source string were not found in the conversion table. These characters were converted to nulls (0x00). The verb still executed.

00000621

SV_INVALID_MESSAGE_ACTION
The **msg_act** parameter contained an invalid value.

00000624

SV_INVALID_SET
The **dt_set** parameter contained an invalid value.

00000629

SV_COPY_TRACE_IN_PROGRESS
A previously issued COPY_TRACE_TO_FILE is still in progress.

0000062A

SV_TRACE_NOT_STOPPED
A trace was in progress when the verb was issued.

0000062B

SV_INVALID_FILE_OPTION
A value other than SV_NEW or SV_OVERWRITE was specified for **file_option**.

0000062C

SV_TRACE_BUFFER_EMPTY
The trace storage buffer did not contain any data.

0000062F

SV_INVALID_RESET_TRACE
The **reset_trc** parameter contained an invalid value.

00000630

SV_INVALID_CHAR_NOT_FOUND
The **char_not_fnd** parameter contained an invalid value.

00000631

SV_INVALID_SOURCE_CODE_PAGE
The code page specified by **source_cp** is not supported.

00000632

SV_INVALID_TARGET_CODE_PAGE
The code page specified by **target_cp** is not supported.

030000AB

SV_SERVER_COMM_FAILURE
The connection to the server was lost due to physical path problems; for example, the server may have been powered off.

CPI-C Programmer's Reference

This section of the Microsoft® Host Integration Server 2004 Developer's Guide provides information about the calls, extensions, and return codes that make up the CPI-C.

For general information about programming for CPI-C, see the CPI-C Programmer's Guide section of the SDK.

For sample code using CPI-C, see CPI-C Samples section of the SDK.

This section contains:

- CPI-C Calls
- Extensions for the Windows Environment
- CPI-C Common Return Codes

CPI-C Calls

This section describes the Common Programming Interface for Communications (CPI-C) calls. The following information is supplied for each call:

- The pseudonym for the call and the actual C function name.
- A definition of the call.
- A list of the parameters used by the call and the data type for each parameter. The prototype of each function is declared in the WINCPIC.H file.
- A description of each input and output parameter. The parameter names are pseudonyms and the actual names for these parameters are declared by the application program. The description includes the possible values of the parameter.
- The conversation states in which the call can be issued.
- The states to which the conversation can change upon return from the call. Conditions that do not cause a state change are not noted. For example, parameter checks and state checks do not cause a state change.
- Additional information describing the use of the call.

Data Types

The data types for the parameters supplied to and received from CPI-C are established as symbolic constants by **#define** statements in the WINCPIC.H file. For example, CM_INT32 represents **signed long int** and CM_PTR represents **far ***. Using symbolic constants improves the portability of CPI-C applications.

For ease of understanding, this reference presents the data types in absolute (not **#defined**) terms.

In writing applications, you should use the symbolic constants from the WINCPIC.H file.

Symbolic Constants

Most parameters supplied to and returned by CPI-C are 32-bit integers. To simplify coding, the values for these parameters are represented by meaningful symbolic constants, which are established by **#define** statements in the WINCPIC.H header file. For example, the value CM_MAPPED_CONVERSATION represents the integer 1. For the sake of readability, use only the symbolic constants when writing programs.

Strings

All strings are in ASCII format when passed across the CPI-C interface.

Validity of output parameters

The parameters returned by CPI-C are valid only if the CPI-C call is executed successfully, as indicated by a return code of CM_OK.

This section contains:

- Accept_Conversation
- Allocate
- Cancel_Conversation
- Confirm
- Confirmed
- Convert_Incoming
- Convert_Outgoing
- Deallocate
- Delete_CPIC_Side_Information
- Extract_Conversation_Security_Type
- Extract_Conversation_Security_User_ID
- Extract_Conversation_State
- Extract_Conversation_Type
- Extract_CPIC_Side_Information
- Extract_Mode_Name
- Extract_Partner_LU_Name

- Extract_Sync_Level
- Extract_TP_Name
- Flush
- Initialize_Conversation
- Prepare_To_Receive
- Receive
- Request_To_Send
- Send_Data
- Send_Error
- Set_Conversation_Security_Password
- Set_Conversation_Security_Type
- Set_Conversation_Security_User_ID
- Set_Conversation_Type
- Set_CPIC_Side_Information
- Set_Deallocate_Type
- Set_Error_Direction
- Set_Fill
- Set_Log_Data
- Set_Mode_Name
- Set_Partner_LU_Name
- Set_Prepare_To_Receive_Type
- Set_Processing_Mode
- Set_Receive_Type
- Set_Return_Control
- Set_Send_Type
- Set_Sync_Level
- Set_TP_Name
- Specify_Local_TP_Name
- Specify_Windows_Handle
- Test_Request_To_Send_Received
- Wait_For_Conversation
- CPI-C Functions Not Supported

Accept_Conversation

The **Accept_Conversation** call (function name **cmaccp**) is issued by the invoked program to accept the incoming conversation and set certain conversation characteristics. For a list of initial conversation characteristics, see Initial Conversation Characteristics.

```
CM_ENTRY Accept_Conversation(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Returned parameter. Specifies the identifier for the conversation. It is used by subsequent CPI-C calls and is returned if the return code is either CM_OK or CM_OPERATION_INCOMPLETE. If the return code is CM_OPERATION_INCOMPLETE, the *conversation_ID* parameter can be used by the application to wait for or cancel the conversation.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_STATE_CHECK
Primary return code; there is no incoming conversation (blocking mode only), or no local transaction program (TP) name has been set up.

CM_OPERATION_INCOMPLETE
Primary return code; a nonblocking operation has been started on the conversation but is not complete. The program can issue Wait_For_Conversation to wait for the operation to complete or Cancel_Conversation to cancel the operation and conversation.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation must be in RESET state when **Accept_Conversation** is issued.

If the call is successful, the conversation changes to RECEIVE state. If the call fails, the state remains unchanged.

Remarks

Upon successful execution of this call, CPI-C generates an 8-byte conversation identifier. This identifier is a required parameter for all other CPI-C calls issued by the invoked program on this conversation.

Incoming conversations will be accepted according to the target TP name that they specify, which must match local TP names that have been set up. Local TP names can be set up by implementation-dependent methods, or by the program calling Specify_Local_TP_Name. In this way, a program can have more than one local TP name. The program can call Extract_TP_Name to discover the name specified on the incoming conversation.

The operation is performed in nonblocking mode if the program has called **Specify_Local_TP_Name** previously; otherwise it is performed in blocking mode.

Allocate

The **Allocate** call (function name **cmallc**) is issued by the invoking program to allocate a conversation with the partner program, using the current conversation characteristics. CPI-C can also allocate a session between the local logical unit (LU) and partner LU if one does not already exist.

```
CM_ENTRY Allocate(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the conversation identifier. The value of this parameter was returned by Initialize_Conversation.
return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.
CM_OPERATION_NOT_ACCEPTED
Primary return code; this value indicates that a previous operation on this conversation is incomplete.
CM_OPERATION_INCOMPLETE
Primary return code; a nonblocking operation has been started on the conversation but is not complete. The program can issue Wait_For_Conversation to wait for the operation to complete or Cancel_Conversation to cancel the operation and conversation.
CM_PARAMETER_ERROR
Primary return code; one of the following occurred:

- The mode name derived from the side information or set by Set_Mode_Name is not valid.
- The mode name is used by SNA service transaction programs (TPs); the invoking program does not have the authority to use this mode name. An example is SNASVCMG.
- The partner program derived from the side information is an SNA service TP; the local program does not have the privilege required to allocate a conversation to an SNA service TP.
- The partner program is a service TP, which participates in basic conversations, but the conversation is set to CM_MAPPED_CONVERSATION.
- The partner LU name derived from the side information or set by Set_Partner_LU_Name is not valid.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is not valid, or the address of a variable is invalid.
CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is not in INITIALIZE state.
CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.
CM_UNSUCCESSFUL
Primary return code; the conversation's return-control characteristic is set to CM_IMMEDIATE and the local LU did not have an available contention-winner session.

The following return codes can be generated if the conversation's return-control type is set to CM_WHEN_SESSION_ALLOCATED.

CM_ALLOCATE_FAILURE_NO_RETRY
Primary return code; the conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.
CM_ALLOCATE_FAILURE_RETRY
Primary return code; the conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

State Changes

The conversation must be in INITIALIZE state when **Allocate** is issued.

State changes, summarized in the following table, are based on the value of the *return_code* parameter.

return_code	**New state**
CM_OK	SEND
CM_ALLOCATE_FAILURE_NO_RETRY	RESET
CM_ALLOCATE_FAILURE_RETRY	RESET
All others	No change

Remarks

The type of conversation allocated is based on the conversation type characteristic: mapped or basic.

When the conversation has been allocated by this call, the following conversation characteristics cannot be changed:

- Conversation type
- Mode name
- Partner LU name
- Partner program name
- Return control
- Synchronization level
- Conversation security
- User identifier
- Password

To send the allocation request immediately, the invoking program can issue Flush or Confirm immediately after **Allocate**. Otherwise, the allocate request accumulates with other data in the local LU's send buffer until the buffer is full.

By issuing **Confirm** after **Allocate**, the invoking program can immediately determine whether the allocation was successful (if the conversation synchronization level is set to CM_CONFIRM).

If the partner LU rejects the allocation request generated by **Allocate**, the error is returned to the invoking program on a subsequent call.

Cancel_Conversation

The **Cancel_Conversation** call (function name **cmcanc**) cancels any outstanding operation on a conversation (an operation returned with CM_OPERATION_INCOMPLETE) and the conversation itself.

```
CM_ENTRY Cancel_Conversation(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Returned parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation must be in any state except RESET.

When the return code is CM_OK, the conversation state becomes RESET.

Remarks

Cancel_Conversation can be called while another operation is active for the specified *conversation_ID*. This allows an application to end any CPI-C action, but will terminate the conversation. This call can be issued regardless of the current application processing mode. Any outstanding operations will return with CM_DEALLOCATED_ABEND as the return code.

The conversation is terminated by a Deallocate with *deallocate_type* set to ABEND_SVC. No *log_data* is sent. The system may be unable to do this immediately, but any delay is transparent to the program.

> **Note** If **Cancel_Conversation** is called while there are outstanding Specify_Windows_Handle asynchronous calls, these calls are canceled. The return codes are set to canceled, and a completion message is posted.

Confirm

The **Confirm** call (function name **cmcfm**) sends the contents of the send buffer of the local logical unit (LU) and a confirmation request to the partner program and waits for confirmation. For Microsoft® Windows Server™ 2003 and Windows® 2000, run a background thread for all CPI-C communications and preserve the foreground thread for user interface only.

```
CM_ENTRY Confirm(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *request_to_send_received,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

request_to_send_received
Returned parameter. Provides the request-to-send-received indicator. Possible values are:

CM_REQ_TO_SEND_RECEIVED
The partner program issued Request_To_Send, which requests the local program to change the conversation to RECEIVE state.

CM_REQ_TO_SEND_NOT_RECEIVED
The partner program did not issue **Request_To_Send**. This value is not relevant if *return_code* is set to CM_PROGRAM_PARAMETER_CHECK or CM_PROGRAM_STATE_CHECK.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully. The partner program issued the Confirmed call.

CM_OPERATION_NOT_ACCEPTED
Primary return code; a previous operation on this conversation is incomplete.

CM_OPERATION_INCOMPLETE
Primary return code; the operation has not completed (processing mode is nonblocking only) and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a Windows message and not call **Wait_For_Conversation**.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* is invalid.
- The local program attempted to use **Confirm** in a conversation with a synchronization level of CM_NONE. The synchronization level must be CM_CONFIRM.

CM_PROGRAM_STATE_CHECK
Primary return code; one of the following occurred:

- The conversation was not in SEND or SEND_PENDING state.
- The basic conversation for the local program was in SEND state, and the local program did not finish sending a logical record.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

CM_CONVERSATION_TYPE_MISMATCH
Primary return code; the partner LU or program does not support the conversation type (basic or mapped) specified in the allocation request.

CM_PIP_NOT_SPECIFIED_CORRECTLY
Primary return code; the allocation request was rejected by a non-CPI-C LU 6.2 transaction program (TP). The partner program requires one or more PIP data variables, which are not supported by CPI-C.

CM_SECURITY_NOT_VALID
Primary return code; the user identifier or password specified in the allocation request is not accepted by the partner LU.

CM_SYNC LEVEL_NOT_SUPPORTED_PGM
Primary return code; the partner program does not support the synchronization level specified in the allocation request.

CM_TPN_NOT_RECOGNIZED
Primary return code; the partner LU does not recognize the program name specified in the allocation request.

CM_TP_NOT_AVAILABLE_NO_RETRY
Primary return code; the partner LU cannot start the program specified in the allocation request because of a permanent condition. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

CM_TP_NOT_AVAILABLE_RETRY
Primary return code; the partner LU cannot start the program specified in the allocation request because of a temporary condition. The reason for the error may be logged on the remote node. Retry the allocation.

CM_PROGRAM_ERROR_PURGING
Primary return code; one of the following occurred:

- While in RECEIVE or CONFIRM state, the partner program issued Send_Error. Data sent but not yet received is purged.
- While in SEND_PENDING state with the error direction set to CM_RECEIVE_ERROR, the partner program issued **Send_Error**. Data was not purged.

CM_RESOURCE_FAILURE_NO_RETRY
Primary return code; one of the following occurred:

- The conversation was terminated prematurely because of a permanent condition. Do not retry until the error has been corrected.
- The partner program did not deallocate the conversation before terminating normally.

CM_RESOURCE_FAILURE_RETRY
Primary return code; the conversation was terminated prematurely because of a temporary condition, such as modem failure. Retry the conversation.

CM_DEALLOCATED_ABEND
Primary return code; the conversation has been deallocated for one of the following reasons:

- The remote program issued Deallocate with the type parameter set to CM_DEALLOCATE_ABEND. If the conversation for the remote program was in RECEIVE state when the call was issued, information sent by the local program and not yet received by the remote program is purged.
- The partner program terminated normally but did not deallocate the conversation before terminating.

CM_DEALLOCATED_ABEND_SVC
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner program issued **Deallocate** with the type parameter set to ABEND_SVC.
- The partner program did not deallocate the conversation before terminating.

If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_DEALLOCATED_ABEND_TIMER
Primary return code; the conversation has been deallocated because the partner program issued **Deallocate** with the type parameter set to ABEND_TIMER. If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_SVC_ERROR_PURGING
Primary return code; while in SEND state, the partner program or partner LU issued Send_Error with the type parameter set to SVC. Data sent to the partner program may have been purged.

State Changes

The conversation can be in SEND or SEND_PENDING state when **Confirm** is issued.

State changes, summarized in the following table, are based on the value of the *return_code* parameter.

return_code	**New state**
CM_OK	No change
Call was issued in SEND state	No change
Call was issued in SEND_PENDING state	SEND
CM_PROGRAM_ERROR_PURGING	RECEIVE

CM_SVC_ERROR_PURGING	RECEIVE
CM_CONVERSATION_TYPE_MISMATCH	RESET
CM_PIP_NOT_SPECIFIED_CORRECTLY	RESET
CM_SECURITY_NOT_VALID	RESET
CM_SYNC_LEVEL_NOT_SUPPORTED_PGM	RESET
CM_TPN_NOT_RECOGNIZED	RESET
CM_TP_NOT_AVAILABLE_NO_RETRY	RESET
CM_TP_NOT_AVAILABLE_RETRY	RESET
CM_RESOURCE_FAILURE_NO_RETRY	RESET
CM_RESOURCE_FAILURE_RETRY	RESET
CM_DEALLOCATED_ABEND	RESET
CM_DEALLOCATED_ABEND_SVC	RESET
CM_DEALLOCATED_ABEND_TIMER	RESET
All others	No change

Remarks

In response to **Confirm**, the partner program normally issues Confirmed to confirm that it has received the data without error. (If the partner program encounters an error, it issues Send_Error or uses Deallocate to abnormally deallocate the conversation.)

The program can issue **Confirm** only if the conversation’s synchronization level is CM_CONFIRM.

Confirm waits for a response from the partner program. A response is generated by one of the following CPI-C calls in the partner program:

- Confirmed
- Send_Error
- Deallocate with the conversation’s deallocate type set to CM_DEALLOCATE_ABEND

Confirmed

The **Confirmed** call (function name **cmcfmd**) replies to a confirmation request from the partner program. It informs the partner program that the local program has not detected an error in the received data. Because the program issuing the confirmation request waits for a confirmation, **Confirmed** synchronizes the processing of the two programs.

```
CM_ENTRY Confirmed(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_OPERATION_NOT_ACCEPTED
Primary return code; a previous operation on this conversation is incomplete.

CM_OPERATION_INCOMPLETE
Primary return code; the operation has not completed (processing mode is nonblocking only) and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a Microsoft® Windows® message and not call **Wait_For_Conversation**.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.

CM_PROGRAM_STATE_CHECK
Primary return code; the conversation was not in CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state when the program issued this call.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation must be in one of the following states when the program issues **Confirmed**:

- CONFIRM
- CONFIRM_SEND
- CONFIRM_DEALLOCATE

The new state is determined by the old state—the state of the conversation when the local program issued **Confirmed**. The old state is indicated by the *status_received* value of the preceding Receive call. The following table summarizes the possible state changes when *return_code* is set to CM_OK.

Old state	New state
CONFIRM	RECEIVE
CONFIRM_SEND	SEND
CONFIRM_DEALLOCATE	RESET

Other return codes result in no state change.

Remarks

A confirmation request is issued by one of the following calls in the partner program:

- Confirm.
- Prepare_To_Receive if the prepare-to-receive type is set to CM_PREP_TO_RECEIVE_CONFIRM or to CM_PREP_TO_RECEIVE_SYNC_LEVEL and the conversation's synchronization level is set to CM_CONFIRM.

- Deallocate if the deallocate type is set to CM_DEALLOCATE_CONFIRM or to CM_DEALLOCATE_SYNC_LEVEL and the conversation's synchronization level is set to CM_CONFIRM.
- Send_Data under the following circumstances:
  - The send type is set to CM_SEND_AND_CONFIRM.
  - The send type is set to CM_SEND_AND_PREPARE_TO_RECEIVE and the prepare-to-receive type is set to CM_PREPARE_TO_RECEIVE_CONFIRM.
  - The send type is set to CM_SEND_AND_PREPARE_TO_RECEIVE, the prepare-to-receive type is set to CM_PREPARE_TO_RECEIVE_SYNC_LEVEL, and the synchronization level is set to CM_CONFIRM.
  - The send type is set to CM_SEND_AND_DEALLOCATE and the deallocate type is set to CM_DEALLOCATE_CONFIRM.
  - The send type is set to CM_SEND_AND_DEALLOCATE, the deallocate type is set to CM_DEALLOCATE_SYNC_LEVEL, and the synchronization level is set to CM_CONFIRM.

A confirmation request is received by the local program through the *status_received* parameter of Receive. The local program can issue **Confirmed** only if the *status_received* parameter is set to one of the following values:

- CM_CONFIRM_RECEIVED
- CM_CONFIRM_SEND_RECEIVED
- CM_CONFIRM_DEALLOC_RECEIVED

Convert_Incoming

The **Convert_Incoming** call (function name **cmcnvi**) converts a string of EBCDIC characters into ASCII. Note that the return conversion can be performed using **Convert_Outgoing**.

```
CM_ENTRY Convert_Incoming(
  unsigned char FAR *string,
  CM_INT32 FAR *string_length,
  CM_INT32 FAR *return_code
);
```

Parameters

string
Supplied parameter. Specifies the EBCDIC string to be converted. The string may contain any of the following characters:

- Uppercase A–Z
- Lowercase a–z
- Numbers 0–9
- The period (.)
- Space characters
- The special characters < > + - ( ) & * ; : , ' ? / _ = ".

string_length characters of this string will be replaced by ASCII equivalents.

string_length
Supplied parameter. Specifies the number of characters to be converted (1–32767).
return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully, and the *string* parameter now contains the converted ASCII string.
CM_OPERATION_NOT_ACCEPTED
Primary return code; the *string_length* parameter specified an invalid value.
CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

The conversation can be in any state.

There is no state change.

Remarks

When data is being received in buffer format in a basic conversation, the data buffer may contain multiple logical records, each consisting of a 2-byte length field (NN) followed by the data. The application must extract and convert each data string separately (excluding the length field value). The applications must not attempt to convert the whole buffer in one operation, because this will make the length field values invalid.

Convert_Outgoing

The **Convert_Outgoing** call (function name **cmcnvo**) converts a string of ASCII characters into EBCDIC. Note that the return conversion can be performed using **Convert_Incoming**.

```
CM_ENTRY Convert_Outgoing(
  unsigned char FAR *string,
  CM_INT32 FAR *string_length,
  CM_INT32 FAR *return_code
);
```

Parameters

string
Supplied parameter. Specifies the ASCII string to be converted. The string may contain any of the following characters:

- Uppercase A–Z
- Lowercase a–z
- Numbers 0–9
- The period (.)
- Space characters
- The special characters < > + - ( ) & * ; : , ' ? / _= ".

string_length characters of this string will be replaced by EBCDIC equivalents.

string_length
Supplied parameter. Specifies the number of characters to be converted (1–32767).
return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully and the *string* parameter now contains the converted EBCDIC string.
CM_OPERATION_NOT_ACCEPTED
Primary return code; the *string_length* parameter specified an invalid value.
CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state.

There is no state change.

Remarks

When data is being received in buffer format in a basic conversation, the data buffer may contain multiple logical records, each consisting of a two-byte length field (NN) followed by the data. The application must extract and convert each data string separately (excluding the length field value). The applications must not attempt to convert the whole buffer in one operation, because this will make the length field values invalid.

Deallocate

The **Deallocate** call (function name **cmdeal**) deallocates a conversation between two programs.

```
CM_ENTRY Deallocate(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.
return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully; the conversation is deallocated.
CM_OPERATION_NOT_ACCEPTED
Primary return code; a previous operation on this conversation is incomplete.
CM_OPERATION_INCOMPLETE
Primary return code; the operation has not completed (processing mode is nonblocking only) and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a Microsoft® Windows® message and not call **Wait_For_Conversation**.
CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.
CM_PROGRAM_STATE_CHECK
Primary return code; the following state errors can occur when the deallocate type indicates a normal deallocation (CM_DEALLOCATE_SYNC_LEVEL, CM_DEALLOCATE_FLUSH, CM_DEALLOCATE_CONFIRM):

- The conversation is not in SEND or SEND_PENDING state.
- For a basic conversation, the conversation is in SEND state, but the program did not finish sending a logical record.

The following return codes can be returned when the *deallocate_type* is set to CM_DEALLOCATE_CONFIRM or to CM_DEALLOCATE_SYNC_LEVEL and the conversation's synchronization level is set to CM_CONFIRM.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.
CM_CONVERSATION_TYPE_MISMATCH
Primary return code; the partner logical unit (LU) or program does not support the conversation type (basic or mapped) specified in the allocation request.
CM_PIP_NOT_SPECIFIED_CORRECTLY
Primary return code; the allocation request was rejected by a non-CPI-C LU 6.2 transaction program (TP). The partner program requires one or more PIP data variables, which are not supported by CPI-C.
CM_SECURITY_NOT_VALID
Primary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.
CM_SYNC LEVEL_NOT_SUPPORTED_PGM
Primary return code; the partner program does not support the synchronization level specified in the allocation request.
CM_TPN_NOT_RECOGNIZED
Primary return code; the partner LU does not recognize the program name specified in the allocation request.
CM_TP_NOT_AVAILABLE_NO_RETRY
Primary return code; the partner LU cannot start the program specified in the allocation request because of a permanent condition. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.
CM_TP_NOT_AVAILABLE_RETRY
Primary return code; the partner LU cannot start the program specified in the allocation request because of a temporary condition. The reason for the error may be logged on the remote node. Retry the allocation.
CM_PROGRAM_ERROR_PURGING

Primary return code; one of the following occurred:

- While in RECEIVE or CONFIRM state, the partner program issued Send_Error. Data sent but not yet received is purged.
- While in SEND_PENDING state with the error direction set to CM_RECEIVE_ERROR, the partner program issued **Send_Error**. Data was not purged.

CM_RESOURCE_FAILURE_NO_RETRY
Primary return code; one of the following occurred:

- The conversation was terminated prematurely because of a permanent condition. Do not retry until the error has been corrected.
- The partner program did not deallocate the conversation before terminating normally.

CM_RESOURCE_FAILURE_RETRY
Primary return code; the conversation was terminated prematurely because of a temporary condition, such as modem failure. Retry the conversation.

CM_DEALLOCATED_ABEND
Primary return code; the conversation has been deallocated for one of the following reasons:

- The remote program issued **Deallocate** with the type parameter set to CM_DEALLOCATE_ABEND, or the remote LU did so because of a remote program abnormal-ending condition. If the conversation for the remote program was in RECEIVE state when the call was issued, information sent by the local program and not yet received by the remote program is purged.
- The remote TP terminated normally but did not deallocate the conversation before terminating. Node services at the remote LU deallocated the conversation on behalf of the remote TP.

CM_DEALLOCATED_ABEND_SVC
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner program issued **Deallocate** with the type parameter set to ABEND_SVC.
- The partner program did not deallocate the conversation before terminating.

If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_DEALLOCATED_ABEND_TIMER
Primary return code; the conversation has been deallocated because the partner program issued **Deallocate** with the type parameter set to ABEND_TIMER. If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_SVC_ERROR_PURGING
Primary return code; while in SEND state, the partner program or partner LU issued **Send_Error** with the type parameter set to SVC. Data sent to the partner program may have been purged.

State Changes

Depending on the value of the conversation's deallocate type parameter (set by Set_Deallocate_Type), the conversation can be in one of the states indicated in the following table when the program issues **Deallocate**:

Deallocate type	Allowed state
CM_DEALLOCATE_FLUSH	SEND or SEND_PENDING
CM_DEALLOCATE_CONFIRM	SEND or SEND_PENDING
CM_DEALLOCATE_SYNC_LEVEL	SEND or SEND_PENDING
CM_DEALLOCATE_ABEND	Any except RESET

State changes, summarized in the following table, are based on the value of the *return_code* parameter.

return_code	**New state**
CM_OK	RESET
CM_PROGRAM_ERROR_PURGING	RECEIVE
CM_SVC_ERROR_PURGING	RECEIVE
CM_CONVERSATION_TYPE_MISMATCH	RESET
CM_PIP_NOT_SPECIFIED_CORRECTLY	RESET
CM_SECURITY_NOT_VALID	RESET

CM_SYNC_LEVEL_NOT_SUPPORTED_PGM	RESET
CM_TPN_NOT_RECOGNIZED	RESET
CM_TP_NOT_AVAILABLE_NO_RETRY	RESET
CM_TP_NOT_AVAILABLE_RETRY	RESET
CM_RESOURCE_FAILURE_NO_RETRY	RESET
CM_RESOURCE_FAILURE_RETRY	RESET
CM_DEALLOCATED_ABEND	RESET
CM_DEALLOCATED_ABEND_SVC	RESET
CM_DEALLOCATED_ABEND_TIMER	RESET
All others	No change

Remarks

Before deallocating the conversation, this call performs the equivalent of either the Flush or Confirmed call, depending on the current conversation synchronization level and deallocate type. The deallocate type is set by Set_Deallocate_Type.

The partner program receives the deallocation notification through one of the following parameters:

- status_received is CM_CONFIRM_DEALLOC_RECEIVED
- *return_code* is CM_DEALLOCATED_NORMAL
- *return_code* is CM_DEALLOCATED_ABEND

After this call has successfully executed, the *conversation_ID* is no longer valid.

For a basic conversation, if the conversation’s deallocate type is set to CM_DEALLOCATE_ABEND and the log data length is greater than zero, the local LU writes the log data (specified by Set_Log_Data) to the local error log and to the partner LU.

After **Deallocate** has been executed, the log data length is set to zero and the log data is set to null.

Delete_CPIC_Side_Information

The **Delete_CPIC_Side_Information** call (function name **xcmdsi**) deletes an entry from the side information table in memory. The side information entry is identified through the symbolic destination name.

```
CM_ENTRY Delete_CPIC_Side_Information(
  unsigned char FAR *key_lock,
  unsigned char FAR *sym_dest_name,
  CM_INT32 FAR *return_code
);
```

Parameters

key_lock
  Supplied parameter. This parameter is ignored.
sym_dest_name
  Supplied parameter. Specifies the symbolic destination name of the entry to be deleted.
return_code
  The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
  Primary return code; the call executed successfully.
CM_PROGRAM_PARAMETER_CHECK
  Primary return code; the *sym_dest_name* parameter specified a nonexistent side information entry.
CM_PRODUCT_SPECIFIC_ERROR
  Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The call is not associated with a conversation and can be in any state.

There is no state change.

Remarks

The side information entry is removed immediately from the side information table in memory.

While this call is being executed, any calls issued by other CPI-C applications that set or extract side information are suspended. These calls include the following:

- Set_CPIC_Side_Information
- Extract_CPIC_Side_Information
- Initialize_Conversation

Extract_Conversation_Security_Type

The **Extract_Conversation_Security_Type** call (function name **xcecst**) returns the security type for a specified conversation.

```
CM_ENTRY Extract_Conversation_Security_Type(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *conversation_security_type,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

conversation_security_type
Returned parameter. Specifies the information the partner logical unit (LU) requires to validate access to the invoked program. Possible values are:

CM_SECURITY_NONE
The invoked program uses no conversation security.

CM_SECURITY_PROGRAM
The invoked program uses conversation security and thus requires a user identifier and password.

CM_SECURITY_SAME
The invoked program, invoked with a valid user identifier and password, in turn invokes another program (as illustrated in Communication Between TPs). For example, assume that program A invokes program B with a valid user identifier and password, and program B in turn invokes program C. If program B specifies the value CM_SECURITY_SAME, CPI-C sends the LU for program C, the user identifier from program A, and an already-verified indicator. This indicator tells program C not to require the password (if program C is configured to accept an already-verified indicator).

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid, or the address of a variable is invalid.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Extract_Conversation_Security_User_ID

The **Extract_Conversation_Security_User_ID** call (function name **cmecsu**) returns the user identifier being used in a specified conversation.

```
CM_ENTRY Extract_Conversation_Security_User_ID(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *security_user_ID,
  CM_INT32 FAR *security_user_ID_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
  Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.
security_user_ID
  Returned parameter. Specifies the user identifier that was used to establish the conversation.
security_user_ID_length
  Returned parameter. Specifies the length of *security_user_ID*.
return_code
  The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
  Primary return code; the call executed successfully.
CM_PROGRAM_PARAMETER_CHECK
  Primary return code; the value specified by *conversation_ID* is invalid.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Remarks

The *security_user_ID* value is not padded with spaces. It is meaningful only up to *security_user_ID_length*.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Extract_Conversation_State

The **Extract_Conversation_State** call (function name **cmecs**) returns the state of the specified conversation.

```
CM_ENTRY Extract_Conversation_State(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *conversation_state,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

conversation_state
Returned parameter. Specifies the conversation state. Possible values are:

- CM_INITIALIZE_STATE
- CM_SEND_STATE
- CM_RECEIVE_STATE
- CM_SEND_PENDING_STATE
- CM_CONFIRM_STATE
- CM_CONFIRM_SEND_STATE
- CM_CONFIRM_DEALLOCATE_STATE

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.
CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.
CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Extract_Conversation_Type

The **Extract_Conversation_Type** call (function name **cmect**) returns the conversation type—mapped or basic—of the specified conversation.

```
CM_ENTRY Extract_Conversation_Type(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *conversation_type,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

conversation_type
Returned parameter. Specifies the conversation type. Possible values are:

- CM_BASIC_CONVERSATION
- CM_MAPPED_CONVERSATION

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Extract_CPIC_Side_Information

The **Extract_CPIC_Side_Information** call (function name **xcmesi**) returns the side information for an entry number or symbolic destination name.

```
CM_ENTRY Extract_CPIC_Side_Information(
  CM_INT32 FAR *entry_number,
  unsigned char FAR *sym_dest_name,
  SIDE_INFO FAR *side_info_entry,
  CM_INT32 FAR *side_info_entry_length,
  CM_INT32 FAR *return_code
);
```

Parameters

entry_number

Supplied parameter. Specifies the number (index) of the side information entry to be returned. The first entry is 1.

The program can look up the side information entry by the symbolic destination name instead. To accomplish this, set the entry number to zero.

sym_dest_name

Supplied parameter. Specifies the symbolic destination name to search for.

If *entry_number* is set to a number greater than zero, this parameter is ignored.

side_info_entry

Returned parameter. Specifies the side information entry. For a detailed explanation of the side information entry, see Set_CPIC_Side_Information.

Each field in the side information structure is left-aligned and padded with spaces on the right as necessary.

side_info_entry_length

Supplied parameter. Always 124.

return_code

The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK

Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK

Primary return code; one of the following occurred:

- The *entry_number* specified a number larger than the maximum number of entries in the side information table or a number that is less than zero.
- The *sym_dest_name* parameter is invalid and *entry_number* is set to zero.
- The *side_info_entry_length* parameter is not set to 124.

CM_PRODUCT_SPECIFIC_ERROR

Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

This call is not associated with a conversation and can be in any state.

There is no state change.

Remarks

The security password is never returned. If the security user identifier in the side information is not set, the security user identifier field is returned as all spaces.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Extract_Mode_Name

The **Extract_Mode_Name** call (function name **cmemn**) returns the mode name and mode name length for a specified conversation.

```
CM_ENTRY Extract_Mode_Name(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *mode_name,
  CM_INT32 FAR *mode_name_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

mode_name
Returned parameter. Specifies the starting address of the mode name.

mode_name_length
Returned parameter. Specifies the length of the mode name.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Extract_Partner_LU_Name

The **Extract_Partner_LU_Name** call (function name **cmepln**) returns the partner LU name and partner LU name length for a specified conversation. This can be an alias name of up to eight bytes or a fully qualified network name of up to 17 bytes.

```
CM_ENTRY Extract_Partner_LU_Name(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *partner_LU_name,
  CM_INT32 FAR *partner_LU_name_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

partner_LU_name
Returned parameter. Specifies the variable containing the partner LU name. (The program must supply a pointer to a suitable variable.)

partner_LU_name_length
Returned parameter. Specifies the length of the partner LU name.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Remarks

An invokable CPI-C transaction program (TP) will only receive the fully qualified network name upon successful completion of this function call. An invokable CPI-C TP is unable to retrieve the alias name using this call.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Extract_Sync_Level

The **Extract_Sync_Level** call (function name **cmesl**) returns the synchronization level for a specified conversation.

```
CM_ENTRY Extract_Sync_Level(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *sync_level,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

sync_level
Returned parameter. Indicates the synchronization level of the conversation. Possible values are:

CM_NONE
The programs will not perform confirmation processing.

CM_CONFIRM
The programs can perform confirmation processing.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Extract_TP_Name

The **Extract_TP_Name** call (function name **cmetpn**) returns the *TP_name* characteristic.

```
CM_ENTRY Extract_TP_Name(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *TP_name,
  CM_INT32 FAR *TP_name_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

TP_name
Returned parameter. Specifies the variable containing the transaction program (TP) name.

TP_name_length
Returned parameter. Specifies the length of the TP name.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Remarks

For an invoking program, the *TP_name* characteristic is the value in the side information referenced in the *sym_dest_name* parameter of the Initialize_Conversation call. For an invokable program, it is the name specified in the conversation startup request (which will have been matched with a name specified locally or in a Specify_Local_TP_Name call), and will therefore be the same as the *TP_name* characteristic of the partner program.

The name returned can be up to 64 bytes in length.

Flush

The **Flush** call (function name **cmflus**) sends the contents of the send buffer of the local logical unit (LU) to the partner LU (and program). If the send buffer is empty, no action takes place.

```
CM_ENTRY Flush(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_OPERATION_NOT_ACCEPTED
Primary return code; a previous operation on this conversation is incomplete.

CM_OPERATION_INCOMPLETE
Primary return code; the operation has not completed (processing mode is nonblocking only) and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a Microsoft® Windows® message and not call **Wait_For_Conversation**.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.

CM_PROGRAM_STATE_CHECK
Primary return code; the conversation was not in SEND or SEND_PENDING state when the program issued this call.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation must be in SEND or SEND_PENDING state.

If the call completes successfully, (*return_code* is CM_OK), the conversation is in SEND state.

Other return codes result in no state change.

Remarks

Data processed by Send_Data accumulates in the local LU's send buffer until one of the following happens:

- The local program issues the Flush call or other call that flushes the LU's send buffer. (Some send types, set by Set_Send_Type, include flush functionality.)
- The buffer is full.

The allocation request generated by Allocate and error information generated by Send_Error are also buffered.

Initialize_Conversation

The **Initialize_Conversation** call (function name **cminit**) is issued by the invoking program to obtain an 8-byte conversation identifier and to set the initial values for the conversation's characteristics.

```
CM_ENTRY Initialize_Conversation(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *sym_dest_name,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Returned parameter. Specifies the identifier for the conversation. It is used by subsequent CPI-C calls.
sym_dest_name
Supplied parameter. Specifies the symbolic destination name—the name associated with a side information entry loaded from the configuration file or defined by Set_CPIC_Side_Information calls.

This parameter is an 8-byte ASCII character string. The allowed characters are as follows:

- Uppercase letters
- Numerals from 0 through 9

This parameter can also be set to eight spaces. In this case, the invoking program must issue the following calls before issuing Allocate:

- Set_Mode_Name
- Set_Partner_LU_Name
- Set_TP_Name

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.
CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *sym_dest_name* does not match a symbolic destination name in the side information table and is not a space.
CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation is in RESET state.

If the *return_code* is CM_OK, the conversation changes to INITIALIZE state. For other return codes, the conversation state remains unchanged.

Remarks

The initial values are CPI-C defaults or are derived from side information associated with the symbolic destination name. For more information about initial values and side information, see Initial Conversation Characteristics and Side Information for CPI-C Programs.

Initial values can be changed by the **Set_** calls.

If the side information contains an invalid value or a **Set_** call sets a conversation characteristic to an invalid value, the error is returned on the **Allocate** call.

If a CPI-C application attempts to invoke more than one concurrent conversation, only a single local APPC logical unit (LU) is used by all conversations. This prevents concurrent conversations across two or more dependent LU 6.2 LU's, causing subsequent Initialize_Conversation (CMALLC) calls to wait for the first conversation to be deallocated.

If the CPI-C application needs to invoke more than one concurrent conversation, independent LU 6.2 must be used between Microsoft® Host Integration Server and the remote system.

Upon successful execution of this call, CPI-C generates a conversation identifier. This identifier is a required parameter for all other CPI-C calls issued for this conversation by the invoking program.

Under normal circumstances, a CPI-C application cannot invoke two concurrent conversations using two different local APPC LUs. A registry key is available that when set forces CPI-C to issue a new TP_STARTED verb on every Initialize_Conversation (cminit) call. This is necessary to force APPC resource location for each call. The registry key that must be defined to force this behavior is the following:

\HKLM\CurrentControlSet\Services\SnaBase\Parameters\Client\GETNEWTPID

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Prepare_To_Receive

The **Prepare_To_Receive** call (function name **cmptr**) changes the state of the conversation for the local program from SEND to RECEIVE.

```
CM_ENTRY Prepare_To_Receive(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_OPERATION_NOT_ACCEPTED
Primary return code; a previous operation on this conversation is incomplete.

CM_OPERATION_INCOMPLETE
Primary return code; the operation has not completed (processing mode is nonblocking only) and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a Microsoft® Windows® message and not call **Wait_For_Conversation**.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.

CM_PROGRAM_STATE_CHECK
Primary return code; one of the following occurred:

- The conversation state is not SEND or SEND_PENDING.
- For a basic conversation, the conversation is in SEND state. However, the program did not finish sending a logical record.

These return codes can occur if the conversation's prepare-to-receive type is set to CM_PREP_TO_RECEIVE_CONFIRM or if the prepare-to-receive type is set to CM_PREP_TO_RECEIVE_SYNC_LEVEL and the conversation's synchronization level is set to CM_CONFIRM.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

CM_CONVERSATION_TYPE_MISMATCH
Primary return code; the partner logical unit (LU) or program does not support the conversation type (basic or mapped) specified in the allocation request.

CM_PIP_NOT_SPECIFIED_CORRECTLY
Primary return code; the allocation request was rejected by a non-CPI-C LU 6.2 transaction program (TP). The partner program requires one or more PIP data variables, which are not supported by CPI-C.

CM_SECURITY_NOT_VALID
Primary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

CM_SYNC_LEVEL_NOT_SUPPORTED_PGM
Primary return code; the partner program does not support the synchronization level specified in the allocation request.

CM_TPN_NOT_RECOGNIZED
Primary return code; the partner LU does not recognize the program name specified in the allocation request.

CM_TP_NOT_AVAILABLE_NO_RETRY
Primary return code; the partner LU cannot start the program specified in the allocation request because of a permanent condition. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

CM_TP_NOT_AVAILABLE_RETRY
Primary return code; the partner LU cannot start the program specified in the allocation request because of a temporary condition. The reason for the error may be logged on the remote node. Retry the allocation.

CM_PROGRAM_ERROR_PURGING
Primary return code; one of the following occurred:

- While in RECEIVE or CONFIRM state, the partner program issued Send_Error. Data sent but not yet received is purged.
- While in SEND_PENDING state with the error direction set to CM_RECEIVE_ERROR, the partner program issued **Send_Error**. Data was not purged.

CM_RESOURCE_FAILURE_NO_RETRY
Primary return code; one of the following occurred:

- The conversation was terminated prematurely because of a permanent condition. Do not retry until the error has been corrected.
- The partner program did not deallocate the conversation before terminating normally.

CM_RESOURCE_FAILURE_RETRY
Primary return code; the conversation was terminated prematurely because of a temporary condition, such as modem failure. Retry the conversation.

CM_DEALLOCATED_ABEND
Primary return code; the conversation has been deallocated for one of the following reasons:

- The remote program issued Deallocate with the type parameter set to CM_DEALLOCATE_ABEND, or the remote LU did so because of a remote program abnormal-ending condition. If the conversation for the remote program was in RECEIVE state when the call was issued, information sent by the local program and not yet received by the remote program is purged.
- The remote TP terminated normally but did not deallocate the conversation before terminating. Node services at the remote LU deallocated the conversation on behalf of the remote TP.

CM_DEALLOCATED_ABEND_SVC
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner program issued **Deallocate** with the type parameter set to ABEND_SVC.
- The partner program did not deallocate the conversation before terminating.

If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_DEALLOCATED_ABEND_TIMER
Primary return code; the conversation has been deallocated because the partner program issued **Deallocate** with the type parameter set to ABEND_TIMER. If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_SVC_ERROR_PURGING
Primary return code; while in SEND state, the partner program or partner LU issued Send_Error with the type parameter set to SVC. Data sent to the partner program may have been purged.

State Changes

The conversation can be in SEND or SEND_PENDING state.

State changes, summarized in the following table, are based on the value of the *return_code* parameter.

return_code	**New state**
CM_OK	RECEIVE
CM_PROGRAM_ERROR_PURGING	RECEIVE
CM_SVC_ERROR_PURGING	RECEIVE
CM_CONVERSATION_TYPE_MISMATCH	RESET
CM_PIP_NOT_SPECIFIED_CORRECTLY	RESET
CM_SECURITY_NOT_VALID	RESET
CM_SYNC_LEVEL_NOT_SUPPORTED_PGM	RESET
CM_TPN_NOT_RECOGNIZED	RESET
CM_TP_NOT_AVAILABLE_NO_RETRY	RESET
CM_TP_NOT_AVAILABLE_RETRY	RESET
CM_DEALLOCATED_ABEND	RESET
CM_RESOURCE_FAILURE_NO_RETRY	RESET

CM_RESOURCE_FAILURE_RETRY	RESET
CM_DEALLOCATED_ABEND_SVC	RESET
CM_DEALLOCATED_ABEND_TIMER	RESET
All others	No change

Before changing the conversation state, this call performs the equivalent of one of the following:

- The Flush call, sending the contents of the local LU's send buffer to the partner LU and program, if either of the following conditions is true:
  - The conversation's prepare-to-receive type is set to CM_PREP_TO_RECEIVE_FLUSH.
  - The conversation's prepare-to-receive type is set to CM_PREP_TO_RECEIVE_SYNC_LEVEL and the conversation's synchronization level is set to CM_NONE.
- The Confirm call, sending the contents of the local LU's send buffer and a confirmation request to the partner program, if either of the following conditions is true:
  - The conversation's prepare-to-receive type is set to CM_PREP_TO_RECEIVE_CONFIRM.
  - The conversation's prepare-to-receive type is set to CM_PREP_TO_RECEIVE_SYNC_LEVEL and the conversation's synchronization level is set to CM_CONFIRM.

The prepare-to-receive type is set by Set_Prepare_To_Receive_Type; the synchronization level is set by Set_Sync_Level.

The conversation cannot change to SEND or SEND_PENDING for the partner program until the partner program receives one of the following values through the *status_received* parameter of the Receive call:

- CM_SEND_RECEIVED
- CM_CONFIRM_SEND_RECEIVED and replies with the Confirmed or Send_Error call

Remarks

After this call has successfully executed, the local program can receive data.

Receive

The **Receive** call (function name **cmrcv**) receives any data currently available from the partner program. For Microsoft® Windows Server™ 2003 and Windows® 2000, run a background thread for all CPI-C communications and preserve the foreground thread for user interface only.

```
CM_ENTRY Receive(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *buffer,
  CM_INT32 FAR *requested_length,
  CM_INT32 FAR *data_received,
  CM_INT32 FAR *received_length,
  CM_INT32 FAR *status_received,
  CM_INT32 FAR *request_to_send_received,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

buffer
Returned parameter. Specifies the address of the buffer to contain the data received by the local program.

The buffer contains data if the following conditions are true:

- The *data_received* parameter is set to a value other than CM_NO_DATA_RECEIVED.
- The *return_code* parameter is set to CM_OK or to CM_DEALLOCATED_NORMAL.

requested_length
Supplied parameter. Indicates the maximum number of bytes of data the local program is to receive. The range is from 0 through 32767.

data_received
Returned parameter. Indicates whether the program received data. Possible values are listed following the Parameters section.

received_length
Returned parameter. Indicates the number of bytes of data the local program received on this **Receive** call. If *return_code* or *data_received* indicates that the program received no data, this number is not relevant.

status_received
Returned parameter. Indicates changes in the status of the conversation. The following are possible values. These codes are not relevant unless *return_code* is set to CM_OK. Possible values are listed following the Parameters section.

request_to_send_received
Returned parameter. Specifies the request-to-send-received indicator. Values are listed following the Parameters section.

return_code
The code returned from this call. Values are listed following the Parameters section.

Values returned in the data_received parameter

These codes are not relevant unless *return_code* is set to CM_OK or CM_DEALLOCATED_NORMAL.

CM_DATA_RECEIVED
Can be returned for a basic conversation if the conversation's fill characteristic is set to CM_FILL_BUFFER, indicating that the program is receiving data independent of its logical format. The local program received data until *requested_length* or end of data was reached.

The end of the data is indicated by either a change to another conversation state, based on the *return_code*, *status_received*, and *data_received* parameters, or an error condition. If the conversation's receive type is set to CM_RECEIVE_IMMEDIATE, the data received can be less than *requested_length* if a smaller amount of data has arrived from the partner program.

CM_COMPLETE_DATA_RECEIVED
In a mapped conversation, indicates that the local program has received a complete data record or the last part of a data record.

In a basic conversation with the fill characteristic set to CM_FILL_LL, this value indicates that the local program has received a complete logical record or the end of a logical record.

CM_INCOMPLETE_DATA_RECEIVED
In a mapped conversation, indicates that the local program has received an incomplete data record. The *requested_length* parameter specified a value less than the length of the data record (or less than the remainder of the data record if this is not the first **Receive** to read the record). The amount of data received is equal to the *requested_length* parameter.

In a basic conversation with the fill characteristic set to CM_FILL_LL, this value indicates that the local program has received an incomplete logical record. The amount of data received is equal to the *requested_length* parameter. (If the received data was truncated, the length of the data will be less than *requested_length*.)

Upon receiving this value, the local program normally reissues **Receive** to receive the next part of the record.

CM_NO_DATA_RECEIVED
The program did not receive data.

Note that if the *return_code* parameter is set to CM_OK, status information may be available through the *status_received* parameter.

Values returned in the status_received parameter

CM_NO_STATUS_RECEIVED
No conversation status change was received on this call.
CM_SEND_RECEIVED
Indicates, for the partner program, that the conversation has entered RECEIVE state. For the local program, the conversation is now in SEND state if no data was received on this call, or SEND_PENDING state if data was received on this call.

Upon receiving this value, the local program normally uses Send_Data to begin sending data.

CM_CONFIRM_DEALLOC_RECEIVED
Indicates that the partner program issued Deallocate with confirmation requested. For the local program, the conversation is now in CONFIRM_DEALLOCATE state.

Upon receiving this value, the local program normally issues the Confirmed call.

CM_CONFIRM_RECEIVED
Indicates that the partner program issued the Confirm call. For the local program, the conversation is in CONFIRM state.

Upon receiving this value, the local program normally issues the **Confirmed** call.

CM_CONFIRM_SEND_RECEIVED
Indicates, for the partner program, that the conversation has entered RECEIVE state and a request for confirmation has been received by the local program. For the local program, the conversation is now in CONFIRM_SEND state.

The program normally responds by issuing the **Confirmed** call. Upon successful execution of the **Confirmed** call, the conversation changes to SEND state for the local program.

Values returned in the request_to_send_received parameter

CM_REQ_TO_SEND_RECEIVED
The partner program issued the Request_To_Send call, which requests the local program to change the conversation to RECEIVE state.
CM_REQ_TO_SEND_NOT_RECEIVED
The partner program did not issue the **Request_To_Send** call. This value is not relevant if the *return_code* parameter is set to CM_PROGRAM_PARAMETER_CHECK or CM_PROGRAM_STATE_CHECK.

Values returned in the return_code parameter

CM_OK
Primary return code; the call executed successfully.
CM_OPERATION_NOT_ACCEPTED
Primary return code; a previous operation on this conversation is incomplete.
CM_OPERATION_INCOMPLETE
Primary return code; the operation has not completed (processing mode is nonblocking only) and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a Windows® message and not call **Wait_For_Conversation**.
CM_UNSUCCESSFUL
Primary return code; the receive type is set to CM_RECEIVE_IMMEDIATE and no data is immediately available from the partner

program.

CM_DEALLOCATED_NORMAL

Primary return code; the conversation has been deallocated normally. The partner program issued Deallocate with the conversation's deallocate type set to CM_DEALLOCATE_FLUSH or CM_DEALLOCATE_SYNC_LEVEL with the synchronization level of the conversation specified as CM_NONE.

CM_PROGRAM_PARAMETER_CHECK

Primary return code; one of the following occurred:

- The value specified by *conversation_ID* is invalid.
- The value specified by *requested_length* is out of range (greater than 32767).

If the program receives this return code, the other returned parameters are not valid.

CM_PROGRAM_STATE_CHECK

Primary return code; one of the following occurred:

- The receive type is set to CM_RECEIVE_AND_WAIT and the conversation state is not RECEIVE, SEND, or SEND_PENDING.
- The receive type is set to CM_RECEIVE_IMMEDIATE and the conversation state is not RECEIVE.
- In a basic conversation, the conversation is in SEND state, the receive type is set to CM_RECEIVE_AND_WAIT, and the program did not finish sending a logical record.

If the program receives this return code, the other returned parameters are not valid.

CM_PRODUCT_SPECIFIC_ERROR

Primary return code; a product-specific error occurred and has been logged in the product's error log.

CM_CONVERSATION_TYPE_MISMATCH

Primary return code; the partner logical unit (LU) or program does not support the conversation type (basic or mapped) specified in the allocation request.

CM_PIP_NOT_SPECIFIED_CORRECTLY

Primary return code; the allocation request was rejected by a non-CPI-C LU 6.2 transaction program (TP). The partner program requires one or more PIP data variables, which are not supported by CPI-C.

CM_SECURITY_NOT_VALID

Primary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.

CM_SYNC_LEVEL_NOT_SUPPORTED_PGM

Primary return code; the partner program does not support the synchronization level specified in the allocation request.

CM_TPN_NOT_RECOGNIZED

Primary return code; the partner LU does not recognize the program name specified in the allocation request.

CM_TP_NOT_AVAILABLE_NO_RETRY

Primary return code; the partner LU cannot start the program specified in the allocation request because of a permanent condition. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

CM_TP_NOT_AVAILABLE_RETRY

Primary return code; the partner LU cannot start the program specified in the allocation request because of a temporary condition. The reason for the error may be logged on the remote node. Retry the allocation.

CM_PROGRAM_ERROR_NO_TRUNC

Primary return code; while in SEND state or in SEND_PENDING state with the error direction set to CM_SEND_ERROR, the partner program issued Send_Error. Data was not truncated.

CM_PROGRAM_ERROR_PURGING

Primary return code; one of the following occurred:

- While in RECEIVE or CONFIRM state, the partner program issued **Send_Error**. Data sent but not yet received is purged.
- While in SEND_PENDING state with the error direction set to CM_RECEIVE_ERROR, the partner program issued **Send_Error**. Data was not purged.

CM_RESOURCE_FAILURE_NO_RETRY

Primary return code; one of the following occurred:

- The conversation was terminated prematurely because of a permanent condition. Do not retry until the error has been corrected.
- The partner program did not deallocate the conversation before terminating normally.

CM_RESOURCE_FAILURE_RETRY

Primary return code; the conversation was terminated prematurely because of a temporary condition, such as modem failure.

Retry the conversation.

CM_DEALLOCATED_ABEND

Primary return code; the conversation has been deallocated for one of the following reasons:

- The remote program issued Deallocate with the type parameter set to CM_DEALLOCATE_ABEND, or the remote LU did so because of a remote program abnormal-ending condition. If the conversation for the remote program was in RECEIVE state when the call was issued, information sent by the local program and not yet received by the remote program is purged.
- The remote TP terminated normally but did not deallocate the conversation before terminating. Node services at the remote LU deallocated the conversation on behalf of the remote TP.

CM_DEALLOCATED_ABEND_SVC

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner program issued **Deallocate** with the type parameter set to ABEND_SVC.
- The partner program did not deallocate the conversation before terminating.

If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_DEALLOCATED_ABEND_TIMER

Primary return code; the conversation has been deallocated because the partner program issued **Deallocate** with the type parameter set to ABEND_TIMER. If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_SVC_ERROR_PURGING

Primary return code; while in SEND state, the partner program or partner LU issued Send_Error with the type parameter set to SVC. Data sent to the partner program may have been purged.

CM_SVC_ERROR_NO_TRUNC

Primary return code; while in SEND state, the partner program or partner LU issued **Send_Error** with the type parameter set to SVC. Data sent to the partner program may have been purged.

CM_PROGRAM_ERROR_TRUNC

Primary return code; in SEND state, before finishing sending a complete logical record, the partner program issued **Send_Error**. The local program may have received the first part of the logical record through a **Receive** call.

CM_SVC_ERROR_TRUNC

Primary return code; while in RECEIVE or CONFIRM state, the partner program or partner LU issued **Send_Error** with the type parameter set to SVC before it finished sending a complete logical record. The local program may have received the first part of the logical record.

State Changes

The conversation can be in RECEIVE, SEND, or SEND_PENDING state.

If *receive_type* is set to CM_RECEIVE_IMMEDIATE, the conversation must be in RECEIVE state.

Issuing **Receive** while the conversation is in SEND or SEND_PENDING state causes the local LU to send the information in its send buffer and a send indicator to the partner program. Based on *data_received* and *status_received* the conversation can change to RECEIVE state for the local program.

The new conversation state is determined by:

- The state the conversation is in when the program issues the call.
- The *return_code* parameter.
- The data_received and status_received parameters.

If no data is currently available and the receive type (set by Set_Receive_Type) is set to CM_RECEIVE_AND_WAIT, the local program waits for data to arrive. If the receive type is set to CM_RECEIVE_IMMEDIATE, the local program does not wait.

The process for receiving data is as follows:

- The local program issues a Receive call until it finishes receiving a complete unit of data. The local program may need to issue Receive several times to receive a complete unit of data. The *data_received* parameter indicates whether the receipt of data is finished.

  The data received can be:

  - One data record transmitted in a mapped conversation.

  - One logical record transmitted in a basic conversation with the conversation's fill characteristic set to CM_FILL_LL.
  - A buffer of data received independent of its logical-record format in a basic conversation with the fill characteristic set to CM_FILL_BUFFER.

  When a complete unit of data has been received, the local program can manipulate it.

- The local program determines the next action to take based on the control information received through *status_received*. The local program may have to reissue **Receive** to receive the control information.

The conversation type is set by Set_Conversation_Type. The fill characteristic is set by Set_Fill.

The following table summarizes the state changes that can occur when **Receive** is issued with the conversation in RECEIVE state and *return_code* is CM_OK.

data_received	***status_received***	**New state**
CM_DATA_RECEIVED	CM_NO_STATUS_RECEIVED	No change
CM_COMPLETE_DATA_RECEIVED	CM_NO_STATUS_RECEIVED	No change
CM_INCOMPLETE_DATA_RECEIVED	CM_SEND_RECEIVED	SEND_PENDING
CM_NO_DATA_RECEIVED	CM_SEND_RECEIVED	SEND

If *return_code* is set to CM_UNSUCCESSFUL, meaning that the *receive_type* is set to CM_RECEIVE_IMMEDIATE and no data is available, there is no state change.

The following table summarizes the state changes that can occur when **Receive** is issued with the conversation in SEND state and *return_code* is CM_OK.

data_received	***status_received***	**New state**
CM_DATA_RECEIVED	CM_NO_STATUS_RECEIVED	RECEIVE
CM_COMPLETE_DATA_RECEIVED	CM_NO_STATUS_RECEIVED	RECEIVE
CM_INCOMPLETE_DATA_RECEIVED	CM_SEND_RECEIVED	SEND_PENDING
CM_NO_DATA_RECEIVED	CM_SEND_RECEIVED	No change

The following table summarizes the state changes that can occur when **Receive** is issued with the conversation in SEND_PENDING state and *return_code* is CM_OK.

data_received	***status_received***	**New state**
CM_DATA_RECEIVED	CM_NO_STATUS_RECEIVED	RECEIVE
CM_COMPLETE_DATA_RECEIVED	CM_NO_STATUS_RECEIVED	RECEIVE
CM_INCOMPLETE_DATA_RECEIVED	CM_SEND_RECEIVED	No change
CM_NO_DATA_RECEIVED	CM_SEND_RECEIVED	SEND

The following topics summarize state changes that can occur when **Receive** is issued in any allowed state.

This section contains:

- Confirmation
- Normal Deallocation
- ABEND
- Errors

Confirmation

The following table summarizes state changes that occur under the following conditions:

- The return_code parameter is CM_OK.
- The *data_received* parameter is set to CM_DATA_RECEIVED, CM_COMPLETE_DATA_RECEIVED, or CM_NO_DATA_RECEIVED.
- The *status_received* parameter indicates a change to a CONFIRM state.

status_received	**New state**
CM_CONFIRM_DEALLOC_RECEIVED	CONFIRM_DEALLOCATE
CM_CONFIRM_SEND_RECEIVED	CONFIRM_SEND
CM_CONFIRM_RECEIVED	CONFIRM

Normal Deallocation

If *return_code* is set to CM_DEALLOCATED_NORMAL, the conversation changes to RESET state.

ABEND

The following ABEND conditions, indicated by *return_code*, cause the conversation to change to RESET state:

- CM_CONVERSATION_TYPE_MISMATCH
- CM_PIP_NOT_SPECIFIED_CORRECTLY
- CM_SECURITY_NOT_VALID
- CM_SYNC_LEVEL_NOT_SUPPORTED_PGM
- CM_TPN_NOT_RECOGNIZED
- CM_TP_NOT_AVAILABLE_NO_RETRY
- CM_TP_NOT_AVAILABLE_RETRY
- CM_DEALLOCATED_ABEND
- CM_DEALLOCATED_ABEND_SVC
- CM_DEALLOCATED_ABEND_TIMER
- CM_SVC_ERROR_TRUNC
- CM_RESOURCE_FAILURE_NO_RETRY
- CM_RESOURCE_FAILURE_RETRY

Errors

The following table summarizes state changes that occur when a data transmission error is encountered.

return_code	**Old state**	**New state**
CM_PROGRAM_ERROR_PURGING	RECEIVE	No change
CM_PROGRAM_ERROR_NO_TRUNC	RECEIVE	No change
CM_SVC_ERROR_PURGING	SEND	RECEIVE
CM_SVC_ERROR_NO_TRUNC	SEND_PENDING	RECEIVE

If the partner program truncates a logical record, the local program receives notification of the truncation through *return_code* on the next **Receive** call.

If a program issues **Receive** with *requested_length* set to zero, the call is executed as usual. However, *data_received* and *status_received* are not set on the same **Receive** call. (One exception to this situation is the null record sent over a mapped conversation, described in the next paragraph.)

In a mapped conversation in which data is available from the partner program, *data_received* is set to CM_INCOMPLETE_DATA_RECEIVED. If a null record is available (*send_length* in the Send_Data call issued by the partner program is set to zero), *data_received* is set to CM_COMPLETE_RECORD_RECEIVED with *received_length* set to zero.

In a basic conversation in which data is available and the fill characteristic is set to CM_FILL_LL, *data_received* is set to CM_INCOMPLETE_DATA_RECEIVED. If the fill characteristic is set to CM_FILL_BUFFER, *data_received* is set to CM_DATA_RECEIVED.

The logical unit (LU) does not automatically perform any conversion between EBCDIC and ASCII on the received string of data before putting it in *buffer*. If necessary, the program can use the Common Service Verb (CSV) CONVERT to translate a string from one character set to the other.

Request_To_Send

The **Request_To_Send** call (function name **cmrts**) notifies the partner program that the local program wants to send data.

```
CM_ENTRY Request_To_Send(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.
return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.
CM_OPERATION_NOT_ACCEPTED
Primary return code; a previous operation on this conversation is incomplete.
CM_OPERATION_INCOMPLETE
Primary return code; the operation has not completed (processing mode is nonblocking only) and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a Microsoft® Windows® message and not call **Wait_For_Conversation**.
CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid.
CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is not in the RECEIVE, SEND, SEND_PENDING, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state.
CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any of the following states: RECEIVE, SEND, SEND_PENDING, CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE.

There is no state change.

In response to this request, the partner program can change the conversation to RECEIVE state by issuing one of the following calls:

- Receive with receive type set to CM_RECEIVE_AND_WAIT
- Prepare_To_Receive
- **Send_Data** with send type set to CM_SEND_AND_PREP_TO_RECEIVE

The partner program can also ignore the request to send.

The conversation state changes to SEND for the local program when the local program receives one of the following values through the *status_received* parameter of a subsequent **Receive** call:

- CM_SEND_RECEIVED
- CM_CONFIRM_SEND_RECEIVED and the local program replies with a Confirmed call

Remarks

The request-to-send notification is received by the partner program through the *request_to_send_received* parameter of the following calls:

- Confirmed
- Receive

- Send_Data
- Send_Error
- Test_Request_To_Send_Received

Request-to-send notification is sent to the partner program immediately. CPI-C does not wait until the send buffer fills up or is flushed. Consequently, the request-to-send notification can arrive out of sequence. For example, if the local program is in SEND state and issues the Prepare_To_Receive call followed by the **Request_To_Send** call, the partner program, in RECEIVE state, can receive the request-to-send notification before it receives the send notification. For this reason, *request_to_send* can be reported to a program through the Receive call.

Upon receiving a request-to-send notification, the partner logical unit (LU) retains the notification until the partner issues a call that returns *request_to_send_received*. The LU keeps only one request-to-send notification per conversation. Thus the local program can issue more **Request_To_Send** calls than are explicitly handled by the partner transaction program (TP).

Send_Data

The **Send_Data** call (function name **cmsend**) puts data in the send buffer of the local logical unit (LU) for transmission to the partner program.

```
CM_ENTRY Send_Data(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *buffer,
  CM_INT32 FAR *send_length,
  CM_INT32 FAR *request_to_send_received,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

buffer
Supplied parameter. Specifies the address of the buffer containing the data to be put in the local LU's send buffer.

send_length
Supplied parameter. Specifies the number of bytes of data to be put in the local LU's send buffer. The range is from 0 through 32767.

For a mapped conversation, if *send_length* is set to zero, a null data record is sent to the partner program.

For a basic conversation, if *send_length* is set to zero, no data is sent. The *buffer* parameter is not relevant. However, the other parameters are processed.

request_to_send_received
Returned parameter. It is the request-to-send-received indicator. Possible values are:

CM_REQ_TO_SEND_RECEIVED
The partner program issued the Request_To_Send call, which requests the local program to change the conversation to RECEIVE state.

CM_REQ_TO_SEND_NOT_RECEIVED
The partner program did not issue the **Request_To_Send** call. This value is not relevant if *return_code* is set to CM_PROGRAM_PARAMETER_CHECK or CM_PROGRAM_STATE_CHECK.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_OPERATION_NOT_ACCEPTED
Primary return code; a previous operation on this conversation is incomplete.

CM_OPERATION_INCOMPLETE
Primary return code; the operation has not completed (processing mode is nonblocking only) and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a Microsoft® Windows® message and not call **Wait_For_Conversation**.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* is invalid.
- The value specified by *send_length* is out of range (greater than 32767).
- This is a basic conversation and the first two bytes of *buffer* contain an invalid logical record length (0x0000, 0x0001, 0x8000, or 0x8001).

CM_PROGRAM_STATE_CHECK
Primary return code; one of the following occurred:

- The conversation state is not SEND or SEND_PENDING.

- The basic conversation is in SEND state and *send_type* is set to CM_SEND_AND_CONFIRM, CM_SEND_AND_DEALLOCATE, or CM_SEND_AND_PREP_TO_RECEIVE. However, the data does not end on a logical record boundary. This condition is allowed only when *deallocate_type* is set to CM_DEALLOCATE_ABEND and the *send_type* is set to CM_SEND_AND_DEALLOCATE.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.
CM_CONVERSATION_TYPE_MISMATCH
Primary return code; the partner LU or program does not support the conversation type (basic or mapped) specified in the allocation request.
CM_PIP_NOT_SPECIFIED_CORRECTLY
Primary return code; the allocation request was rejected by a non-CPI-C LU 6.2 transaction program (TP). The partner program requires one or more PIP data variables, which are not supported by CPI-C.
CM_SECURITY_NOT_VALID
Primary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.
CM_SYNC_LEVEL_NOT_SUPPORTED_PGM
Primary return code; the partner program does not support the synchronization level specified in the allocation request.
CM_TPN_NOT_RECOGNIZED
Primary return code; the partner LU does not recognize the program name specified in the allocation request.
CM_TP_NOT_AVAILABLE_NO_RETRY
Primary return code; the partner LU cannot start the program specified in the allocation request because of a permanent condition. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.
CM_TP_NOT_AVAILABLE_RETRY
Primary return code; the partner LU cannot start the program specified in the allocation request because of a temporary condition. The reason for the error may be logged on the remote node. Retry the allocation.
CM_PROGRAM_ERROR_PURGING
Primary return code; one of the following occurred:

- While in RECEIVE or CONFIRM state, the partner program issued Send_Error. Data sent but not yet received is purged.
- While in SEND_PENDING state with the error direction set to CM_RECEIVE_ERROR, the partner program issued **Send_Error**. Data was not purged.

CM_RESOURCE_FAILURE_NO_RETRY
Primary return code; one of the following occurred:

- The conversation was terminated prematurely because of a permanent condition. Do not retry until the error has been corrected.
- The partner program did not deallocate the conversation before terminating normally.

CM_RESOURCE_FAILURE_RETRY
Primary return code; the conversation was terminated prematurely because of a temporary condition, such as modem failure. Retry the conversation.
CM_DEALLOCATED_ABEND
Primary return code; the conversation has been deallocated for one of the following reasons:

- The remote program issued Deallocate with the type parameter set to CM_DEALLOCATE_ABEND, or the remote LU did so because of a remote program abnormal-ending condition. If the conversation for the remote program was in RECEIVE state when the call was issued, information sent by the local program and not yet received by the remote program is purged.
- The remote TP terminated normally but did not deallocate the conversation before terminating. Node services at the remote LU deallocated the conversation on behalf of the remote TP.

CM_DEALLOCATED_ABEND_SVC
Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner program issued **Deallocate** with the type parameter set to ABEND_SVC.
- The partner program did not deallocate the conversation before terminating.

If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_DEALLOCATED_ABEND_TIMER

Primary return code; the conversation has been deallocated because the partner program issued **Deallocate** with the type parameter set to ABEND_TIMER. If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_SVC_ERROR_PURGING

Primary return code; while in SEND state, the partner program or partner LU issued Send_Error with the type parameter set to SVC. Data sent to the partner program may have been purged.

State Changes

The conversation must be in SEND or SEND_PENDING state when the program issues this call.

The following table summarizes state changes that are possible when *return_code* is set to CM_OK.

send_type	**Old state**	**New state**
CM_BUFFER_DATA	SEND	No change
CM_BUFFER_DATA	SEND_PENDING	SEND
CM_SEND_AND_FLUSH	SEND	No change
CM_SEND_AND_FLUSH	SEND_PENDING	SEND
CM_SEND_AND_CONFIRM	SEND	No change
CM_SEND_AND_CONFIRM	SEND_PENDING	SEND
CM_SEND_AND_PREP_TO_ RECEIVE	Not available	RECEIVE
CM_SEND_AND_DEALLOCATE	Not available	RESET

For a *return_code* value of CM_PROGRAM_ERROR_PURGING or CM_SVC_ERROR_PURGING, the conversation changes to RECEIVE state. For other non-CM_OK values, the conversation changes to RESET state.

Remarks

The data collected in the local LU's send buffer is transmitted to the partner LU and partner program when one of the following occurs:

- The send buffer fills up.
- The local program issues a Flush, Confirm, or Deallocate call or other call that flushes the LU's send buffer. (Some send types, set by Set_Send_Type, include flush functionality.)

The data to be sent can be either:

- A complete data record on a mapped conversation. A complete data record is a string of the length specified by the *send_length* parameter.
- A complete logical record or portion thereof on a basic conversation. A complete logical record is determined by the LL value. (One logical record can end and a new one begin in the middle of the string of data to be sent.)

The LU does not automatically perform any conversion between ASCII and EBCDIC on the string of data to be sent. If necessary, the program can use the Common Service Verb (CSV) CONVERT to translate a string from one character set to the other.

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Send_Error

The **Send_Error** call (function name **cmserr**) notifies the partner program that the local program has encountered an application-level error.

```
CM_ENTRY Send_Error(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *request_to_send_received,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
  Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.
request_to_send_received
  Returned parameter. Specifies the request-to-send-received indicator. Possible values are:
CM_REQ_TO_SEND_RECEIVED
  The partner program issued Request_To_Send, which requests the local program to change the conversation to RECEIVE state.
CM_REQ_TO_SEND_NOT_RECEIVED
  The partner program did not issue **Request_To_Send**. This value is not relevant if *return_code* is set to CM_PROGRAM_PARAMETER_CHECK or CM_STATE_CHECK.
return_code
  The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

The value of *return_code* varies depending on the conversation state when the call is issued.

SEND State

If the program issues the call with the conversation in SEND state, the following return codes are possible:

CM_OK
  Primary return code; the call executed successfully.
CM_OPERATION_NOT_ACCEPTED
  Primary return code; a previous operation on this conversation is incomplete.
CM_OPERATION_INCOMPLETE
  Primary return code; the operation has not completed (processing mode is nonblocking only) and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a Microsoft® Windows® message and not call **Wait_For_Conversation**.
CM_PRODUCT_SPECIFIC_ERROR
  Primary return code; a product-specific error occurred and has been logged in the product's error log.
CM_CONVERSATION_TYPE_MISMATCH
  Primary return code; the partner logical unit (LU) or program does not support the conversation type (basic or mapped) specified in the allocation request.
CM_PIP_NOT_SPECIFIED_CORRECTLY
  Primary return code; the allocation request was rejected by a non-CPI-C LU 6.2 transaction program (TP). The partner program requires one or more PIP data variables, which are not supported by CPI-C.
CM_SECURITY_NOT_VALID
  Primary return code; the user identifier or password specified in the allocation request was not accepted by the partner LU.
CM_SYNC LEVEL_NOT_SUPPORTED_PGM
  Primary return code; the partner program does not support the synchronization level specified in the allocation request.
CM_TPN_NOT_RECOGNIZED
  Primary return code; the partner LU does not recognize the program name specified in the allocation request.
CM_TP_NOT_AVAILABLE_NO_RETRY
  Primary return code; the partner LU cannot start the program specified in the allocation request because of a permanent condition. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.
CM_TP_NOT_AVAILABLE_RETRY

Primary return code; the partner LU cannot start the program specified in the allocation request because of a temporary condition. The reason for the error may be logged on the remote node. Retry the allocation.

CM_PROGRAM_ERROR_PURGING

Primary return code; one of the following occurred:

- While in RECEIVE or CONFIRM state, the partner program issued **Send_Error**. Data sent but not yet received is purged.
- While in SEND_PENDING state with the error direction set to CM_RECEIVE_ERROR, the partner program issued **Send_Error**. Data was not purged.

CM_RESOURCE_FAILURE_NO_RETRY

Primary return code; one of the following occurred:

- The conversation was terminated prematurely because of a permanent condition. Do not retry until the error has been corrected.
- The partner program did not deallocate the conversation before terminating normally.

CM_RESOURCE_FAILURE_RETRY

Primary return code; the conversation was terminated prematurely because of a temporary condition, such as modem failure. Retry the conversation.

CM_DEALLOCATED_ABEND

Primary return code; the conversation has been deallocated for one of the following reasons:

- The remote program issued Deallocate with the type parameter set to CM_DEALLOCATE_ABEND, or the remote LU has done so because of a remote program abnormal-ending condition. If the conversation for the remote program was in RECEIVE state when the call was issued, information sent by the local program and not yet received by the remote program is purged.
- The remote TP terminated normally but did not deallocate the conversation before terminating. Node services at the remote LU deallocated the conversation on behalf of the remote TP.

CM_DEALLOCATED_ABEND_SVC

Primary return code; the conversation has been deallocated for one of the following reasons:

- The partner program issued **Deallocate** with the type parameter set to ABEND_SVC.
- The partner program did not deallocate the conversation before terminating.

If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_DEALLOCATED_ABEND_TIMER

Primary return code; the conversation has been deallocated because the partner program issued **Deallocate** with the type parameter set to ABEND_TIMER. If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

CM_SVC_ERROR_PURGING

Primary return code; while in SEND state, the partner program or partner LU issued **Send_Error** with the type parameter set to SVC. Data sent to the partner program may have been purged.

RECEIVE State

If the call is issued in RECEIVE state, the following return codes are possible:

CM_OK

Primary return code; because incoming information is purged when the **Send_Error** call is issued in RECEIVE state, CM_OK is generated instead of the following:

- CM_PROGRAM_ERROR_NO_TRUNC
- CM_PROGRAM_ERROR_PURGING
- CM_SVC_ERROR_NO_TRUNC
- CM_SVC_ERROR_PURGING
- CM_PROGRAM_ERROR_TRUNC
- CM_SVC_ERROR_TRUNC (basic conversation only)
- CM_PRODUCT_SPECIFIC_ERROR
- CM_RESOURCE_FAILURE_NO_RETRY

  - CM_RESOURCE_FAILURE_RETRY

  For an explanation of these return codes, see CPI-C Common Return Codes.

CM_DEALLOCATED_NORMAL
  Primary return code; because incoming information is purged when **Send_Error** is issued in RECEIVE state, CM_DEALLOCATED_NORMAL is generated instead of the following:

  - CM_CONVERSATION_TYPE_MISMATCH
  - CM_PIP_NOT_SPECIFIED_CORRECTLY
  - CM_SECURITY_NOT_VALID
  - CM_SYNC_LEVEL_NOT_SUPPORTED_PGM
  - CM_TPN_NOT_RECOGNIZED
  - CM_TP_NOT_AVAILABLE_NO_RETRY
  - CM_TP_NOT_AVAILABLE_RETRY
  - CM_DEALLOCATED_ABEND
  - CM_DEALLOCATED_ABEND_SVC
  - CM_DEALLOCATED_ABEND_TIMER

SEND_PENDING State

If the call is issued in SEND_PENDING state, the following return codes are possible:

- CM_OK (Primary return code; the call executed successfully.)
- CM_PRODUCT_SPECIFIC_ERROR
- CM_PROGRAM_ERROR_PURGING
- CM_RESOURCE_FAILURE_NO_RETRY
- CM_RESOURCE_FAILURE_RETRY
- CM_DEALLOCATED_ABEND
- CM_DEALLOCATED_ABEND_SVC
- CM_DEALLOCATED_ABEND_TIMER
- CM_SVC_ERROR_PURGING

For an explanation of these return codes, see CPI-C Common Return Codes.

CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE State

If the call is issued in CONFIRM, CONFIRM_SEND, or CONFIRM_DEALLOCATE state, the following return codes are possible:

- CM_OK (Primary return code; the call executed successfully.)
- CM_PRODUCT_SPECIFIC_ERROR
- CM_RESOURCE_FAILURE_NO_RETRY
- CM_RESOURCE_FAILURE_RETRY

For an explanation of these return codes, see CPI-C Common Return Codes.

Other States

Issuing **Send_Error** with the conversation in RESET or INITIALIZE state is illegal. The following return codes are possible:

CM_PROGRAM_PARAMETER_CHECK
  Primary return code; the value specified by *conversation_ID* is invalid.
CM_PROGRAM_STATE_CHECK
  Primary return code; the conversation state is not SEND, RECEIVE, CONFIRM, CONFIRM_SEND, CONFIRM_DEALLOCATE, or SEND_PENDING.

State Changes

The conversation can be in any state except INITIALIZE or RESET.

State changes, summarized in the following table, are based on the value of the *return_code* parameter.

return_code	**New state**
CM_OK	SEND
CM_CONVERSATION_TYPE_MISMATCH	RESET
CM_PIP_NOT_SPECIFIED_CORRECTLY	RESET
CM_SECURITY_NOT_VALID	RESET
CM_SYNC_LEVEL_NOT_SUPPORTED_PGM	RESET
CM_TPN_NOT_RECOGNIZED	RESET
CM_TP_NOT_AVAILABLE_NO_RETRY	RESET
CM_TP_NOT_AVAILABLE_RETRY	RESET
CM_RESOURCE_FAILURE_RETRY	RESET
CM_RESOURCE_FAILURE_NO_RETRY	RESET
CM_DEALLOCATED_ABEND	RESET
CM_DEALLOCATED_ABEND_PROG	RESET
CM_DEALLOCATED_ABEND_SVC	RESET
CM_DEALLOCATED_ABEND_TIMER	RESET
CM_DEALLOCATED_NORMAL	RESET
CM_PROGRAM_ERROR_PURGING	RECEIVE
CM_SVC_ERROR_PURGING	RECEIVE
All others	No change

Upon successful execution of this call, the conversation is in SEND state for the local program and in RECEIVE state for the partner program.

In a basic conversation, the local program can use Set_Log_Data to specify that error log data be sent to the partner LU and added to the local error log. If the conversation's log data length characteristic is greater than zero, the LU formats the data and stores it in the send buffer.

After **Send_Error** is completed, the log data length is set to zero and the log data to null.

If the conversation is in RECEIVE state when the program issues **Send_Error**, incoming data is purged by CPI-C. This data includes:

- Data sent by Send_Data.
- Confirmation requests.
- Deallocation requests if the conversation's deallocate type is set to CM_DEALLOCATE_CONFIRM or to CM_DEALLOCATE_SYNC_LEVEL with the synchronization level set to CM_CONFIRM.

CPI-C does not purge an incoming request-to-send indicator.

If the conversation is in SEND_PENDING state, the local program can issue Set_Error_Direction to specify whether the error being reported resulted from the received data or from the processing of the local program after successfully receiving the data.

Remarks

The local program can use **Send_Error** for such purposes as informing the partner program of an error encountered in received data, rejecting a confirmation request, or truncating an incomplete logical record it is sending.

Send_Error flushes the local LU's send buffer and sends the partner program the contents of the send buffer followed by the error notification.

The error notification is sent to the partner as one of the following *return_code* values:

- CM_PROGRAM_ERROR_TRUNC
- CM_PROGRAM_ERROR_NO_TRUNC
- CM_PROGRAM_ERROR_PURGING

Set_Conversation_Security_Password

The **Set_Conversation_Security_Password** call (function name **cmscsp**) is issued by the invoking program to specify the password required to gain access to the invoked program.

```
CM_ENTRY Set_Conversation_Security_Password(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *security_password,
  CM_INT32 FAR *security_password_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation.
security_password
Supplied parameter. Specifies the password required to gain access to the partner program. This parameter is a character string of up to eight ASCII characters and is case-sensitive. It must match the password for the user identifier configured for the partner program.

The allowed characters are:

- Uppercase and lowercase letters.
- Numerals from 0 through 9.
- Special characters, except the space.

If the CPI-C automatic logon feature is to be used, this parameter must be set to the MS$SAME string. For details, see the Remarks section later in this topic.

security_password_length
Supplied parameter. Specifies the length of *security_password*. The range is from 0 through 8.

If the CPI-C automatic logon feature is to be used, this parameter must be set to 7. For details, see the Remarks section later in this topic.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.
CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* is invalid.
- The value specified by *security_password_length* is out of range.

CM_PROGRAM_STATE_CHECK
Primary return code; one of the following occurred:

- The conversation is not in INITIALIZE state.
- The conversation's security type is not set to CM_SECURITY_PROGRAM.

State Changes

The conversation must be in INITIALIZE state.

There is no state change.

Remarks

This call has an effect on the conversation only if the conversation security type is CM_SECURITY_PROGRAM or CM_SECURITY_SAME. It overrides the initial password from the side information specified by Initialize_Conversation. This call cannot be issued after Allocate has been issued.

An invalid password is not detected until the allocation request, generated by **Allocate**, is sent to the partner logical unit (LU). The error is returned to the invoking program on a subsequent call.

Automatic logon for CPI-C applications is supported by Microsoft® Host Integration Server 2004. This feature requires specific configuration by the network administrator: The CPI-C application must be invoked on the LAN side from a client of SNA Server. The client must be logged into a Microsoft® Windows Server™ 2003 or Windows® 2000 domain, but can be any platform that supports Host Integration Server CPI-C APIs.

The client application is coded to use program level security, with a special hard-coded CPI-C user name MS$SAME and password MS$SAME. When this session allocation flows from client to SNA Server, the SNA Server looks up the host account and password corresponding to the Windows Server 2003 or Windows 2000 account under which the client is logged in, and substitutes the host account information into the APPC attach message it sends to the host.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Set_Conversation_Security_Type

The **Set_Conversation_Security_Type** call (function name **cmscst**) is issued by the invoking program to specify the information the partner logical unit (LU) requires to validate access to the invoked program.

```
CM_ENTRY Set_Conversation_Security_Type(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *conversation_security_type,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation.

conversation_security_type
Supplied parameter. Specifies the information the partner LU requires to validate access to the invoked program. Based on the conversation security established for the invoked program during configuration, use one of the following values:

CM_SECURITY_NONE
To indicate that the invoked program uses no conversation security.

CM_SECURITY_PROGRAM
To indicate that the invoked program uses conversation security and thus requires a user identifier and password.

CM_SECURITY_SAME
To indicate that the user ID is sent on the allocate request to node services in the partner LU. This setting is also used to specify that the invoked program, invoked with a valid user identifier and password, in turn invokes another program (as illustrated in Communication Between TPs). For example, assume that program A invokes program B with a valid user identifier and password, and program B in turn invokes program C. If program B specifies the value CM_SECURITY_SAME, CPI-C will send the LU for program C, the user identifier from program A, and an already-verified indicator. This indicator tells program C not to require the password (if program C is configured to accept an already-verified indicator).

When CM_SECURITY_SAME is used, your application must always call Set_Conversation_Security_User_ID and Set_Conversation_Security_Password to provide values for the *security_user_ID* and *security_password* parameters. Depending on the properties negotiated between SNA Server and the peer LU, the **Allocate** function will send one of 3 kinds of Attach (FMH-5) messages, in this order of precedence:

1. If the LUs have negotiated already verified security, the Attach sent by SNA Server will not include the contents of the security_password parameter field specified by Set_Conversation_Security_Password.
2. If the LUs have negotiated persistent verification security, the Attach sent by SNA Server will include the security_password parameter specified by Set_Conversation_Security_Password, but only when the Attach is the first for the specified security_user_ID parameter set by Set_Conversation_Security_User_ID since the start of the LU-LU session, and will omit the security_password parameter on all subsequent Attaches (issued by your application or any other application using this LU-LU-mode triplet).
3. Your application cannot tell which mode of security has been negotiated between the LUs, nor can it tell whether the **Allocate** function it is issuing is the first for that LU-LU-mode triplet. So your application must always call Set_Conversation_Security_User_ID and Set_Conversation_Security_Password to set the security_user_ID and security_password parameters when conversation_security_type is set to CM_SECURITY_SAME.

For more information on persistent verification and already verified security, see the SNA Formats Guide, section "FM Header 5: Attach (LU 6.2)."

If the CPI-C automatic logon feature is to be used, this parameter must be set to CM_SECURITY_PROGRAM. For details, see the Remarks section later in this topic.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is not in INITIALIZE state.

CM_PROGRAM_PARAMETER_CHECK
  Primary return code; the value specified by *conversation_ID* or *conversation_security_type* is invalid.
CM_PRODUCT_SPECIFIC_ERROR
  Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation must be in INITIALIZE state.

There is no state change.

Remarks

This call overrides the initial security type from the side information specified by Initialize_Conversation. This call cannot be issued after Allocate has been issued.

If the conversation security type is set to CM_SECURITY_NONE, the user identifier and password are ignored when the conversation is allocated.

A conversation security type of CM_SECURITY_SAME is intended for use between nodes which have the same set of user IDs and which accept user validation performed on one node as validating the user for all nodes. A password is not used in this case except for the initial validation of the user ID.

Automatic logon for CPI-C applications is supported by Microsoft® Host Integration Server 2004. This feature requires specific configuration by the network administrator. The CPI-C application must be invoked on the LAN side from a client of SNA Server. The client must be logged into a Microsoft® Windows Server™ 2003 or Windows® 2000 domain, but can be any platform that supports SNA Server CPI-C APIs.

The client application is coded to use program level security, with a special hard-coded CPI-C user name MS$SAME and password MS$SAME. When this session allocation flows from client to SNA Server, the SNA Server looks up the host account and password corresponding to the Windows Server 2003 or Windows 2000 account under which the client is logged on, and substitutes the host account information into the APPC attach message it sends to the host.

Set_Conversation_Security_User_ID

The **Set_Conversation_Security_User_ID** call (function name **cmscsu**) is issued by the invoking program to specify the user identifier required to gain access to the invoked program.

```
CM_ENTRY Set_Conversation_Security_User_ID(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *security_user_ID,
  CM_INT32 FAR *security_user_ID_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation.

security_user_ID
Supplied parameter. Specifies the user identifier required to gain access to the partner program. This parameter is a character string of up to eight ASCII characters and is case-sensitive.

The allowed characters are:

- Uppercase and lowercase letters.
- Numerals from 0 through 9.
- Special characters, except the space.

If the CPI-C automatic logon feature is to be used, this parameter must be set to the MS$SAME string. For details, see the Remarks section later in this topic.

security_user_ID_length
Supplied parameter. Specifies the length of *security_user_ID*. The range is from 0 through 8.

If the CPI-C automatic logon feature is to be used, this parameter must be set to 7. For details, see the Remarks section later in this topic.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* is invalid.
- The value specified by *security_user_ID_length* is out of range.

CM_PROGRAM_STATE_CHECK
Primary return code; one of the following occurred:

- The conversation is not in INITIALIZE state.
- The conversation’s security type is not set to CM_SECURITY_PROGRAM.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

The conversation must be in INITIALIZE state.

There is no state change.

Remarks

This call has an effect on the conversation only if the conversation security type is CM_SECURITY_PROGRAM or CM_SECURITY_SAME. It overrides the initial user identifier from the side information specified by Initialize_Conversation. This call cannot be issued after Allocate has been issued.

An invalid user identifier is not detected until the allocation request, generated by **Allocate**, is sent to the partner logical unit (LU). The error is returned to the invoking program on a subsequent call.

Automatic logon for CPI-C applications is supported by Microsoft® Host Integration Server 2004. This feature requires specific configuration by the network administrator. The CPI-C application must be invoked on the LAN side from a client of SNA Server. The client must be logged into a Microsoft® Windows Server™ 2003 or Windows® 2000 domain, but can be any platform that supports SNA Server CPI-C APIs.

The client application is coded to use program level security, with a special hard-coded CPI-C user name MS$SAME and password MS$SAME. When this session allocation flows from client to SNA Server, the SNA Server looks up the host account and password corresponding to the Windows Server 2003 or Windows 2000 account under which the client is logged on, and substitutes the host account information into the APPC attach message it sends to the host.

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Set_Conversation_Type

The **Set_Conversation_Type** call (function name **cmsct**) is issued by the invoking program to define a conversation as being mapped or basic. This call overrides the default conversation type established by Initialize_Conversation. The default conversation type is CM_MAPPED_CONVERSATION. This call cannot be issued after Allocate has been issued.

```
CM_ENTRY Set_Conversation_Type(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *conversation_type,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation.
conversation_type
Supplied parameter. Specifies the type of conversation to be allocated by **Allocate**. Possible values are:

- CM_BASIC_CONVERSATION
- CM_MAPPED_CONVERSATION

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.
CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is not in INITIALIZE state.
CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* or *conversation_type* is invalid.
- The *conversation_type* parameter specifies a mapped conversation, but the fill characteristic is set to CM_FILL_BUFFER, which is incompatible with mapped conversations. Before changing the conversation type to mapped, you must issue the Set_Fill call to change the fill type to CM_FILL_LL.
- The *conversation_type* parameter specifies a mapped conversation. However, a previous Set_Log_Data call, allowed only in basic conversations, is still in effect.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

The conversation must be in INITIALIZE state.

There is no state change.

Set_CPIC_Side_Information

The **Set_CPIC_Side_Information** call (function name **xcmssi**) adds or replaces a side information entry in memory. A CPI-C side information entry associates a set of conversation characteristics with a symbolic definition name. This call overrides entries having the same symbolic destination name.

```
CM_ENTRY Set_CPIC_Side_Information(
  unsigned char FAR *key_lock,
  SIDE_INFO FAR *side_info_entry,
  CM_INT32 FAR *side_info_entry_length,
  CM_INT32 FAR *return_code
);
```

Parameters

key_lock
Supplied parameter. This parameter is ignored.

side_info_entry
Supplied parameter. Specifies the contents of a side information entry. The following table describes the *side_info_entry* structure, which defines the format of the side information entry.

Offset	Description	Type	Length
0	*sym_dest_name*	unsigned char	8 bytes
8	*partner_LU_name*	unsigned char	17 bytes
25	*reserved*	unsigned char	3 bytes
28	*TP_name_type*	signed long int	32 bits
32	*TP_name*	unsigned char	64 bytes
96	*mode_name*	unsigned char	8 bytes
104	*conversation_ security_type*	signed long int	32 bits
108	*security_user_ID*	unsigned char	8 bytes
116	*security_password*	unsigned char	8 bytes

The allowed characters for *sym_dest_name* are the uppercase letters (A through Z) and the numerals from 0 through 9.

Set_CPIC_Side_Information is the only CPI-C call that lets you specify an SNA service transaction program (TP) as the partner program. The SNA convention for naming a service TP is up to four characters. The first character is a hexadecimal byte between 0x00 and 0x3F. The remaining characters are translated from ASCII to EBCDIC.

For the allowed characters for the other fields, see the description of the corresponding **Set_** call. For example, for the *mode_name* field, see the description of the Set_Mode_Name call.

Each field in the structure must be left-aligned. Pad fields on the right with spaces as necessary.

side_info_entry_length
Supplied parameter. Specifies the length of *side_info_entry*. It is always 124.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- A value specified in the *side_info_entry* structure is invalid.
- The left character of the *side_info_entry* contains a space.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

The conversation can be in any state.

There is no state change.

Remarks

Invalid string parameters in the side information (for example, specifying a nonexistent partner logical unit (LU)) are not detected until Allocate is issued. The error is returned on a call following **Allocate**.

Set_Deallocate_Type

The **Set_Deallocate_Type** call (function name **cmsdt**) specifies how the conversation is to be deallocated.

```
CM_ENTRY Set_Deallocate_Type(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *deallocate_type,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

deallocate_type
Supplied parameter. Specifies how to perform the deallocation. Possible values are:

CM_DEALLOCATE_ABEND
Indicates that the conversation is to be deallocated abnormally and unconditionally. A program should specify CM_DEALLOCATE_ABEND when it encounters an error preventing the successful completion of a transaction.

If the conversation is in SEND state, CPI-C sends the contents of the send buffer of the local logical unit (LU) to the partner program before deallocating the conversation. If the conversation is in RECEIVE state, incoming data can be purged. For a basic conversation in SEND state, logical record truncation can occur.

CM_DEALLOCATE_CONFIRM
Used to send the partner program the contents of the local LU’s send buffer and a request to confirm the deallocation.

This request for deallocation confirmation is sent by Deallocate or by Send_Data with the send type set to CM_SEND_AND_DEALLOCATE. The conversation is deallocated normally when the partner program issues Confirmed, responding to the confirmation request.

CM_DEALLOCATE_FLUSH
Used to send the contents of the local LU’s send buffer to the partner program before deallocating the conversation normally.

CM_DEALLOCATE_SYNC_LEVEL
Uses the conversation’s synchronization level to determine how to deallocate the conversation. A default synchronization level is established by Initialize_Conversation and can be overridden by Set_Sync_Level.

If the synchronization level of the conversation is CM_NONE, the default, the contents of the local LU’s send buffer are sent to the partner program and the conversation is deallocated normally.

If the synchronization level of the conversation is CM_CONFIRM, the contents of the local LU’s send buffer and a request to confirm the deallocation are sent to the partner program. This request for deallocation confirmation is sent by Deallocate or by Send_Data with the send type set to CM_SEND_AND_DEALLOCATE. The conversation is deallocated normally when the partner program issues the Confirmed call, responding to the confirmation request.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* or *deallocate_type* is invalid.
- The *deallocate_type* parameter specifies CM_DEALLOCATE_CONFIRM, but the conversation’s synchronization level is set to CM_NONE.
- The address of a variable is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Remarks

This call overrides the default deallocate type established by Initialize_Conversation or Accept_Conversation. The default deallocate type is CM_DEALLOCATE_SYNC_LEVEL.

The deallocation instructions specified by this call take effect when Deallocate is issued or when the send type is set to CM_SEND_AND_DEALLOCATE and Send_Data is issued.

You can set *deallocate_type* to CM_FLUSH if the synchronization level of the conversation is set to CM_NONE or CM_CONFIRM.

The value CM_DEALLOCATE_FLUSH is functionally the same as CM_DEALLOCATE_SYNC_LEVEL with the conversation's synchronization level set to CM_NONE.

The value CM_DEALLOCATE_CONFIRM is functionally the same as CM_DEALLOCATE_SYNC_LEVEL with the conversation's synchronization level set to CM_CONFIRM.

Set_Error_Direction

The **Set_Error_Direction** call (function name **cmsed**) specifies whether a program detected an error while receiving data or while preparing to send data.

```
CM_ENTRY Set_Error_Direction(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *error_direction,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

error_direction
Supplied parameter. Specifies the direction in which data was flowing when the program encountered an error. Possible values are:

- CM_RECEIVE_ERROR

  An error occurred in the data received from the partner program.

- CM_SEND_ERROR

  An error occurred while the local program prepared to send data to the partner program.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* or *error_direction* is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Remarks

This call overrides the default error direction established by Initialize_Conversation or Accept_Conversation. The default error direction is CM_RECEIVE_ERROR.

Error direction is relevant only when a program issues Send_Error in SEND_PENDING state, immediately after issuing Receive and receiving data (*data_received* is a value other than CM_NO_DATA_RECEIVED) and a send indicator (*status_received* is CM_SEND_RECEIVED).

When the conversation is in SEND_PENDING state, the program issues **Send_Error** if it detects errors in the received data or if an error occurred while the local program prepared to send data. The program must supply the error direction information using **Set_Error_Direction** before issuing **Send_Error** because the logical unit (LU) cannot tell which kind of error occurred (receive or send). The new error direction remains in effect until a subsequent **Set_Error_Direction** changes it.

When **Send_Error** is issued, the partner program receives one of the following return codes:

- CM_PROGRAM_ERROR_PURGING if *error_direction* is set to CM_RECEIVE_ERROR
- CM_PROGRAM_ERROR_NO_TRUNC if *error_direction* is set to CM_SEND_ERROR

Set_Fill

The **Set_Fill** call (function name **cmsf**) specifies whether programs will receive data in the form of logical records or as a specified length of data. This call is allowed only in basic conversations.

```
CM_ENTRY Set_Fill(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *fill,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

fill
Supplied parameter. Specifies the form in which programs will receive data. The following are possible choices:

CM_FILL_BUFFER
The local program receives data until the number of bytes specified by the *requested_length* parameter of the **Receive** call is reached or until the end of the data. Data is received without regard for the logical-record format.

CM_FILL_LL
Data is received in logical-record format. The data received can be a complete logical record, a portion of a logical record equal to the *requested_length* parameter of the Receive call, or the end of a logical record.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* or *fill* is invalid.
- The current conversation is mapped.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Remarks

Set_Fill overrides the default *fill* established by Initialize_Conversation or Accept_Conversation. The default *fill* is CM_FILL_LL.

The *fill* value affects all subsequent Receive calls. It can be changed by reissuing the **Set_Fill** call.

Set_Log_Data

The **Set_Log_Data** call (function name **cmsld**) specifies a log message (log data) and its length to be sent to the partner logical unit (LU). This call is allowed only in basic conversations. It overrides the default log data, which is null, and the default log data length, which is zero.

```
CM_ENTRY Set_Log_Data(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *log_data,
  CM_INT32 FAR *log_data_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

log_data
Supplied parameter. Specifies the starting address of the data to be sent to the partner LU. It can contain up to 512 ASCII characters. The allowed characters are:

- Uppercase and lowercase letters.
- Numerals from 0 through 9.
- Special characters.
- The space.

log_data_length
Supplied parameter. Specifies the length of the log data. The range is from 0 through 512 bytes.

A length of 0 indicates that there is no log data, and the *log_data* parameter is ignored.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* is invalid.
- The conversation type is set to mapped.
- The value specified by *log_data_length* is out of range (greater than 512 or less than 0).

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Remarks

The log data specified by **Set_Log_Data** is sent to the partner LU when the local program issues one of the following calls:

- Send_Error
- Deallocate with the conversation's deallocate type set to CM_DEALLOCATE_ABEND
- Send_Data with the conversation's send type set to CM_SEND_AND_DEALLOCATE and the deallocate type set to CM_DEALLOCATE_ABEND

After sending the log data to the partner LU, the local LU resets the log data to null and the log data length to zero.

CPI-C automatically converts the log data from ASCII to other encoding standards, such as EBCDIC, as required.

Set_Mode_Name

The **Set_Mode_Name** call (function name **cmsmn**) is issued by the invoking program to specify the mode name for a conversation. This call overrides the system-defined mode name derived from the side information when the Initialize_Conversation call was issued. This call cannot be issued after Allocate has been issued. Issuing this call has no effect on the side information itself.

```
CM_ENTRY Set_Mode_Name(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *mode_name,
  CM_INT32 FAR *mode_name_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation.
mode_name
Supplied parameter. Specifies the starting address of the mode name (the name of a set of networking characteristics defined during configuration). The mode name can contain up to eight ASCII characters. The allowed characters are:

- Uppercase letters.
- Numerals from 0 through 9.

The value of *mode_name* must match the name of a mode associated with the partner logical unit (LU) during configuration. The mode name cannot be SNASVCMG or CPSVCMG.

mode_name_length
Supplied parameter. Specifies the length of the mode name. The range is from 0 through 8 bytes.

If *mode_name_length* is set to zero, **Set_Mode_Name** is ignored.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.
CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is not in INITIALIZE state.
CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* is invalid.
- The value specified by *mode_name_length* is out of range (greater than 8 or less than 0).

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation must be in INITIALIZE state.

There is no state change.

Remarks

Specifying an invalid value for *mode_name* is not detected until Allocate is issued.

Set_Partner_LU_Name

The **Set_Partner_LU_Name** call (function name **cmspln**) is issued by the invoking program to specify the partner logical unit (LU) name. This call overrides the partner LU name derived from the side information when the Initialize_Conversation call was issued. This call cannot be issued after Allocate has been issued. Issuing this call has no effect on the side information itself.

```
CM_ENTRY Set_Partner_LU_Name(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *partner_LU_name,
  CM_INT32 FAR *partner_LU_name_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation.

partner_LU_name
Supplied parameter. Specifies the starting address of the partner LU name. The mode name can contain up to 17 ASCII characters. The allowed characters are:

- Uppercase letters.
- Numerals from 0 through 9.

The partner LU name can be either:

- An alias consisting of one through eight characters.
- A fully qualified network name consisting of from 2 through 17 characters. A period separates the network identifier (which can be from zero through eight characters) from the network LU name (which can be from one through eight characters). If the network identifier is zero characters long, the period is still required.

The partner LU name must match the name of a partner LU established during configuration.

partner_LU_name_length
Supplied parameter. Specifies the length of the partner LU name. The range is from 1 through 17.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is not in INITIALIZE state.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* is invalid.
- The value specified by *partner_LU_name_length* is out of range (greater than 17 or less than 1).

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

The conversation must be in INITIALIZE state.

There is no state change.

Remarks

Specifying an invalid value for *partner_LU_name* is not detected until Allocate is issued.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Set_Prepare_To_Receive_Type

The **Set_Prepare_To_Receive_Type** call (function name **cmsptr**) specifies how the subsequent Prepare_To_Receive calls will be executed. It overrides the default prepare-to-receive processing established by Initialize_Conversation or Accept_Conversation. By default, the prepare-to-receive processing is based on the synchronization level of the conversation.

The prepare-to-receive type affects all subsequent **Prepare_To_Receive** calls. It can be changed by reissuing **Set_Prepare_To_Receive_Type**.

```
CM_ENTRY Set_Prepare_To_Receive_Type(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *prepare_to_receive_type,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

prepare_to_receive_type
Supplied parameter. Specifies how subsequent Prepare_To_Receive calls will be executed. Possible values are:

CM_PREP_TO_RECEIVE_CONFIRM
Used to send the partner program the contents of the send buffer of the logical unit (LU) and a confirmation request. Upon receipt of confirmation, the conversation changes to RECEIVE state.

CM_PREP_TO_RECEIVE_FLUSH
Used to send the partner program the contents of the local LU's send buffer and changes the conversation to RECEIVE state.

CM_PREP_TO_RECEIVE_SYNC_LEVEL
Used by the conversation's synchronization level to determine prepare-to-receive processing. A default synchronization level is established by Initialize_Conversation and can be overridden by Set_Sync_Level.

If the synchronization level of the conversation is CM_NONE, the default, the contents of the local LU's send buffer are sent to the partner program and the conversation changes to RECEIVE state. If the synchronization level of the conversation is CM_CONFIRM, the contents of the local LU's send buffer and a request for confirmation are sent to the partner program. The conversation changes to RECEIVE state when the partner program issues Confirmed, responding to the confirmation request.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *prepare_to_receive_type* or *conversation_ID* is invalid.
- The *prepare_to_receive_type* parameter is set to CM_PREP_TO_RECEIVE_CONFIRM, but the conversation's synchronization level is set to CM_NONE.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Set_Processing_Mode

The **Set_Processing_Mode** call (function name **cmspm**) specifies for the conversation whether subsequent calls will be returned when the operation they have requested is complete (blocking) or immediately after the operation is initiated (nonblocking).

> **Note** A program is notified of the completion of nonblocking calls when it issues Wait_For_Conversation or through a Microsoft® Windows® message sent to a WndProc identified by the *hWnd* in the Specify_Windows_Handle call.

```
CM_ENTRY Set_Processing_Mode(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *receive_type,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

receive_type
Supplied parameter. Specifies whether subsequent calls on the conversation will be blocking or nonblocking. Possible values are:

CM_BLOCKING
Subsequent calls will return only when the operation is complete.

CM_NON_BLOCKING
Subsequent calls will return immediately after the operation has been initiated.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_STATE_CHECK
Primary return code; the previous incomplete operation on the conversation has not yet completed.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* or *processing_mode* is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Set_Receive_Type

The **Set_Receive_Type** call (function name **cmsrt**) specifies how the program will receive data on subsequent Receive calls. It overrides the default receive type established by the Initialize_Conversation or Accept_Conversation call. By default, the program waits for data to arrive if it is not available when the **Receive** call is issued.

The receive type value affects all subsequent **Receive** calls. It can be changed by reissuing **Set_Receive_Type**.

```
CM_ENTRY Set_Receive_Type(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *receive_type,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

receive_type
Supplied parameter. Specifies how data is to be received by the program on the subsequent Receive calls. Possible values are:

CM_RECEIVE_AND_WAIT
The local program receives any data currently available from the partner program. If no data is available, the local program waits for data to arrive.

CM_RECEIVE_IMMEDIATE
The local program receives any data currently available from the partner program. If no data is available, the local program does not wait.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* or *receive_type* is invalid, or the address of a variable is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Set_Return_Control

The **Set_Return_Control** call (function name **cmsrc**) is issued by the invoking program to specify when the local logical unit (LU), acting on the session request from the local program's Allocate call, should return control to the local program.

```
CM_ENTRY Set_Return_Control(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *return_control,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation.

return_control
Supplied parameter. Specifies when the local LU, acting on the Allocate call, should return control to the local program. The following are allowed values:

CM_IMMEDIATE
The LU allocates a contention-winner session, if one is immediately available, and returns control to the program.

CM_WHEN_SESSION_ALLOCATED
The LU does not return control to the program until it allocates a session or encounters errors. If a session is not available, the program waits for one. (If the session limit is zero, the LU returns control immediately.)

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is not in INITIALIZE state.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* or *return_control* is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation must be in INITIALIZE state.

There is no state change.

Remarks

This call overrides the default return control established by Initialize_Conversation. By default, control is returned when the session is allocated. This call cannot be issued after the Allocate call has been issued.

For further information about sessions, see Writing CPI-C Applications.

If the LU is unable to allocate a session, the notification is returned on the **Allocate** call.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Set_Send_Type

The **Set_Send_Type** call (function name **cmsst**) specifies how data will be sent by the next Send_Data call. It overrides the default send type established by Initialize_Conversation or Accept_Conversation. The default send type is CM_BUFFER_DATA, indicating that data only (and no control information) is to be sent.

The *send_type* value affects all subsequent **Send_Data** calls. It can be changed by reissuing **Set_Send_Type**.

```
CM_ENTRY Set_Send_Type(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *send_type,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

send_type
Supplied parameter. Specifies how data is sent by the next Send_Data call. Possible values are:

CM_BUFFER_DATA
The data pointed to by **Send_Data** is stored in a buffer until the buffer fills up or is flushed.

CM_SEND_AND_FLUSH
The data pointed to by **Send_Data** is to be sent immediately.

CM_SEND_AND_CONFIRM
The data is to be sent immediately with a request for confirmation.

CM_SEND_AND_PREP_TO_RECEIVE
The data is to be sent immediately along with notification to the partner program that the conversation state for the sending program is changing to RECEIVE.

CM_SEND_AND_DEALLOCATE
The data is to be sent immediately along with deallocation notification.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* or *send_type* is invalid.
- The *send_type* parameter is set to CM_SEND_AND_CONFIRM, but the conversation's synchronization level is set to CM_NONE.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation can be in any state except RESET.

There is no state change.

Remarks

The *send_type* values that cause additional information to be sent with the data pointed to by Send_Data let you economize on the number of calls issued. The following table summarizes **Send_Data** equivalences.

Send_Data with *send_type* set to this value	**Equates to Send_Data with *send_type* set to CM_BUFFER_DATA followed by**
CM_SEND_AND_FLUSH	Flush
CM_SEND_AND_CONFIRM	Confirm
CM_SEND_AND_PREP_TO_RECEIVE	Prepare_To_Receive

CM_SEND_AND_DEALLOCATE	Deallocate

Set_Sync_Level

The **Set_Sync_Level** call (function name **cmssl**) is issued by the invoking program to specify the synchronization level of the conversation. The synchronization level determines whether the programs synchronize their processing through the Confirm and Confirmed calls.

This call overrides the synchronization level established by the Initialize_Conversation call. The default synchronization level is CM_NONE, indicating no synchronization. This call cannot be issued after the Allocate call has been issued.

```
CM_ENTRY Set_Sync_Level(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *sync_level,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by **Initialize_Conversation**.

sync_level
Supplied parameter. Specifies the synchronization level of the conversation. Possible values are:

CM_NONE
The programs will not perform confirmation processing.

CM_CONFIRM
The programs can perform confirmation processing.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is not in INITIALIZE state.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* or *sync_level* is invalid.
- The *sync_level* parameter specifies CM_NONE but one of the following has occurred: the *send_type* parameter is set to CM_SEND_AND_CONFIRM, the *prepare_to_receive_type* parameter is set to CM_PREP_TO_RECEIVE_CONFIRM, or the *deallocate_type* is set to CM_DEALLOCATE_CONFIRM.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation must be in INITIALIZE state.

There is no state change.

Set_TP_Name

The **Set_TP_Name** call (function name **cmstpn**) is issued by the invoking program to specify the partner (invokable) program name. This call overrides the partner program name derived from the side information when the Initialize_Conversation call was issued. This call cannot be issued after the Allocate call has been issued. Issuing this call has no effect on the side information itself.

```
CM_ENTRY Set_TP_Name(
  unsigned char FAR *conversation_ID,
  unsigned char FAR *TP_name,
  CM_INT32 FAR *TP_name_length,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation.

TP_name
Supplied parameter. Specifies the starting address of the partner program name. The program name can contain up to 64 ASCII characters. The allowed characters are:

- Uppercase and lowercase letters.
- Numerals from 0 through 9.
- Special characters, except the space.

You cannot use **Set_TP_Name** to specify the name of an SNA service transaction program (TP). You can, however, use Set_CPIC_Side_Information to do this.

Double-byte character sets, such as Kanji, are not supported.

TP_name_length
Supplied parameter. Specifies the length of the partner program name. The range is from 1 through 64.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is not in INITIALIZE state.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The value specified by *conversation_ID* is invalid.
- The value specified by *TP_name_length* is out of range (greater than 64 or less than 1).
- The address of a variable is invalid.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product’s error log.

State Changes

The conversation must be in INITIALIZE state.

There is no state change.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Specify_Local_TP_Name

The **Specify_Local_TP_Name** call (function name **cmsltp**) is issued by the program to indicate that it is able to accept incoming conversations that are directed to the name given.

```
CM_ENTRY Specify_Local_TP_Name(
  unsigned char FAR *TP_name,
  CM_INT32 FAR *TP_name_length,
  CM_INT32 FAR *return_code
);
```

Parameters

TP_name
Supplied parameter. Specifies the starting address of the local transaction program (TP) name. The program name can contain up to 64 ASCII characters. The allowed characters are:

- Uppercase and lowercase letters.
- Numerals from 0 through 9.
- Special characters, except the space.

You cannot use **Specify_Local_TP_Name** to specify the name of an SNA service TP.

Double-byte character sets, such as Kanji, are not supported.

TP_name_length
Supplied parameter. Specifies the length of the local program name. The range is from 1 through 64.
return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.
CM_PROGRAM_PARAMETER_CHECK
Primary return code; one of the following occurred:

- The *TP_name* supplied is invalid.
- The value specified by *TP_name_length* is out of range (greater than 64 or less than 1).

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The call is not associated with a particular conversation, and no state restrictions apply.

There is no state change.

Remarks

A program can issue this call more than once to handle incoming conversations with more than one TP name. The program can discover the actual name on the incoming conversation by calling Extract_TP_Name.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Specify_Windows_Handle

The **Specify_Windows_Handle** call (function name **xchwnd**) sets the Microsoft® Windows® handle to which a message is sent on completion of an operation in nonblocking mode.

```
CM_ENTRY Specify_Windows_Handle(
  HWND hwndNotify,
  CM_INT32 FAR *return_code
);
```

Parameters

hwndNotify
Supplied parameter. Specifies the Windows handle to be notified when the outstanding operation completes.
return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.
CM_PROGRAM_PARAMETER_CHECK
The Windows handle is invalid.
CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The state change is dependent on the operation that completed and its return code.

Remarks

An application can set the processing mode by calling Set_Processing_Mode. If the Windows handle is set to NULL, or this call is never issued, the application must call Wait_For_Conversation to be notified when the outstanding operation completes.

When an asynchronous operation is complete, the application's window *hwndNotify* receives the message returned by **RegisterWindowMessage** with "WinAsyncCPIC" as the input string. The *wParam* value contains the *conversation_return_code* from the operation that is completing. Its values will depend on which operation was originally issued. The *lParam* argument contains the CM_PTR to the *conversation_ID* specified in the original function call.

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Test_Request_To_Send_Received

The **Test_Request_To_Send_Received** call (function name **cmtrts**) determines whether a request-to-send notification has been received from the partner program.

```
CM_ENTRY Test_Request_To_Send_Received(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *request_to_send_received,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Supplied parameter. Specifies the identifier for the conversation. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

request_to_send_received
Returned parameter. The request-to-send-received indicator. Possible values are:

CM_REQ_TO_SEND_RECEIVED
The partner program issued Request_To_Send, which requests the local program to change the conversation to RECEIVE state.

CM_REQ_TO_SEND_NOT_RECEIVED
The partner program did not issue **Request_To_Send**. This value is not relevant if *return_code* contains a value other than CM_OK.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_PROGRAM_PARAMETER_CHECK
Primary return code; the value specified by *conversation_ID* is invalid, or the address of a variable is invalid.

CM_PROGRAM_STATE_CHECK
Primary return code; the conversation is in a state other than SEND, RECEIVE, or SEND_PENDING.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error occurred and has been logged in the product's error log.

State Changes

The conversation must be in SEND, RECEIVE, or SEND_PENDING state.

There is no state change.

Wait_For_Conversation

The **Wait_For_Conversation** call (function name **cmwait**) waits for an operation to complete that has been initiated when the *processing_mode* conversation characteristic was set to CM_NON_BLOCKING and CM_OPERATION_INCOMPLETE was returned in the *return_code* parameter.

```
CM_ENTRY Wait_For_Conversation(
  unsigned char FAR *conversation_ID,
  CM_INT32 FAR *conversation_return_code,
  CM_INT32 FAR *return_code
);
```

Parameters

conversation_ID
Returned parameter. Specifies the identifier for the conversation on which the operation completed. The value of this parameter was returned by Initialize_Conversation or Accept_Conversation.

conversation_return_code
Returned parameter. Specifies the *return_code* from the operation that is completing. Its values will depend on which operation was originally issued.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
Primary return code; the call executed successfully.

CM_SYSTEM_EVENT
Primary return code; the wait completed not because the operation completed but because some system event occurred.

CM_PROGRAM_STATE_CHECK
Primary return code; the program has no incomplete operation outstanding.

CM_PRODUCT_SPECIFIC_ERROR
Primary return code; a product-specific error has occurred and has been logged in the product’s error log.

State Changes

The state change is dependent on the operation that completed and its return code.

Remarks

The program must have an incomplete operation outstanding on some conversation.

See Also

Set_Processing_Mode

Specify_Windows_Handle

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CPI-C Functions Not Supported

The Microsoft® Windows® CPI-C implementation does not support the following CPI-C 1.2 functions.

CPI-C Function	Function Name
Extract_Conversation_Context	cmectx
Extract_Maximum_Buffer_Size	cmembs
Extract_Secondary_Information	cmesi
Extract_Send_Receive_Mode	cmesrm
Extract_TP_ID	xceti
Initialize_Conversation_For_TP	xcinct
Initialize_For_Incoming	cminic
Receive_Expedited	cmrcvx
Release_Local_TP_Name	cmrltp
Send_Expedited	cmsndx
Set_Queue_Callback_Function	cmsqcf
Set_Queue_Processing_Mode	cmsqpm
Set_Send_Receive_Mode	cmssrm
Start_TP	xcstp
Wait_For_Completion	cmwcmp
End_TP	xcendt

Extensions for the Windows Environment

This section describes API extensions to Microsoft® Windows® Common Programming Interface for Communications (CPI-C) that allow nonblocking or asynchronous verb completion. Asynchronous verbs return control to the program immediately, without waiting for full execution, and must notify the application later when the verb has been completed. An application is also notified in response to the completion of a Wait_For_Conversation call. In contrast, synchronous verbs block, that is, the function call does not return until the call has completed.

Under Microsoft® Windows Server™ 2003 and Windows 2000, two methods are available for handling asynchronous verb completion:

- Message posting using window handles.
- Waiting on Win32® events.

The first method uses messages posted to a window handle to notify an application of verb completion. There is one such window for each CPI-C application. Each CPI-C conversation can have one asynchronous verb outstanding at any time. When a verb completes, the posting to the window takes as parameters the CPI-C conversation identifier of the verb that has completed, and the return code of the verb.

> **Note** The extensions using window handles and message posting described in this section were designed for all implementations and versions of Microsoft Windows. They are now supported only for Windows Server 2003 and Windows 2000.

A second method using Win32 events for notification is supported on Microsoft® Host Integration Server. The extensions using Win32 events described in this section (WinCPICSetEvent and WinCPICExtractEvent) operate only on Windows Server 2003 and Windows 2000 and offer the optimum application performance in the 32-bit operating environment. If an event has been registered with the conversation, an application can call the Win32 **WaitForSingleObject** or **WaitForMultipleObjects** function to wait to be notified of the completion of the verb.

Windows CPI-C allows multithreaded Windows-based processes. Multithreading is the running of several processes in rapid sequence within a single program. A process contains one or more threads of execution.

The extension descriptions in this section provide a definition of the function, syntax, return values, and remarks for using these Windows extensions in CPI-C programs.

This section contains:

- WinCPICCleanup
- WinCPICExtractEvent
- WinCPICIsBlocking
- WinCPICSetBlockingHook
- WinCPICSetEvent
- WinCPICStartup
- WinCPICUnhookBlockingHook

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WinCPICCleanup

The **WinCPICCleanup** function terminates and deregisters an application from a Microsoft® Windows® Common Programming Interface for Communications (CPI-C) implementation.

```
BOOL WINAPI WinCPICCleanup(void);
```

Return Values

The return value specifies whether the deregistration was successful. If the value is not zero, the application was successfully deregistered. The application was not deregistered if a value of zero is returned.

Remarks

Use **WinCPICCleanup** to indicate deregistration of a Windows CPI-C application from a Windows CPI-C implementation.

WinCPICExtractEvent

The **WinCPICExtractEvent** function provides a method for an application to determine the event handle being used for a Microsoft® Windows® Common Programming Interface for Communications (CPI-C) conversation.

```
VOID WINAPI WinCPICExtractEvent(
    unsigned char FAR *conversation_ID,
    HANDLE FAR *event_handle,
    CM_INT32 FAR *return_code
   );
```

Parameters

conversation_ID
Specifies the identifier for the conversation for which this event is used. This parameter is returned by the initial Accept_Conversation call.

event_handle
Returned parameter. The handle of the event being used by this conversation. If no handle has been registered, this parameter returns as a NULL.

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
The function executed successfully.

CM_PROGRAM_PARAMETER_CHECK
One or more of the parameters passed to this function are invalid.

Remarks

When a verb is issued on a nonblocking conversation, it returns CM_OPERATION_INCOMPLETE if it is going to complete asynchronously. If an event has been registered with the conversation, the application can call **WaitForSingleObject** or **WaitForMultipleObjects** to be notified of the completion of the verb. **WinCPICExtractEvent** allows a CPI-C application to determine this event handle. When the verb has completed, the application must call Wait_For_Conversation to determine the return code for the asynchronous verb. The Cancel_Conversation function can be called to cancel an operation and conversation.

If no event has been registered, the asynchronous verb completes as it does at present, which is by posting a message to the window that the application has registered with the CPI-C library.

WinCPICIsBlocking

The **WinCPICIsBlocking** function determines if a task is executing while waiting for a previous blocking call to finish.

```
BOOL WINAPI WinCPICIsBlocking(void);
```

Return Values

The return value specifies the outcome of the function. If the value is not zero, there is an outstanding blocking call awaiting completion. A value of zero indicates the absence of an outstanding blocking call.

Remarks

This call does not infer any information about a particular conversation; it is only intended to provide help to an application written to use the CM_BLOCKING characteristic of Set_Processing_Mode. **WinCPICIsBlocking** serves the same purpose as **InSendMessage** in the Microsoft® Windows® API. Legacy applications targeted at Windows version 3.*x* that support multiple conversations must specify CM_NONBLOCKING in **Set_Processing_Mode** so they can support multiple outstanding operations simultaneously. Applications are still limited to one outstanding operation per conversation in all environments.

Although a call issued on a blocking function appears to an application as though it blocks, the Windows CPI-C dynamic-link library (DLL) has to relinquish the processor to allow other applications to run. This means that it is possible for the application that issued the blocking call to be re-entered, depending on the messages it receives. In this instance, **WinCPICIsBlocking** can be used to determine whether the application task currently has been re-entered while waiting for an outstanding blocking call to finish. Note that Windows CPI-C prohibits more than one outstanding blocking call per thread.

See Also

Specify_Windows_Handle

WinCPICSetBlockingHook

WinCPICUnhookBlockingHook

WinCPICSetBlockingHook

The **WinCPICSetBlockingHook** function allows a Microsoft® Windows® Common Programming Interface for Communications (CPI-C) implementation to block CPI-C function calls by means of a new function. This legacy call was used by Microsoft® Windows® version 3.*x* applications to make blocking calls without blocking the rest of the system. By default in the Microsoft® Windows Server™ 2003 or Windows 2000 system, blocking calls suspend the calling application's thread until the request is finished.

Parameters

lpBlockFunc
Specifies the procedure instance address of the blocking function to be installed.

Return Values

The return value points to the procedure instance of the previously installed blocking function. The application or library that calls **WinCPICSetBlockingHook** should save this return value so that it can be restored if needed. (If nesting is not important, the application can simply discard the value returned by **WinCPICSetBlockingHook** and eventually use WinCPICUnhookBlockingHook to restore the default mechanism.)

Remarks

A Windows CPI-C implementation has a default mechanism by which blocking CPI-C functions are implemented. This function gives the application the ability to execute its own function at blocking time in place of the default function.

The default blocking function is equivalent to:

```
BOOL DefaultBlockingHook (void)  {
    MSG msg;
    /* get the next message if any */
    if ( PeekMessage (&msg,0,0,PM_NOREMOVE)  )  {
        if ( msg.message = = WM_QUIT  )
            return FALSE;   // let app process WM_QUIT
        PeekMessage (&msg,0,0,PM_REMOVE) ;
        TranslateMessage (&msg) ;
        DispatchMessage (&msg) ;
    }
    /* TRUE if no WM_QUIT received */
    return TRUE;
}
```

The **WinCPICSetBlockingHook** function is provided to support applications that require more complex message processing, for example, those employing the multiple document interface (MDI) model or applications with Menu accelerators (TranslateAccelerator).

Blocking functions must return FALSE in response to a WM_QUIT message so Windows CPI-C can return control to the application to process the message and terminate gracefully. Otherwise, the function should return TRUE.

See Also

Set_Processing_Mode

Specify_Windows_Handle

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WinCPICSetEvent

The **WinCPICSetEvent** function associates an event handle with a verb completion.

```
VOID WINAPI WinCPICSetEvent(
    unsigned char FAR * conversation_ID,
    HANDLE FAR * event_handle,
    CM_INT32 FAR *return_code
   );
```

Parameters

conversation_ID
Specifies the identifier for the conversation for which this event is used. This parameter is returned by the initial Accept_Conversation call.

event_handle
The handle of the event that is to be cleared when an asynchronous verb on the conversation completes. This parameter can replace an already defined event or remove an already defined event (by having NULL as the parameter).

return_code
The code returned from this call. The valid return codes are listed later in this topic.

Return Codes

CM_OK
The function executed successfully.

CM_PROGRAM_PARAMETER_CHECK
One or more of the parameters passed to this function are invalid.

CM_OPERATION_NOT_ACCEPTED
This value indicates that a previous operation on this conversation is incomplete and the **WinCPICSetEvent** call was not accepted.

Remarks

When a verb is issued on a nonblocking conversation, it returns CM_OPERATION_INCOMPLETE if it is going to complete asynchronously. If an event has been registered with the conversation, the application can call **WaitForSingleObject** or **WaitForMultipleObjects** to be notified of the completion of the verb. When the verb has completed, the application must call Wait_For_Conversation to determine the return code for the asynchronous verb.

It is the responsibility of the application to reset the event, as it is with other APIs.

See Also

Cancel_Conversation

WinCPICStartup

The **WinCPICStartup** function allows an application to specify the version of Microsoft® Windows® Common Programming Interface for Communications (CPI-C) required and to retrieve details of the specific Windows CPI-C implementation. This function must be called by an application to register itself with a Windows CPI-C implementation before issuing any further Windows CPI-C calls.

```
INT WINAPI WinCPICStartup(
    WORD wVersionRequired,
    LPWCPICDATA lpwcpicdata
   );
```

Parameters

wVersionRequired
Specifies the version of Windows CPI-C support required. The high-order byte specifies the minor version (revision) number. The low-order byte specifies the major version number.

lpwcpicdata
A pointer to the CPI-C data structure. The **CPICDATA** structure is defined as follows:

```
typedef struct {
....WORD wVersion;
    char szDescription[WCPICDESCRIPTION_LEN+1];
}  CPICDATA, FAR * LPWCPICDATA;
```

WCPIDESCRIPTION is defined to be 127 and the structure members are as follows:

wVersion

The version of Windows CPI-C supported. The high-order byte specifies the minor version (revision) number. The low-order byte specifies the major version number.

szDescription

The description string describing the CPI-C version supported.

Return Values

The return value specifies whether the application was registered successfully and whether the Windows CPI-C implementation can support the specified version number. If the value is zero, it was registered successfully. Otherwise, the return value is one of the following:

WCPICSYSNOTRERADY
The underlying network subsystem is not ready for network communication.

WCPICVERNOTSUPPORTED
The version of Windows CPI-C support requested is not provided by this particular Windows CPI-C implementation.

WCPICINVALID
The Windows CPI-C version specified by the application is not supported by this dynamic-link library (DLL).

Remarks

To support future Windows CPI-C implementations and applications that may have functionality differences from Windows CPI-C version 1.0, a negotiation takes place in **WinCPICStartup**. An application passes to **WinCPICStartup** the Windows CPI-C version that it can use. If this version is lower than the lowest version supported by the Windows CPI-C DLL, the DLL cannot support the application and the **WinCPICStartup** call fails. If the version is not lower, however, the call succeeds and returns the highest version of Windows CPI-C supported by the DLL. If this version is lower than the lowest version supported by the application, the application either fails its initialization or attempts to find another Windows CPI-C DLL on the system.

This negotiation allows both a Windows CPI-C DLL and a Windows CPI-C application to support a range of Windows CPI-C versions. An application can successfully use a DLL if there is any overlap in the versions. The following table illustrates how **WinCPICStartup** works in conjunction with different application and DLL versions.

Application versions	DLL versions	To WinCPICStartup	From WinCPICStartup	Result
1.0	1.0	1.0	1.0	Use 1.0
1.0, 2.0	1.0	2.0	1.0	Use 1.0

1.0	1.0, 2.0	1.0	2.0	Use 1.0
1.0	2.0, 3.0	1.0	WCPICINVALID	Fail
2.0, 3.0	1.0	3.0	1.0	App Fails
1.0, 2.0, 3.0	1.0, 2.0, 3.0	3.0	3.0	Use 3.0

Details of the actual Windows CPI-C implementation are described in the **WHLLDATA** structure defined as follows:

```
typedef struct tagWCPICDATA { WORD wVersion;
            char szDescription[WHLLDESCRIPTION_LEN+1];
            } WCPICDATA, FAR *LPWCPICDATA;
```

Having made its last Windows CPI-C call, an application should call the WinCPICCleanup routine.

Each Windows CPI-C implementation must make a **WinCPICStartup** call before issuing any other Windows CPI-C calls.

WinCPICUnhookBlockingHook

The **WinCPICUnhookBlockingHook** function removes any previous blocking hook that has been installed and reinstalls the default blocking mechanism.

```
BOOL WINAPI WinCPICUnhookBlockingHook(void);
```

Return Values

The return value specifies the outcome of the function. It is not zero if the default mechanism is successfully reinstalled. The value is zero if the mechanism did not reinstall.

See Also

WinCPICSetBlockingHook

CPI-C Common Return Codes

This section describes the return codes for Common Programming Interface for Communications (CPI-C) calls. The return codes are listed in integer order.

Call-specific return codes are described for the individual calls in CPI-C Calls.

0

CM_OK
The call executed successfully.

1

CM_ALLOCATION_FAILURE_NO_RETRY
The conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error. To determine the error, the system administrator should examine the error log file. Do not retry the allocation until the error has been corrected.

2

CM_ALLOCATION_FAILURE_RETRY
The conversation could not be allocated because of a temporary condition, such as a link failure. The reason for the failure is logged in the system error log. Retry the allocation.

3

CM_CONVERSATION_TYPE_MISMATCH
The partner LU or program does not support the conversation type (basic or mapped) specified in the allocation request.

5

CM_PIP_NOT_SPECIFIED_CORRECTLY
The allocation request was rejected by a non-CPI-C LU 6.2 transaction program (TP). The partner program requires one or more PIP data variables, which are not supported by CPI-C.

6

CM_SECURITY_NOT_VALID
The user identifier or password specified in the allocation request was not accepted by the partner logical unit (LU).

8

CM_SYNC_LVL_NOT_SUPPORTED_PGM
The partner program does not support the synchronization level specified in the allocation request.

9

CM_TPN_NOT_RECOGNIZED
The partner LU does not recognize the program name specified in the allocation request.

10

CM_TP_NOT_AVAILABLE_NO_RETRY
The partner LU cannot start the program specified in the allocation request because of a permanent condition. The reason for the error may be logged on the remote node. Do not retry the allocation until the error has been corrected.

11

CM_TP_NOT_AVAILABLE_RETRY
The partner LU cannot start the program specified in the allocation request because of a temporary condition. The reason for the error may be logged on the remote node. Retry the allocation.

17

CM_DEALLOCATED_ABEND
The conversation has been deallocated for one of the following reasons:

- The remote program issued Deallocate with the type parameter set to CM_DEALLOCATE_ABEND. If the conversation for the remote program was in RECEIVE state when the call was issued, information sent by the local program and not yet received by the remote program is purged.

- The partner program terminated normally but did not deallocate the conversation before terminating.

18

CM_DEALLOCATED_NORMAL
This return code does not indicate an error.

The partner program issued the Deallocate call with *deallocate_type* set to one of the following:

- CM_DEALLOCATE_FLUSH.
- CM_DEALLOCATE_SYNC_LEVEL with the synchronization level of the conversation specified as CM_NONE.

19

CM_PARAMETER_ERROR
The local program specified an invalid argument in one of its parameters.

20

CM_PRODUCT_SPECIFIC_ERROR
A product-specific error occurred and has been logged in the product's error log.

21

CM_PROGRAM_ERROR_NO_TRUNC
While in SEND state or in SEND-PENDING state with the error direction set to CM_SEND_ERROR, the partner program issued Send_Error. Data was not truncated.

22

CM_PROGRAM_ERROR_PURGING
One of the following occurred:

- While in RECEIVE or CONFIRM state, the partner program issued Send_Error. Data sent but not yet received is purged.
- While in SEND-PENDING state with the error direction set to CM_RECEIVE_ERROR, the partner program issued **Send_Error**. Data was not purged.

23

CM_PROGRAM_ERROR_TRUNC (for a basic conversation)
In SEND state, before finishing sending a complete logical record, the partner program issued Send_Error. The local program may have received the first part of the logical record through a Receive call.

24

CM_PROGRAM_PARAMETER_CHECK
A parameter or the address of a variable is invalid. For details, see individual calls in CPI-C Calls.

25

CM_PROGRAM_STATE_CHECK
The call was not issued in an allowed conversation state. For details, see individual calls in CPI-C Calls.

26

CM_RESOURCE_FAILURE_NO_RETRY
One of the following occurred:

- The conversation was terminated prematurely because of a permanent condition. Do not retry until the error has been corrected.
- The partner program did not deallocate the conversation before terminating normally.

27

CM_RESOURCE_FAILURE_RETRY
The conversation was terminated prematurely because of a temporary condition, such as modem failure. Retry the conversation.

28

CM_UNSUCCESSFUL

The verb issued by the local program was not executed successfully.

30

CM_DEALLOCATED_ABEND_SVC
The conversation has been deallocated for one of the following reasons:

- The partner program issued Deallocate with the type parameter set to ABEND_SVC.
- The partner program did not deallocate the conversation before terminating.

If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

31

CM_DEALLOCATED_ABEND_TIMER
The conversation has been deallocated because the partner program issued Deallocate with the type parameter set to ABEND_TIMER. If the conversation is in RECEIVE state for the partner program when this call is issued by the local program, data sent by the local program and not yet received by the partner program is purged.

32

CM_SVC_ERROR_NO_TRUNC (for a basic conversation)
While in SEND state, the partner program or partner LU issued Send_Error with the type parameter set to SVC. Data was not truncated.

33

CM_SVC_ERROR_PURGING
While in SEND state, the partner program or partner LU issued Send_Error with the type parameter set to SVC. Data sent to the partner program may have been purged.

34

CM_SVC_ERROR_TRUNC (for a basic conversation)
While in RECEIVE or CONFIRM state, the partner program or partner LU issued Send_Error with the type parameter set to SVC before it finished sending a complete logical record. The local program may have received the first part of the logical record.

35

CM_OPERATION_INCOMPLETE
The operation has not completed and is still in progress. The program can issue Wait_For_Conversation to await the completion of the operation, or Cancel_Conversation to cancel the operation and conversation. If Specify_Windows_Handle has been called, the application should wait for notification by a windows message and not call **Wait_For_Conversation**.

36

CM_SYSTEM_EVENT
This error code is not used by Microsoft Host Integration Server 2004.

37

CM_OPERATION_NOT_ACCEPTED
A previous operation on this conversation is incomplete.

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LUA Programmer's Reference

This section of the Microsoft® Host Integration Server 2004 Developer's Guide lists the verbs, extensions, control blocks, and return codes that describe the logical unit application (LUA) programming interface.

For general information about programming for LUA, see LUA Programmer's Guide.

For sample code using LUA, see LUA Samples.

This section contains:

- LUA RUI Verbs
- LUA SLI Verbs
- LUA Extensions for the Windows Environment
- SNA Services Enhancement to the Windows LUA Environment
- LUA Verb Control Blocks
- LUA Common Return Codes

LUA RUI Verbs

This section describes the Microsoft® Windows® logical unit application (LUA) Request Unit Interface (RUI) verbs. It provides the following information for each RUI verb:

- Details of the LUA verb control block (VCB) structure.
- A description of the verb and its purpose.
- Parameters (VCB structure members) supplied to and returned by LUA. The description of each parameter includes information about the valid values for that parameter.
- Interaction with other verbs.

The verb descriptions in this section include parameter values specific to each verb. For a complete description of the VCB structure for both RUI and Session Level Interface (SLI) verbs, see LUA Verb Control Blocks.

This section contains:

- RUI_BID
- RUI_INIT
- RUI_PURGE
- RUI_READ
- RUI_TERM
- RUI_WRITE

RUI_BID

The **RUI_BID** verb notifies the Request Unit Interface (RUI) application that a message is waiting to be read using RUI_READ.

The following structure describes the **LUA_COMMON** member of the verb control block (VCB) used by **RUI_BID**:

```
struct LUA_COMMON {
    unsigned short lua_verb;
    unsigned short lua_verb_length;
    unsigned short lua_prim_rc;
    unsigned long  lua_sec_rc;
    unsigned short lua_opcode;
    unsigned long  lua_correlator;
    unsigned char  lua_luname[8];
    unsigned short lua_extension_list_offset;
    unsigned short lua_cobol_offset;
    unsigned long  lua_sid;
    unsigned short lua_max_length;
    unsigned short lua_data_length;
    char FAR *     lua_data_ptr;
    unsigned long  lua_post_handle;
    struct LUA_TH  lua_th;
    struct LUA_RH  lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char  lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char  lua_resv56[7];
    unsigned char  lua_encr_decr_option;
};
```

The following union describes the **LUA_SPECIFIC** member of the verb control block (VCB) used by **RUI_BID**. Other union members are omitted for clarity:

```
union LUA_SPECIFIC {
    unsigned char lua_peek_data[12];
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_RUI for RUI verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the logical unit application (LUA) VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_RUI_BID.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

RUI_BID only requires this parameter if **lua_sid** is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by RUI in Microsoft® Host Integration Server and should be set to zero.

lua_cobol_offset
Not used by LUA in Host Integration Server and should be zero.

lua_sid

Supplied parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length

Not used by **RUI_BID** and should be set to zero.

lua_data_length

Returned parameter. Specifies the length of data returned in **lua_peek_data** for **RUI_BID**.

lua_data_ptr

This parameter is not used and should be set to zero.

lua_post_handle

Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows® 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th

Returned parameter. Contains the SNA transmission header (TH) of the message received. Various subparameters are set for write functions and returned for read and bid functions. Its subparameters are as follows:

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits. Defines the type of data segment. The following values are valid:

0x00 Middle segment
0x04 Last segment
0x08 First segment
0x0C Only segment

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh

Returned parameter. Contains the SNA request/response header (RH) of the message sent or received. It is set for the write function and returned by the read and bid functions. Its subparameters are as follows:

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

RU category, two bits. The following values are valid:

LUA_RH_FMD (**0x00**) FM data segment
LUA_RH_NC (**0x20**) Network control
LUA_RH_DFC (**0x40**) Data flow control
LUA_RH_SC (**0x60**) Session control

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

SSCP expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

lua_message_type

Returned parameter. Specifies the type of SNA message indicated to **RUI_BID**. Possible values are:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIND

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_CLEAR

LUA_MESSAGE_TYPE_CRV

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RQR

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SHUTD

LUA_MESSAGE_TYPE_SIGNAL

LUA_MESSAGE_TYPE_SDT

LUA_MESSAGE_TYPE_STSN

LUA_MESSAGE_TYPE_UNBIND

The Session Level Interface (SLI) receives and responds to the BIND, CRV, and STSN requests through the LUA interface extension routines.

LU_DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2

Returned parameter. Contains flags for messages returned by LUA. Its subparameters are as follows:

lua_flag2.bid_enable

Indicates that **RUI_BID** was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56
Reserved and should be set to zero.
lua_encr_decr_option
Reserved and should be set to zero.
lua_peek_data
The union member of **LUA_SPECIFIC** used by the **RUI_BID** and SLI_BID verbs. Returned parameter. Contains up to 12 bytes of the data waiting to be read.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.
LUA_CANCELED
Primary return code; the verb did not complete successfully because it was canceled by another verb.

LUA_TERMINATED

Secondary return code; RUI_TERM was issued while this verb was pending.

LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_BID_ALREADY_ENABLED

Secondary return code; **RUI_BID** was rejected because a previous **RUI_BID** was already outstanding. Only one **RUI_BID** can be outstanding at any one time.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved field in the verb record, or a parameter not used by this verb, was set to a nonzero value.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with the value of **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_RUI_SESSION

Secondary return code; RUI_INIT has not yet completed successfully for the LU name specified on this verb.

LUA_UNSUCCESSFUL
Primary return code; the verb record supplied was valid, but the verb did not complete successfully.

LUA_INVALID_PROCESS

Secondary return code; the process that issued this verb was not the same process that issued **RUI_INIT** for this session. Only the process that started a session can issue verbs on that session.

LUA_NEGATIVE_RSP
Primary return code; LUA detected an error in the data received from the host. Instead of passing the received message to the application on RUI_READ, LUA discards the message (and the rest of the chain if it is in a chain), and sends a negative response to the host.

LUA informs the application on a subsequent **RUI_READ** or **RUI_BID** that a negative response was sent.

The secondary return code contains the sense code sent to the host on the negative response. For information about interpreting the sense code values that can be returned, see SNA Considerations Using LUA.

A zero secondary return code indicates that, following a previous RUI_WRITE of a negative response to a message in the middle of a chain, LUA has now received and discarded all messages from this chain.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_SESSION_FAILURE
Primary return code; a required Host Integration Server component has terminated.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; indicates that the LUA session has failed because of a problem with the link service or with the host LU.

LUA_RUI_LOGIC_ERROR

Secondary return code; an internal error was detected within LUA. This error should not occur during normal operation.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

Remarks

RUI_BID is used by applications that require notification that a message is waiting to be read. This allows the application to determine how it will handle the message before issuing RUI_READ.

When a message is available, **RUI_BID** returns with details of the message flow on which it was received, the message type, the TH and RH of the message, and up to 12 bytes of message data.

The main difference between **RUI_BID** and **RUI_READ** is that **RUI_BID** allows the application to check the data without removing it from the incoming message queue, so it can be left and accessed later. **RUI_READ** removes the message from the queue, so when the application reads the data it must also process it.

Note the following when using **RUI_BID**:

- RUI_INIT must complete successfully before this verb is issued.
- Only one **RUI_BID** can be outstanding at any one time.
- After **RUI_BID** has completed successfully, it can be reissued by setting **lua_flag1.bid_enable** on a subsequent RUI_READ. If the verb is reissued in this way, the application must not free or modify the storage associated with the **RUI_BID** record.
- If a message arrives from the host when **RUI_READ** and **RUI_BID** are both outstanding, **RUI_READ** completes and **RUI_BID** is left in progress.

Each message that arrives is bid only once. After **RUI_BID** indicates that data is waiting on a particular session flow, the application issues **RUI_READ** to receive the data. Any subsequent **RUI_BID** does not report data arriving on that session flow until the message that was bid has been accepted by issuing **RUI_READ**.

In general, the **lua_data_length** parameter returned on this verb indicates only the length of data in **lua_peek_data**, not the total length of data on the waiting message (except when a value of less than 12 is returned). The application should ensure that the data length on **RUI_READ** that accepts the data is sufficient to contain the message.

See Also

RUI_INIT, RUI_READ, RUI_TERM, RUI_WRITE, SLI_OPEN

RUI_INIT

The **RUI_INIT** verb transfers control of the specified logical unit (LU) to the Microsoft® Windows® logical unit application (LUA) application. **RUI_INIT** establishes a session between the system services control point (SSCP) and the specified LU.

> **Note** For 3270 emulator users, a Microsoft Host Integration Server extension has been added that enables you to use 3270 LUs rather than the LUA LUs. For more information, see Remarks in this topic.

The following structure describes the **LUA_COMMON** member of the verb control block (VCB) used by **RUI_INIT**.

```
struct LUA_COMMON {
    unsigned short lua_verb;
    unsigned short lua_verb_length;
    unsigned short lua_prim_rc;
    unsigned long  lua_sec_rc;
    unsigned short lua_opcode;
    unsigned long  lua_correlator;
    unsigned char  lua_luname[8];
    unsigned short lua_extension_list_offset;
    unsigned short lua_cobol_offset;
    unsigned long  lua_sid;
    unsigned short lua_max_length;
    unsigned short lua_data_length;
    char FAR *     lua_data_ptr;
    unsigned long  lua_post_handle;
    struct LUA_TH  lua_th;
    struct LUA_RH  lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char  lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char  lua_resv56[7];
    unsigned char  lua_encr_decr_option;
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_RUI for Request Unit Interface (RUI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_RUI_INIT.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

RUI_INIT requires this parameter.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by RUI in Host Integration Server and should be set to zero.

lua_cobol_offset
Not used by LUA in Host Integration Server and should be zero.

lua_sid
Returned parameter. Specifies the session identifier.

lua_max_length
Not used by **RUI_INIT** and should be set to zero.

lua_data_length
Not used by **RUI_INIT** and should be set to zero.
lua_data_ptr
Not used by **RUI_INIT** and should be set to zero.
lua_post_handle
Supplied parameter. Used under Microsoft® Windows Server™ 2003 or Windows® 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.
lua_th
Not used by **RUI_INIT** and should be set to zero.
lua_rh
Not used by **RUI_INIT** and should be set to zero.
lua_flag1
Not used by **RUI_INIT** and should be set to zero.
lua_message_type
Specifies the type of the inbound or outbound SNA commands and data. This is a returned parameter for **RUI_INIT**. Possible values are:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIND

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_CLEAR

LUA_MESSAGE_TYPE_CRV

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RQR

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SHUTD

LUA_MESSAGE_TYPE_SIGNAL

LUA_MESSAGE_TYPE_SDT

LUA_MESSAGE_TYPE_STSN

LUA_MESSAGE_TYPE_UNBIND

The Session Level Interface (SLI) receives and responds to the BIND, CRV, and STSN requests through the LUA interface extension routines.

LU_DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2
Returned parameter. Contains flags for messages returned by LUA.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

RUI_INIT always completes asynchronously unless it returns an error such as LUA_PARAMETER_CHECK).

lua_resv56

Supplied parameter. A reserved field used by **RUI_INIT** and SLI_OPEN. All other reserved fields in the array must be left blank. For more information, see the discussion of these Host Integration Server extensions in the Remarks section.

lua_resv56[1]

Supplied parameter. Indicates whether an RUI application can access LUs configured as 3270 LUs, in addition to LUA LUs. If this parameter is nonzero, 3270 LUs can be accessed.

lua_resv56[2]

Supplied parameter. Indicates whether the RUI library will release the LU when the LU-SSCP session or connection goes away. If this parameter is nonzero, the LU will not be released.

lua_resv56[3]

Supplied parameter. Indicates whether incomplete reads are supported. If this parameter is set to a nonzero value, incomplete or truncated reads are supported. For more details, see the remarks for RUI_READ.

lua_resv56[4]

Supplied parameter. Indicates whether the RUI library will allow the application to keep hold of the LU if it is recycled at the host. If this parameter is nonzero, the application can keep hold of the LU.

lua_encr_decr_option

Field for cryptography options. On **RUI_INIT**, only the following are supported:

lua_encr_decr_option = 0

lua_encr_decr_option = 128

Values from 1 through 127 are not supported.

Return Codes

LUA_OK

Primary return code; the verb executed successfully.

LUA_CANCELED

Primary return code; the verb did not complete successfully because it was canceled by another verb.

LUA_TERMINATED

Secondary return code; RUI_TERM was issued before **RUI_INIT** completed.

LUA_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

LUA_INVALID_LUNAME

Secondary return code; the **lua_luname** parameter did not match any LUA LU name or LU pool name in the configuration file.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved field in the verb record, or a parameter not used by this verb, was set to a nonzero value.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with the value of **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_DUPLICATE_RUI_INIT

Secondary return code; the **lua_luname** parameter specified an LU name or LU pool name already in use by this application (or for which this application already has **RUI_INIT** in progress).

LUA_UNSUCCESSFUL

Primary return code; the verb record supplied was valid, but the verb did not complete successfully.

LUA_COMMAND_COUNT_ERROR

Secondary return code, which indicates one of the following errors occurred:

The verb could not be issued because the application had already reached its maximum number of active sessions. On Windows Server 2003 or Windows 2000, an application can have as many as 15,000 sessions active at any time.

The verb specified the name of an LU pool or the name of an LU in a pool, but all the LUs in the pool are in use.

LUA_ENCR_DECR_LOAD_ERROR

Secondary return code; the verb specified a value for **lua_encr_decr_option** other than 0 or 128.

LUA_INVALID_PROCESS

Secondary return code; the LU specified by **lua_luname** is in use by another process.

LUA_LINK_NOT_STARTED

Secondary return code; the connection to the host has not been started; none of the link services it could use are active.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_SESSION_FAILURE
Primary return code; a required Host Integration Server component has terminated.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; indicates that the LUA session failed because of a problem with the link service or with the host LU.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

Remarks

This verb must be the first LUA verb issued for the session. Until this verb has completed successfully, the only other LUA verb that can be issued for this session is RUI_TERM (which terminates a pending **RUI_INIT**).

All other verbs issued on this session must identify the session using one of the following parameters from this verb:

- The session identifier, returned to the application in **lua_sid**.
- The LU name or LU pool name, supplied by the application in the **lua_luname** parameter.

RUI_INIT completes after an ACTLU message is received from the host. If necessary, the verb waits indefinitely. If an ACTLU has already been received prior to **RUI_INIT**, LUA sends a NOTIFY to the host to inform it that the LU is ready for use.

Note Neither ACTLU nor NOTIFY is visible to the LUA application.

After **RUI_INIT** has completed successfully, this session uses the LU for which the session was started. No other LUA session (from this or any other application) can use the LU until **RUI_TERM** is issued, or until an LUA_SESSION_FAILURE primary return code is received.

Using 3270 LUs

To provide 3270 emulator users the ability to use the Emulator Interface Specification (EIS) configuration call with the RUI API, a Host Integration Server extension has been added to the RUI. This extension allows you to use 3270 LUs rather than LUA LUs. If an application sets **lua_resv56[1]** to a nonzero value on the **RUI_INIT** call, 3270 LUs can be used.

Do Not Release the LU

If an application sets **lua_resv56[2]** to a nonzero value on the **RUI_INIT** call, the RUI library will not release the LU when the LU-SSCP session or connection goes away. When this Host Integration Server extension is enabled, the application does not have to issue a new **RUI_INIT** after a session failure or connection failure. When the LU-SSCP session comes back up (the application can use **WinRUIGetLastInitStatus** to detect this), the application can start using it again.

Support Chunking on this Session

If an application sets **lua_resv56[3]** to a nonzero value on the **RUI_INIT** session establishment, this enables a Host Integration Server extension that can change the behavior of **RUI_READ**. The default behavior for an **RUI_READ** call is to truncate data (discarding any data remaining) if the application's data buffer is not large enough to receive all of the data in the RU, returning an error code. When **lua_resv56[3]** is set to a nonzero value on the **RUI_INIT** call, an **RUI_READ** issued where the application's data buffer is not large enough will not result in the RU data being discarded. The **RUI_READ** verb will return success (LUA_OK) for the primary return code and LUA_DATA_INCOMPLETE for the secondary return code. Subsequent **RUI_READ** requests can then be issued to retrieve the data that exceeded the application's data buffer.

Ignore DACTLUs

If an application sets **lua_resv56[4]** to a nonzero value on the **RUI_INIT** session establishment, this enables a Host Integration Server extension, and the RUI library will allow the application to keep hold of the LU if it is recycled at the host (that is, deactivated and reactivated).

> **Note** All other reserved fields must be left blank.

For more information, see the description of the sepdcrec function in the section of the Software Development Kit (SDK) Help on the 3270 Emulator Interface Specification.

Encryption

Session-level cryptography is implemented through Cryptography Verification (CRV) requests. RUI applications must perform all necessary processing of these requests. For all interfaces other than RUI, CRV requests are rejected with a negative response by Host Integration Server.

For **RUI_INIT**, the following options are supported:

- **lua_encr_decr_option** = 0
- **lua_encr_decr_option** = 128

Values from 1 through 127 (ACSRENCR and ACSROECR routines) are not supported.

The sending application is responsible for padding data to a multiple of eight bytes and for setting the padded data indicator bit in the RH as well as for encryption. The receiving application is responsible for removing the padding after decryption.

See Also

RUI_INIT, RUI_TERM, SLI_OPEN

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

RUI_PURGE

The **RUI_PURGE** verb cancels a previous RUI_READ.

The following structure describes the **LUA_COMMON** member of the verb control block (VCB) used by **RUI_PURGE**.

```
struct LUA_COMMON {
    unsigned short lua_verb;
    unsigned short lua_verb_length;
    unsigned short lua_prim_rc;
    unsigned long  lua_sec_rc;
    unsigned short lua_opcode;
    unsigned long  lua_correlator;
    unsigned char  lua_luname[8];
    unsigned short lua_extension_list_offset;
    unsigned short lua_cobol_offset;
    unsigned long  lua_sid;
    unsigned short lua_max_length;
    unsigned short lua_data_length;
    char FAR *      lua_data_ptr;
    unsigned long  lua_post_handle;
    struct LUA_TH  lua_th;
    struct LUA_RH  lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char  lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char  lua_resv56[7];
    unsigned char  lua_encr_decr_option;
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_RUI for Request Unit Interface (RUI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the logical unit application (LUA) VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_RUI_PURGE.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

RUI_PURGE only requires this parameter if **lua_sid** is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by RUI in Microsoft® Host Integration Server and should be set to zero.

lua_cobol_offset
Not used by LUA in Host Integration Server and should be zero.

lua_sid
Supplied parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length
Not used by **RUI_PURGE** and should be set to zero.

lua_data_length
Not used by **RUI_PURGE** and should be set to zero.
lua_data_ptr
Points to the location of the RUI_READ verb's VCB that is to be canceled.
lua_post_handle
Supplied parameter. Used under Microsoft® Windows Server™ 2003 or Windows® 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.
lua_th
Not used by **RUI_PURGE** and should be set to zero.
lua_rh
Not used by **RUI_PURGE** and should be set to zero.
lua_flag1
Not used by **RUI_PURGE** and should be set to zero.
lua_message_type
Not used by **RUI_PURGE** and should be set to zero.
lua_flag2
Returned parameter. Contains flags for messages returned by LUA.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_resv56
Reserved and should be set to zero.
lua_encr_decr_option
Reserved and should be set to zero.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.
LUA_CANCELED
Primary return code; the verb did not complete successfully because it was canceled by another verb.

LUA_TERMINATED

Secondary return code; RUI_TERM was issued while **RUI_PURGE** was pending.

LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_BAD_DATA_PTR

Secondary return code; the **lua_data_ptr** parameter was set to null.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved field in the verb record, or a parameter not used by this verb, was set to a nonzero value.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with the value of **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_RUI_SESSION

Secondary return code; RUI_INIT has not yet completed successfully for the LU name specified on this verb.

LUA_UNSUCCESSFUL
Primary return code; the verb supplied was valid, but the verb did not complete successfully.

LUA_INVALID_PROCESS

Secondary return code; the OS/2 process that issued this verb was not the same process that issued **RUI_INIT** for this session. Only the process that started a session can issue verbs on that session.

LUA_NO_READ_TO_PURGE

Secondary return code; either **lua_data_ptr** did not contain a pointer to an RUI_READ VCB, or **RUI_READ** completed before **RUI_PURGE** was issued.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node was broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_SESSION_FAILURE
Primary return code; a required Host Integration Server component has terminated.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; indicates that the LUA session failed because of a problem with the link service or with the host LU.

LUA_RUI_LOGIC_ERROR

Secondary return code; an internal error was detected within LUA. This error should not occur during normal operation.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

Remarks

RUI_READ can wait indefinitely if it is sent without using the **lua_flag1.nowait** (immediate return) option and no data is available on the specified flow. **RUI_PURGE** forces the waiting verb to return (with the primary return code LUA_CANCELED).

This verb is used only when **RUI_READ** has been issued and is pending completion. (The primary return code is LUA_IN_PROGRESS.)

See Also

RUI_INIT, RUI_READ, RUI_TERM, RUI_WRITE, SLI_OPEN, SLI_PURGE, SLI_RECEIVE, SLI_SEND

RUI_READ

The **RUI_READ** verb receives responses, SNA commands, and data into a Microsoft® Windows® logical unit application (LUA) application's buffer.

The following structure describes the **LUA_COMMON** member of the verb control block (VCB) used by **RUI_READ**.

```
struct LUA_COMMON {
    unsigned short lua_verb;
    unsigned short lua_verb_length;
    unsigned short lua_prim_rc;
    unsigned long  lua_sec_rc;
    unsigned short lua_opcode;
    unsigned long  lua_correlator;
    unsigned char  lua_luname[8];
    unsigned short lua_extension_list_offset;
    unsigned short lua_cobol_offset;
    unsigned long  lua_sid;
    unsigned short lua_max_length;
    unsigned short lua_data_length;
    char FAR *     lua_data_ptr;
    unsigned long  lua_post_handle;
    struct LUA_TH  lua_th;
    struct LUA_RH  lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char  lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char  lua_resv56[7];
    unsigned char  lua_encr_decr_option;
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_RUI for Request Unit Interface (RUI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_RUI_READ.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

RUI_READ only requires this parameter if **lua_sid** is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by RUI in Host Integration Server and should be set to zero.

lua_cobol_offset
Not used by LUA in Microsoft® Host Integration Server and should be zero.

lua_sid
Supplied and returned parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length
Specifies the length of received buffer for **RUI_READ** and SLI_RECEIVE. Not used by other RUI and SLI verbs and should be set

to zero.

lua_data_length

Returned parameter. Specifies the length of data returned in **lua_peek_data** for the RUI_BID verb.

lua_data_ptr

Pointer to the application-supplied buffer that is to receive the data from an **RUI_READ** verb. Both SNA commands and data are placed in this buffer, and they can be in an EBCDIC format.

When **RUI_READ** is issued, this parameter points to the location to receive the data from the host.

lua_post_handle

Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th

Returned parameter. Contains the SNA transmission header (TH) of the message sent or received. Various subparameters are set for write functions and returned for read and bid functions. Its subparameters are as follows:

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits. Defines the type of data segment. The following values are valid:

0x00 Middle segment
0x04 Last segment
0x08 First segment
0x0C Only segment

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh

Returned parameter. Contains the SNA request/response header (RH) of the message sent or received. It is set for the write function and returned by the read and bid functions. Its subparameters are as follows:

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

RU category, two bits. The following values are valid:

LUA_RH_FMD (**0x00**) FM data segment
LUA_RH_NC (**0x20**) Network control
LUA_RH_DFC (**0x40**) Data flow control
LUA_RH_SC (**0x60**) Session control

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

SSCP expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

Set **lua_flag1.nowait** to 1 to indicate that you want **RUI_READ** to return immediately whether or not data is available to be read, or set it to zero if you want the verb to wait for data before returning.

Set **lua_flag1.bid_enable** to 1 to re-enable the most recent RUI_BID (equivalent to issuing **RUI_BID** again with exactly the same parameters as before), or set it to zero if you do not want to re-enable **RUI_BID**.

Note Re-enabling the previous **RUI_BID** reuses the VCB originally allocated for it, so this VCB must not have been freed or modified.

Set one or more of the following flags to 1 to indicate from which message flow to read data:

lua_flag1.sscp_exp

lua_flag1.lu_exp

lua_flag1.sscp_norm

lua_flag1.lu_norm

If more than one flag is set, the highest-priority data available is returned. The order of priorities (highest first) is: SSCP expedited, LU expedited, SSCP normal, LU normal. The equivalent flag in the **lua_flag2** group is set to indicate from which flow the data was read.

lua_message_type
Specifies the type of the inbound or outbound SNA commands and data. Returned parameter. Specifies the type of SNA message indicated to **RUI_READ**. Possible values are:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_RQR

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIND

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_CLEAR

LUA_MESSAGE_TYPE_CRV

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SHUTD

LUA_MESSAGE_TYPE_SIGNAL

LUA_MESSAGE_TYPE_SDT

LUA_MESSAGE_TYPE_STSN

LUA_MESSAGE_TYPE_UNBIND

LU_DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2

Returned parameter. Contains flags for messages returned by LUA. Its subparameters are as follows:

lua_flag2.bid_enable

Indicates that RUI_BID was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56

Reserved and should be set to zero.

lua_encr_decr_option

Reserved and should be set to zero.

Return Codes

LUA_OK

Primary return code; the verb executed successfully.

LUA_DATA_INCOMPLETE

Secondary return code; **RUI_READ** was not able to return all of the data received because the application's data buffer (indicated by **lua_max_length**) was not large enough. Subsequent **RUI_READ** requests can be issued to retrieve the remaining RUI data.

Note This is not the default behavior for **RUI_READ** and is only enabled when **lua_resv56[3]** is set to a nonzero value in the verb control block when calling RUI_INIT during session establishment. For more details, see Remarks.

LUA_CANCELED

Primary return code; the verb did not complete successfully because it was canceled by another verb or by an internal error.

LUA_PURGED

Secondary return code; **RUI_READ** has been canceled by RUI_PURGE.

LUA_TERMINATED

Secondary return code; RUI_TERM was issued while **RUI_READ** was pending.

LUA_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

LUA_BAD_DATA_PTR

Secondary return code; the **lua_data_ptr** parameter contained an invalid value.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_BID_ALREADY_ENABLED

Secondary return code; **lua_flag1.bid_enable** was set to re-enable RUI_BID but the previous **RUI_BID** was still in progress.

LUA_DUPLICATE_READ_FLOW

Secondary return code; the flow flags in the **lua_flag1** group specified one or more session flows for which **RUI_READ** was already outstanding. Only one **RUI_READ** at a time can be waiting on each session flow.

LUA_INVALID_FLOW

Secondary return code; none of the **lua_flag1** flow flags was set. At least one of these flags must be set to 1, to indicate from which flow or flows to read.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_NO_PREVIOUS_BID_ENABLED

Secondary return code; **lua_flag1.bid_enable** was set to re-enable RUI_BID, but there was no previous **RUI_BID** that could be enabled. (For more information, see Remarks.)

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved field in the verb record or a parameter not used by this verb was set to a nonzero value.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with the value of **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_RUI_SESSION

Secondary return code; RUI_INIT has not yet completed successfully for the LU name specified on **RUI_READ**.

LUA_NEGATIVE_RSP
Primary return code; indicates one of the following two cases, which can be distinguished by the secondary return code:

- LUA detected an error in the data received from the host. Instead of passing the received message to the application on **RUI_READ**, LUA discards the message (and the rest of the chain if it is in a chain), and sends a negative response to the host. LUA informs the application on a subsequent **RUI_READ** or RUI_BID that a negative response was sent.
- The LUA application previously sent a negative response to a message in the middle of a chain. LUA has purged subsequent messages in this chain, and is now reporting to the application that all messages from the chain have been received and purged.

LUA_SEC_RC

Secondary return code; this parameter is a nonzero secondary return code containing the sense code sent to the host on the negative response. This indicates that LUA detected an error in the host data and sent a negative response to the host. For information about interpreting the sense code values that may be returned, see SNA Considerations Using LUA.

A secondary return code of zero indicates that, following a previous RUI_WRITE of a negative response to a message in the middle of a chain, LUA has now received and discarded all messages from this chain.

LUA_UNSUCCESSFUL
Primary return code; the verb record supplied was valid, but the verb did not complete successfully.

LUA_DATA_TRUNCATED

Secondary return code; the **lua_data_length** parameter was smaller than the actual length of data received on the message. Only **lua_data_length** bytes of data were returned to the verb; the remaining data was discarded. Additional parameters are also returned if this secondary return code is obtained.

LUA_NO_DATA

Secondary return code; **lua_flag1.nowait** was set to indicate immediate return without waiting for data, and no data was currently available on the specified session flow or flows.

LUA_INVALID_PROCESS

Secondary return code; the OS/2 process that issued this verb was not the same process that issued RUI_INIT for this session. Only the process that started a session can issue verbs on that session.

LUA_COMM_SUBSYSTEM_ABENDED

Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node was broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_SESSION_FAILURE
Primary return code; a required Host Integration Server component has terminated.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; indicates that the LUA session failed because of a problem with the link service or with the host LU.

LUA_RUI_LOGIC_ERROR

Secondary return code; an internal error was detected within LUA. This error should not occur during normal operation.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

Remarks

RUI_INIT must have completed successfully before **RUI_READ** is issued.

While an existing **RUI_READ** is pending, you can issue another **RUI_READ** only if it specifies a different session flow or flows from pending **RUI_READ** verbs. You cannot have more than one **RUI_READ** outstanding for the same session flow.

You can specify a particular message flow (LU normal, LU expedited, SSCP normal, or SSCP expedited) from which to read data, or you can specify more than one message flow. You can have multiple **RUI_READ** verbs outstanding, provided that no two of them specify the same flow.

Data is received by the application on one of four session flows. The four session flows, from highest to lowest priority are:

- SSCP expedited
- LU expedited
- SSCP normal
- LU normal

The data flow type that **RUI_READ** is to process is specified in the **lua_flag1** parameter. The application can also specify whether it wants to look at more than one type of data flow. When multiple flow bits are set, the highest priority is received first. When **RUI_READ** completes processing, **lua_flag2** indicates the specific type of flow for which data has been received by the Windows LUA application.

If RUI_BID successfully completes before an **RUI_READ** is issued, the Windows LUA interface can be instructed to reuse the last **RUI_BID** verb's VCB. To do this, issue the **RUI_READ** with **lua_flag1.bid_enable** set.

The **lua_flag1.bid_enable** parameter can be used only if the following are true:

- **RUI_BID** has already been issued successfully and has completed.
- The storage allocated for **RUI_BID** has not been freed or modified.
- No other **RUI_BID** is pending.

When using **lua_flag1.bid_enable**, the **RUI_BID** storage must not be freed because the last **RUI_BID** verb's VCB is used. Also, when using **lua_flag1.bid_enable**, the successful completion of **RUI_BID** will be posted.

If **RUI_READ** is issued with **lua_flag1.nowait** when no data is available to receive, LUA_NO_DATA will be the secondary return code set by the Windows LUA interface.

If the data received is longer than **lua_max_length**, it is truncated. Only **lua_max_length** bytes of data are returned. The primary return code LUA_UNSUCCESSFUL and the secondary return code LUA_DATA_TRUNCATED are also returned. The RUI library returns as much data as possible to the application's data buffer, but the remaining data in the RUI is discarded and cannot be extracted on subsequent **RUI_READ** requests. This forces the RUI application to allocate an **RUI_READ** data buffer large enough to handle the full RU size.

This default behavior can be changed by setting the value of **lua_resv56[3]** to a nonzero value in the verb control block when calling RUI_INIT during session establishment. In this case, if the data received is longer than **lua_max_length**, an **RUI_READ** request will return a primary return code of LUA_OK and a secondary return code of LUA_DATA_INCOMPLETE. An RUI application can then issue new **RUI_READ** calls and receive the remainder of the data.

Note This enhancement has not been adopted as part of the Microsoft Windows Open Services Architecture (WOSA) LUA API standard and differs from the implementation of RUI by IBM.

After a message has been read using **RUI_READ,** it is removed from the incoming message queue and cannot be accessed again. (Note that RUI_BID can be used as a nondestructive read. The application can use it to check the type of data available, but the data remains on the incoming queue and does not need to be used immediately.)

Pacing can be used on the primary-to-secondary half-session (specified in the host configuration), to protect the LUA application from being flooded with messages. If the LUA application is slow to read messages, Host Integration Server delays the sending of pacing responses to the host to slow it down.

See Also

RUI_BID, RUI_INIT, RUI_TERM, RUI_WRITE, SLI_OPEN, SLI_PURGE, SLI_RECEIVE, SLI_SEND

RUI_TERM

The **RUI_TERM** verb ends both the logical unit (LU) session and the system services control point (SSCP) session for a given LUA LU.

The following structure describes the **LUA_COMMON** member of the verb control block (VCB) used by **RUI_TERM**.

```
struct LUA_COMMON {
    unsigned short lua_verb;
    unsigned short lua_verb_length;
    unsigned short lua_prim_rc;
    unsigned long  lua_sec_rc;
    unsigned short lua_opcode;
    unsigned long  lua_correlator;
    unsigned char  lua_luname[8];
    unsigned short lua_extension_list_offset;
    unsigned short lua_cobol_offset;
    unsigned long  lua_sid;
    unsigned short lua_max_length;
    unsigned short lua_data_length;
    char FAR *     lua_data_ptr;
    unsigned long  lua_post_handle;
    struct LUA_TH  lua_th;
    struct LUA_RH  lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char  lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char  lua_resv56[7];
    unsigned char  lua_encr_decr_option;
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_RUI for Request Unit Interface (RUI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the logical unit application (LUA) VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_RUI_TERM.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

RUI_TERM only requires this parameter if **lua_sid** is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by RUI in Microsoft® Host Integration Server and should be set to zero.

lua_cobol_offset
Not used by LUA in Host Integration Server and should be set to zero.

lua_sid
Supplied and returned parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length

Not used by **RUI_TERM** and should be set to zero.
lua_data_length
Not used by **RUI_TERM** and should be set to zero.
lua_data_ptr
Not used by **RUI_TERM** and should be set to zero.
lua_post_handle
Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows® 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.
lua_th
Not used by **RUI_TERM** and should be set to zero.
lua_rh
Not used by **RUI_TERM** and should be set to zero.
lua_flag1
Not used by **RUI_TERM** and should be set to zero.
lua_message_type
Not used by **RUI_TERM** and should be set to zero.
lua_flag2
Not used by **RUI_TERM** and should be set to zero.
lua_resv56
Reserved and should be set to zero.
lua_encr_decr_option
Reserved and should be set to zero.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.
LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved field in the verb record or a parameter not used by this verb was set to a nonzero value.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with the value of **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_RUI_SESSION

Secondary return code; RUI_INIT has not yet completed successfully for the LU name specified on **RUI_TERM**.

LUA_UNSUCCESSFUL
Primary return code; the verb record supplied was valid, but the verb did not complete successfully.

LUA_COMMAND_COUNT_ERROR

Secondary return code; **RUI_TERM** was already pending when the verb was issued.

LUA_INVALID_PROCESS

Secondary return code; the OS/2 process that issued this verb was not the same process that issued **RUI_INIT** for this session. Only the process that started a session can issue verbs on that session.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.

- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node was broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_SESSION_FAILURE
Primary return code; a required Host Integration Server component has terminated.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; indicates that the LUA session failed because of a problem with the link service or with the host LU.

LUA_RUI_LOGIC_ERROR

Secondary return code; an internal error was detected within LUA. This error should not occur during normal operation.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

Remarks

This verb can be issued at any time after RUI_INIT has been issued (whether or not it has completed). If any other LUA verb is pending when **RUI_TERM** is issued, no further processing on the pending verb takes place, and it returns with a primary return code of LUA_CANCELED.

After this verb has completed, no other LUA verb can be issued for this session.

See Also

RUI_INIT, SLI_OPEN

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

RUI_WRITE

The **RUI_WRITE** verb sends an SNA request or response unit from the logical unit application (LUA) application to the host over either the LU session or the system services control point (SSCP) session, and sends responses, SNA commands, and data from a Microsoft® Windows® LUA application to the host LU.

The following structure describes the **LUA_COMMON** member of the verb control block (VCB) used by **RUI_WRITE**.

```
struct LUA_COMMON {
    unsigned short lua_verb;
    unsigned short lua_verb_length;
    unsigned short lua_prim_rc;
    unsigned long  lua_sec_rc;
    unsigned short lua_opcode;
    unsigned long  lua_correlator;
    unsigned char  lua_luname[8];
    unsigned short lua_extension_list_offset;
    unsigned short lua_cobol_offset;
    unsigned long  lua_sid;
    unsigned short lua_max_length;
    unsigned short lua_data_length;
    char FAR *     lua_data_ptr;
    unsigned long  lua_post_handle;
    struct LUA_TH  lua_th;
    struct LUA_RH  lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char  lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char  lua_resv56[7];
    unsigned char  lua_encr_decr_option;
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_RUI for Request Unit Interface (RUI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_RUI_WRITE.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

RUI_WRITE only requires this parameter if **lua_sid** is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by RUI in Microsoft® Host Integration Server and should be set to zero.

lua_cobol_offset
Not used by LUA in Host Integration Server and should be zero.

lua_sid
Supplied and returned parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length

Not used by **RUI_WRITE** and should be set to zero.

lua_data_length

Returned parameter. Specifies the length of data returned in **lua_peek_data** for the RUI_BID verb.

lua_data_ptr

Points to the buffer containing the data to be sent to the host by **RUI_WRITE**.

Both SNA commands and data are placed in this buffer, and they can be in an EBCDIC format.

lua_post_handle

Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th

Returned parameter. Contains the SNA transmission header (TH) of the message sent or received. Various subparameters are set for write functions and returned for read and bid functions. Its subparameters are as follows:

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits. Defines the type of data segment. The following values are valid:

0x00 Middle segment
0x04 Last segment
0x08 First segment
0x0C Only segment

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh

Returned parameter. Contains the SNA request/response header (RH) of the message sent or received. For the RH for **RUI_WRITE**, all fields except the queued-response indicator (**lua_rh.qri**) and pacing indicator (**lua_rh.pi**) are used. Its subparameters are as follows:

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

RU category, two bits. The following values are valid:

LUA_RH_FMD (**0x00**) FM data segment
LUA_RH_NC (**0x20**) Network control
LUA_RH_DFC (**0x40**) Data flow control
LUA_RH_SC (**0x60**) Session control

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

SSCP expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

Set one of the following flags to 1 to indicate on which message flow the data is to be sent:

lua_flag1.sscp_exp

lua_flag1.sscp_norm

lua_flag1.lu_exp

lua_flag1.lu_norm

lua_message_type
Not used by **RUI_WRITE** and should be set to zero.

lua_flag2
Returned parameter. Contains flags for messages returned by LUA. Its subparameters are as follows:

lua_flag2.bid_enable

Indicates that RUI_BID was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56
Reserved and should be set to zero.

lua_encr_decr_option
Reserved and should be set to zero.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.

LUA_CANCELED
Primary return code; the verb did not complete successfully because it was canceled by another verb.

LUA_TERMINATED

Secondary return code; the verb was canceled because RUI_TERM was issued for this session.

LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_BAD_DATA_PTR

Secondary return code; the **lua_data_ptr** parameter contained an invalid value.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_DUPLICATE_WRITE_FLOW

Secondary return code; **RUI_WRITE** was already outstanding for the session flow specified on this verb (the session flow is specified by setting one of the **lua_flag1** flow flags to 1). Only one **RUI_WRITE** at a time can be outstanding on each session flow.

LUA_INVALID_FLOW

Secondary return code; the **lua_flag1.sscp_exp** flow flag was set, indicating that the message should be sent on the SSCP expedited flow. LUA does not allow applications to send data on this flow.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_MULTIPLE_WRITE_FLOWS

Secondary return code; more than one of the **lua_flag1** flow flags was set to 1. One and only one of these flags must be set to 1, to indicate which session flow the data is to be sent on.

LUA_REQUIRED_FIELD_MISSING

Secondary return code; indicates one of the following cases:

- None of the **lua_flag1** flow flags was set. One and only one of these flags must be set to 1.
- **RUI_WRITE** was used to send a response, and the response required more data than was supplied.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved field in the verb record or a parameter not used by this verb was set to a nonzero value.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with the value of **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_MODE_INCONSISTENCY

Secondary return code; the SNA message sent on **RUI_WRITE** was not valid at this time. This is caused by trying to send data on the LU session before the session is bound. Check the sequence of SNA messages sent.

LUA_NO_RUI_SESSION

Secondary return code; RUI_INIT has not yet completed successfully for the LU name specified on this verb.

LUA_UNSUCCESSFUL
Primary return code; the verb record supplied was valid, but the verb did not complete successfully.

LUA_FUNCTION_NOT_SUPPORTED

Secondary return code; indicates one of the following cases:

- The **lua_rh.fi** bit (format indicator) was set to 1, but the first byte of the supplied RU was not a recognized request code.
- The **lua_rh.ruc** parameter (RU category) specified the network control (NC) category; LUA does not allow applications to send requests in this category.

LUA_INVALID_PROCESS

Secondary return code; the OS/2 process that issued this verb was not the same process that issued **RUI_INIT** for this session. Only the process that started a session can issue verbs on that session.

LUA_INVALID_SESSION_PARAMETERS

Secondary return code; the application used **RUI_WRITE** to send a positive response to a BIND message received from the host. However, Host Integration Server cannot accept the BIND parameters as specified, and has sent a negative response to the host. For more information about the BIND profiles accepted by Host Integration Server, see SNA Considerations Using LUA.

LUA_RSP_CORRELATION_ERROR

Secondary return code; when using **RUI_WRITE** to send a response, **lua_th.snf** (which indicates the sequence number of the received message being responded to) did not contain a valid value.

LUA_RU_LENGTH_ERROR

Secondary return code; the **lua_data_length** parameter contained an invalid value. When sending data on the LU normal flow, the maximum length is as specified in the BIND received from the host; for all other flows the maximum length is 256 bytes.

> **Note** Any other secondary return code is an SNA sense code indicating that the supplied SNA data was invalid or could not be sent. For information about interpreting the SNA sense codes that can be returned, see SNA Considerations Using LUA.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node was broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_SESSION_FAILURE
Primary return code; a required Host Integration Server component has terminated.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; indicates that the LUA session has failed because of a problem with the link service or with the host LU.

LUA_RUI_LOGIC_ERROR

Secondary return code; an internal error was detected within LUA. This error should not occur during normal operation.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or has terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

Remarks

RUI_INIT must be issued successfully before this verb is issued.

When sending an SNA request, all applicable values in the **lua_rh** must be set. Chaining and bracketing are the responsibility of the application.

When sending a response, the type of response determines the **RUI_WRITE** information required. For all responses, you must:

- Set the selected **lua_rh.rri** flag to 1.
- Provide the sequence number in **lua_th.snf** for the request to which you are responding.

For multi-chain message responses, the sequence number of the last received chain element must be used. For a response to a multichain message ending with a CANCEL command, the CANCEL command sequence number is used.

For positive responses that only require the request code, set **lua_rh.ri** to zero (indicating that the response is positive) and **lua_data_length** to zero (indicating that no data is provided). The request code is filled in by the RUI, using the sequence number provided.

For negative responses, set **lua_rh.ri** to 1, **lua_data_ptr** to the SNA sense code address, and **lua_data_length** to the SNA sense code length (four bytes). The sequence number is used by the RUI to fill in the request code.

For positive responses to the BIND and STSN commands that require data in the responses, set **lua_data_ptr** to point to the response and set **lua_data_length** to the length of the data provided in **lua_data_ptr**.

While an existing **RUI_WRITE** is pending, you can issue a second **RUI_WRITE** only if it specifies a different session flow from the pending **RUI_WRITE**. You cannot have more than one **RUI_WRITE** outstanding for the same session flow.

RUI_WRITE can be issued on the SSCP normal flow at any time after a successful RUI_INIT. **RUI_WRITE** verbs on the LU expedited or LU normal flows are permitted only after a BIND has been received, and must abide by the protocols specified on the BIND.

The successful completion of **RUI_WRITE** indicates that the message was queued successfully to the data link. It does not necessarily indicate that the message was sent successfully, or that the host accepted it.

Pacing can be used on the secondary-to-primary half-session (specified on the BIND) to prevent the LUA application from sending more data than the local or remote LU can handle. If this is the case, an **RUI_WRITE** on the LU normal flow may be delayed by LUA and may take some time to complete.

See Also

RUI_INIT, RUI_READ, RUI_TERM, SLI_OPEN, SLI_PURGE, SLI_RECEIVE, SLI_SEND

LUA SLI Verbs

This section describes the Microsoft® Windows® logical unit application (LUA) Session Level Interface (SLI) verbs. It provides the following information for each SLI verb:

- Details of the LUA verb control block (VCB) structure.
- A description of the verb and its purpose.
- Parameters (VCB structure members) supplied to and returned by LUA. The description of each parameter includes information about the valid values for that parameter.
- Interaction with other verbs.

Cryptography is not defined as part of the Windows LUA standard.

The verb descriptions in this section include parameter values specific to each verb. For a complete description of the VCB structure for both Request Unit Interface (RUI) and SLI verbs, see LUA Verb Control Blocks.

This section contains:

- SLI_BID
- SLI_CLOSE
- SLI_OPEN
- SLI_PURGE
- SLI_RECEIVE
- SLI_RECEIVE_EX
- SLI_SEND
- SLI_SEND_EX
- SLI_BIND_ROUTINE
- SLI_STSN_ROUTINE

SLI_BID

The **SLI_BID** verb notifies the Session Level Interface (SLI) application that a message is waiting to be read using SLI_RECEIVE. **SLI_BID** also provides the current status of the session to the Windows logical unit application (LUA) application.

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_BID.

```
struct LUA_COMMON {
    unsigned short lua_verb;
    unsigned short lua_verb_length;
    unsigned short lua_prim_rc;
    unsigned long  lua_sec_rc;
    unsigned short lua_opcode;
    unsigned long  lua_correlator;
    unsigned char  lua_luname[8];
    unsigned short lua_extension_list_offset;
    unsigned short lua_cobol_offset;
    unsigned long  lua_sid;
    unsigned short lua_max_length;
    unsigned short lua_data_length;
    char FAR *     lua_data_ptr;
    unsigned long  lua_post_handle;
    struct LUA_TH  lua_th;
    struct LUA_RH  lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char  lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char  lua_resv56[7];
    unsigned char  lua_encr_decr_option;
};
```

The following union describes the **LUA_SPECIFIC** member of the VCB used by **SLI_BID**. Other union members are omitted for clarity.

```
union LUA_SPECIFIC {
    unsigned char  lua_peek_data[12];
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_SLI for SLI verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_BID.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_BID only requires this parameter if lua_sid is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by **SLI_BID** and should be set to zero.

lua_cobol_offset
Not used by LUA in Microsoft® Host Integration Server and should be zero.

lua_sid

Supplied parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length

Not used by **SLI_BID** and should be set to zero.

lua_data_length

Returned parameter. Specifies the length of data returned in **lua_peek_data**.

lua_data_ptr

Pointer to the application-supplied buffer that contains the data to be sent for SLI_SEND and RUI_WRITE or that will receive data for SLI_RECEIVE and RUI_READ. Not used by other RUI and SLI verbs and should be set to zero.

lua_post_handle

Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

For all other environments, this parameter is reserved and should be set to zero.

lua_th

Returned parameter. Contains the SNA transmission header (TH) of the message received. Various subparameters are returned for read and bid functions. Its subparameters are as follows:

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits. Defines the type of data segment. The following values are valid:

0x00 Middle segment
0x04 Last segment
0x08 First segment
0x0C Only segment

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh

Returned parameter. Contains the SNA request/response header (RH) of the message sent or received. Its subparameters are as follows:

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

Request/response unit (RU) category, two bits. The following values are valid:

LUA_RH_FMD (**0x00**) FM data segment
LUA_RH_NC (**0x20**) Network control
LUA_RH_DFC (**0x40**) Data flow control
LUA_RH_SC (**0x60**) Session control

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

System services control point (SSCP) expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

lua_message_type

Returned parameter. Specifies the type of SNA message indicated to SLI_BID. Possible values are:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_RSP

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIND

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SIGNAL

LUA_MESSAGE_TYPE_STSN

The SLI receives and responds to the BIND and STSN requests through the LUA interface extension routines.

LU_DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2

Returned parameter. Contains flags for messages returned by LUA. Its subparameters are as follows:

lua_flag2.bid_enable

Indicates that **SLI_BID** was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56
Reserved and should be set to zero.

lua_encr_decr_option
Not used by **SLI_BID** and should be set to zero.

lua_peek_data
The union member of **LUA_SPECIFIC** used by the RUI_BID and **SLI_BID** verbs. Returned parameter. Contains up to 12 bytes of the data waiting to be read.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_INVALID_LUNAME

Secondary return code; an invalid **lua_luname** name was specified.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved parameter for the verb just issued is not set to zero.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Microsoft Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with the value of **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_SLI_SESSION

Secondary return code; a session was not open or was down due to an SLI_CLOSE or session failure when a command was issued.

LUA_SLI_BID_PENDING

Secondary return code; an SLI verb was still active when another **SLI_BID** was issued. Only one **SLI_BID** can be active at a time.

LUA_SESSION_FAILURE
Primary return code; an error condition, specified in the secondary return code, caused the session to fail.

LUA_RECEIVED_UNBIND

Secondary return code; the primary logical unit (PLU) sent an SNA UNBIND command to the LUA interface when a session was active. As a result, the session was stopped.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_NO_RUI_SESSION

Secondary return code; no session has been initialized for the LUA verb issued, or some verb other than SLI_OPEN was issued before the session was initialized.

LUA_MODE_INCONSISTENCY

Secondary return code; performing this function is not allowed by the current status. The request sent to the half-session component was not executed even though it was understood and supported. This SNA sense code is also an exception request sense code.

LUA_RECEIVER_IN_TRANSMIT_MODE

Secondary return code; either resources needed to handle normal flow data were not available or the state of the half-duplex contention was not received when a normal-flow request was received. The result is a race condition. This SNA sense code is also an exception request sense code.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; an LU component is unavailable because it is not connected properly. Make sure that the power is on.

LUA_FUNCTION_NOT_SUPPORTED

Secondary return code; LUA does not support the requested function. A control character, an RU parameter, or a formatted request code may have specified the function. Specific sense code information is in bytes 2 and 3.

LUA_CHAINING_ERROR

Secondary return code; the sequence of the chain indicator settings is in error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_BRACKET

Secondary return code; the sender failed to enforce the session bracket rules. Note that contention and race conditions are exempt from this error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DIRECTION

Secondary return code; while the half-duplex flip-flop state was NOT_RECEIVE, a request for normal flow was received. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_QUIESCED

Secondary return code; a data flow control (DFC) or function management data (FMD) request was received from a half-session that sent either a SHUTC command or QC command, and the DFC or FMD request has not responded to a RELQ command. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_NO_BEGIN_BRACKET

Secondary return code; the receiver has already sent a positive response to a BIS command when a BID or an FMD request specifying BBI=BB was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_IMMEDIATE_REQUEST_MODE_ERROR

Secondary return code; the request violated the immediate request mode protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_QUEUED_RESPONSE_ERROR

Secondary return code; the request violated the queued response protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_ERP_SYNC_EVENT_ERROR

Secondary return code; a violation of the ERP synchronous event protocol occurred. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_RSP_CORRELATION_ERROR

Secondary return code; a response was sent that does not correspond to a previously received request or a response was received that does not correspond to a previously sent request.

LUA_RSP_PROTOCOL_ERROR

Secondary return code; a violation of the response protocol was found in the response received from the primary half-session.

LUA_BB_NOT_ALLOWED

Secondary return code; the begin bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EB_NOT ALLOWED

Secondary return code; the end bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EXCEPTION_RSP_NOT_ALLOWED

Secondary return code; when an exception response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_DEFINITE_RSP_NOT_ALLOWED

Secondary return code; when a definite response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_ALLOWED

Secondary return code; the change-direction indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NO_RESPONSE_NOT_ALLOWED

Secondary return code; a request other than an EXR contained a "NO RESPONSE" The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CHAINING_NOT_SUPPORTED

Secondary return code; the chaining indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_BRACKETS_NOT_SUPPORTED

Secondary return code; the bracket indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_SUPPORTED

Secondary return code; the change-direction indicator was set, but LUA does not support change-direction for this situation. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_FI

Secondary return code; the format indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_ALTERNATE_CODE_NOT_SUPPORTED

Secondary return code; the code selection indicator was set, but LUA does not support code selection for this session. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_RU_CATEGORY

Secondary return code; the request unit category indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_REQUEST_CODE

Secondary return code; the request code was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_SPEC_OF_SDI_RTI

Secondary return code; the sense-data-included indicator (SDI) and the response-type-indicator (RTI) were not specified correctly on a response. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_DR1I_DR2I_ERI

Secondary return code; the definite response 1 indicator (DR1I), the definite response 2 indicator (DR2I), and the exception response indicator (ERI) were specified incorrectly. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_QRI

Secondary return code; the queued response indicator (QRI) was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_EDI

Secondary return code; the enciphered data indicator (EDI) was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_PDI

Secondary return code; the padded data indicator (PDI) was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_UNSUCCESSFUL

Primary return code; the verb record supplied was valid, but the verb did not complete successfully.

LUA_VERB_RECORD_SPANS_SEGMENTS

Secondary return code; the LUA VCB length parameter plus the segment offset is beyond the segment end.

LUA_NOT_ACTIVE

Secondary return code; LUA was not active within Microsoft Host Integration Server when an LUA verb was issued.

LUA_INVALID_PROCESS

Secondary return code; the session for which an LUA verb was issued is unavailable because another process owns the session.

LUA_LU_INOPERATIVE

Secondary return code; a severe error occurred while attempting to stop the session. This LU is unavailable for any LUA requests until an activate logical unit (ACTLU) is received from the host.

LUA_RECEIVE_CORRELATION_TABLE_FULL

Secondary return code; the session receive correlation table for the flow requested reached its capacity.

LUA_NEGATIVE_RESPONSE
Primary return code; either LUA sent a negative response to a message received from the primary logical unit (PLU) because an error was found in the message, or the application responded negatively to a chain for which the end-of-chain has arrived.

LUA_FUNCTION_NOT_SUPPORTED

Secondary return code; the LUA does not support the requested function. A control character, an RU parameter, or a formatted request code may have specified the function. Specific sense code information is in bytes 2 and 3.

LUA_DATA_TRAFFIC_RESET

Secondary return code; a half-session of an active session but with inactive data traffic received a normal flow DFC or FMD request. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_NOT_RESET

Secondary return code; while the data traffic state was not reset, the session control request was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_SC_PROTOCOL_VIOLATION

Secondary return code; a violation of the session control (SC) protocol occurred. A request (that is permitted only after an SC request and a positive response to that request have been successfully exchanged) was received before the required exchange. Byte 4 of the sense data contains the request code. No user data exists for this sense code. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_INVALID_SC_OR_NC_RH

Secondary return code; the RH of an SC or NC request was invalid.

LUA_PACING_NOT_SUPPORTED

Secondary return code; the request contained a pacing indicator when support of pacing for this session does not exist for the receiving half-session or boundary function half-session. The BIND options chosen previously or the architectural rules were violated by **lua_rh** values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NAU_INOPERATIVE

Secondary return code; the network addressable unit (NAU) is not able to process responses or requests. Delivery to the receiver could not take place for one of the following reasons:

A path information unit error

A path outage

An invalid sequence of requests for activation

If a path error is received during an active session, that usually means there is no longer a valid path to the session partner.

LUA_CANCELED
Primary return code; the secondary return code gives the reason for canceling the command.

LUA_TERMINATED

Secondary return code; the session was terminated when a verb was pending. The verb process has been canceled.

LUA_IN_PROGRESS
Primary return code; an asynchronous command was received but is not completed.

LUA_STATUS
Primary return code; the secondary return code contains SLI status information for the application.

LUA_READY

Secondary return code; following a NOT_READY status, this status is issued to notify you that the SLI is ready to process commands.

LUA_NOT_READY

Secondary return code; an SNA UNBIND type 0x02 command was received, which means a new BIND is coming.

- If the UNBIND type 0x02 is received after the beginning SLI_OPEN is complete, the session is suspended until a BIND, optional CRV and STSN, and SDT flows are received. These routines are re-entrant because they have to be called again. The session resumes after the SLI processes the SDT command.
- If the UNBIND type 0x02 is received while SLI_OPEN is still processing, the primary return code is session-failure, not status. Or, the receipt of an SNA CLEAR caused the suspension. Receipt of an SNA SDT will cause the session to resume.

LUA_INIT_COMPLETE

Secondary return code; the LUA interface initialized the session while **SLI_OPEN** was processing. LUA applications that issue **SLI_OPEN** with the **lua_open_type_prim_sscp** parameter receive this status on SLI_RECEIVE or **SLI_BID**.

LUA_SESSION_END_REQUESTED

Secondary return code; the LUA interface received an SNA shutdown command (SHUTD) from the host, which means the host is ready to shut down the session.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

LUA_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.

Remarks

SLI_BID does the following:

- Notifies a Windows LUA application that a message is waiting to be read.
- Provides the current session status.
- Provides a preview of the next message that will be read by SLI_RECEIVE.

  This preview contains a maximum of 12 bytes of information (peek data) that enables the Windows LUA application to define its processing strategy for the data.

To use **SLI_BID** within a Windows LUA application, issue **SLI_BID**. When the verb completes, it can be reactivated in the following two ways:

- Reissue **SLI_BID**.
- Issue SLI_RECEIVE with lua_flag1_bid_enable set to 1. This issues an SLI_BID that uses the most recently accepted address for the VCB and establishes the active bid.

Each session can have only one **SLI_BID** at a time.

If multiple messages are available when a Windows LUA application issues SLI_BID, the data flow with the highest priority is returned. The order in which the data can be returned is as follows:

- SSCP expedited
- LU expedited
- SSCP normal

- LU normal

If SLI_RECEIVE has flags set to read more than one type of message flow, the data returned by **SLI_BID** might be for a flow different than the one for which you actually receive data through **SLI_RECEIVE**. This situation occurs when higher priority data arrives from the host after **SLI_BID** completes processing, but before **SLI_RECEIVE** is issued.

To ensure that SLI_RECEIVE reads the data, the SLI_BID returned specifies the flow that matches lua_flag2 returned by the completed SLI_BID.

Session Status Return Values

If LUA_STATUS is the primary return code, the secondary return code can be LUA_READY, LUA_NOT_READY, LUA_SESSION_END_REQUESTED, or LUA_INIT_COMPLETE. In addition, if LUA_STATUS is the primary return code, the following parameters are used:

lua_sec_rc

lua_sid

LUA_READY is returned after LUA_NOT_READY status, and indicates that the SLI is again ready to perform all commands.

LUA_NOT_READY indicates that the SLI session is suspended because the SLI has received either an SNA CLEAR command or an SNA UNBIND command with an 0x02 UNBIND type (UNBIND with BIND forthcoming). Depending on what caused the suspension, the session can be reactivated as follows:

- When the suspension is caused by an SNA CLEAR, receiving an SNA SDT reactivates the session.
- When an SNA UNBIND type BIND forthcoming causes suspension of the session and the SLI_OPEN that opened the session is completed, the session is suspended until the SLI receives a BIND and SDT command. The session can also optionally receive an STSN command. As a result, user-supplied routines issued with the initial SLI_OPEN must be re-entered because they will be recalled.

The application can send SSCP data after a CLEAR or UNBIND type BIND forthcoming arrives and before the NOT READY status is read. The application can send and receive SSCP data after reading a NOT READY.

When an SNA UNBIND type BIND forthcoming arrives before completion of the SLI_OPEN that opened the session, LUA_SESSION_FAILURE (not LUA_STATUS) is the primary return code.

LUA_SESSION_END_REQUESTED indicates that the application received an SNA SHUTD from the host. The Windows LUA application should issue SLI_CLOSE to close the session when convenient.

LUA_INIT_COMPLETE is returned only when lua_init_type for SLI_OPEN is LUA_INIT_TYPE_PRIM_SSCP. The status means that SLI_OPEN has been processed sufficiently to allow SSCP data to now be sent or received.

Exception Requests

If a host application request unit is converted into an EXR, sense data will be returned. When an **SLI_BID** completes with the returned verb parameters set as shown, an EXR conversion occurs.

Member	Set to
lua_prim_rc	OK (0x0000)
lua_sec_rc	OK (0x00000000)
lua_rh.rri	bit off (request unit)
lua_rh.sdi	bit on (includes sense data)

Of the seven bytes of data in **lua_peek_data**, bytes 0 through 3 define the error detected. The following table indicates possible sense data and the values of bytes 0 through 3.

Sense data	Value of bytes 0–3
LUA_MODE_INCONSISTENCY	0x08090000
LUA_BRACKET_RACE_ERROR	0x080B0000
LUA_BB_REJECT_NO_RTR	0x08130000
LUA_RECEIVER_IN_TRANSMIT_MODE	0x081B0000
LUA_CRYPTOGRAPHY_FUNCTION_INOP	0x08480000
LUA_SYNC_EVENT_RESPONSE	0x10010000
LUA_RU_DATA_ERROR	0x10020000

LUA_RU_LENGTH_ERROR	0x10020000
LUA_INCORRECT_SEQUENCE_NUMBER	0x20010000

The information returned to bytes 3 through 6 in **lua_peek_data** is determined by the first 3 bytes of the initial request unit that caused the error.

See Also

RUI_INIT, SLI_CLOSE, SLI_OPEN, SLI_RECEIVE

SLI_CLOSE

The **SLI_CLOSE** verb ends a session opened with SLI_OPEN. The LU-LU and LU-SSCP resources are released.

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_CLOSE.

```
struct LUA_COMMON {
    unsigned short   lua_verb;
    unsigned short   lua_verb_length;
    unsigned short   lua_prim_rc;
    unsigned long    lua_sec_rc;
    unsigned short   lua_opcode;
    unsigned long    lua_correlator;
    unsigned char    lua_luname[8];
    unsigned short   lua_extension_list_offset;
    unsigned short   lua_cobol_offset;
    unsigned long    lua_sid;
    unsigned short   lua_max_length;
    unsigned short   lua_data_length;
    char FAR *       lua_data_ptr;
    unsigned long    lua_post_handle;
    struct LUA_TH    lua_th;
    struct LUA_RH    lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char    lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char    lua_resv56[7];
    unsigned char    lua_encr_decr_option;

};
```

Members

lua_verb

Supplied parameter. Contains the verb code, LUA_VERB_SLI for Session Level Interface (SLI) verbs.

lua_verb_length

Supplied parameter. Specifies the length in bytes of the logical unit application (LUA) VCB. It must contain the length of the verb record being issued.

lua_prim_rc

Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc

Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode

Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_CLOSE.

lua_correlator

Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname

Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_CLOSE only requires this parameter if lua_sid is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset

Not used by **SLI_CLOSE** and should be set to zero.

lua_cobol_offset

Not used by LUA in Microsoft® Host Integration Server and should be zero.

lua_sid

Supplied parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length

Not used by **SLI_CLOSE** and should be set to zero.

lua_data_length

Not used by **SLI_CLOSE** and should be set to zero.

lua_data_ptr

Not used by **SLI_CLOSE** and should be set to zero.

lua_post_handle

Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows® 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th

Not used by **SLI_CLOSE** and should be set to zero.

lua_rh

Not used by **SLI_CLOSE** and should be set to zero.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit. A supplied parameter used by **SLI_CLOSE** to specify whether the session is to be closed immediately (ON) or closed normally (OFF). For verbs other than **SLI_CLOSE**, this flag must be off.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

System services control point (SSCP) expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

lua_message_type

Not used by **SLI_CLOSE** and should be set to zero.

lua_flag2

Returned parameter. Contains flags for messages returned by LUA.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_resv56

Reserved and should be set to zero.

lua_encr_decr_option

Not used by **SLI_CLOSE** and should be set to zero.

Return Codes

LUA_OK

Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

LUA_INVALID_LUNAME

Secondary return code; an invalid **lua_luname** was specified.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved parameter for the verb just issued is not set to zero.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Microsoft Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with a value for **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_SLI_SESSION

Secondary return code; a session was not open or was down due to an **SLI_CLOSE** or session failure when a command was issued.

LUA_CLOSE_PENDING

Secondary return code; one of the following has occurred:

- A CLOSE_ABEND was still pending when another CLOSE_ABEND was issued. You can issue a CLOSE_ABEND if a CLOSE_NORMAL is pending.
- Either a CLOSE_ABEND or a CLOSE_NORMAL was still pending when a CLOSE_NORMAL was issued.

LUA_SESSION_FAILURE
Primary return code; an error condition, specified in the secondary return code, caused the session to fail.

LUA_NOT_ACTIVE

Secondary return code; LUA was not active within Microsoft Host Integration Server when an LUA verb was issued.

LUA_UNEXPECTED_SNA_SEQUENCE

Secondary return code; unexpected data or commands were received from the host while SLI_OPEN was processing.

LUA_NEGATIVE_RSP_CHASE

Secondary return code; a negative response to an SNA CHASE command from the host was received by the LUA interface while **SLI_CLOSE** was being processed. **SLI_CLOSE** continued processing to stop the session.

LUA_NEGATIVE_RSP_SHUTC

Secondary return code; a negative response to an SNA SHUTC command from the host was received by the SLI while **SLI_CLOSE** was still being processed. **SLI_CLOSE** continued processing to stop the session.

LUA_NEGATIVE_RSP_SHUTD

Secondary return code; a negative response to an SNA RSHUTD command from the host was received by the LUA interface while **SLI_CLOSE** was still being processed. **SLI_CLOSE** continued processing to stop the session.

LUA_RECEIVED_UNBIND

Secondary return code; the primary logical unit (PLU) sent an SNA UNBIND command to the LUA interface when a session was active. As a result, the session was stopped.

LUA_NO_RUI_SESSION

Secondary return code; no session has been initialized for the LUA verb issued, or some verb other than SLI_OPEN was issued before the session was initialized.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; an LU component is unavailable because it is not connected properly. Make sure that the power is on.

LUA_IN_PROGRESS
Primary return code; an asynchronous command was received but is not completed.
LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.

Remarks

There are two types of **SLI_CLOSE**: normal and ABEND. For a normal close, **lua_flag1.close_abend** is set to zero. The sequence for a normal close can be initiated either as primary (host-initiated) or secondary (requested by a Windows LUA application). During a primary normal close, the Windows LUA interface:

- Reads the SHUTD command and posts the SESSION_END_REQUESTED status to the application.
- Writes the CHASE command (if necessary).
- Reads and processes the CHASE command response (if necessary).
- Writes the shutdown complete (SHUTC) command.
- Reads and processes the SHUTC command response.
- Reads and processes the CLEAR command (if necessary).
- Writes the CLEAR command response (if necessary).
- Reads and processes the UNBIND command.
- Writes the UNBIND command response.
- Stops the session.

During a secondary normal close, the Windows LUA interface:

- Writes the RSHUTD command.
- Reads and processes the RSHUTD command response.
- Reads and processes the CLEAR command (if necessary).
- Writes the CLEAR command response (if necessary).
- Reads and processes the UNBIND command.
- Writes the UNBIND command response.
- Stops the session.

For an ABEND close, **lua_flag1.close_abend** is set to 1, which directs the Windows LUA interface to close the session immediately. After **SLI_CLOSE** starts processing, the LU-LU connection is terminated and the SSCP is informed that the LU is not capable of sustaining a session.

See Also

SLI_OPEN

SLI_OPEN

The **SLI_OPEN** verb transfers control of the specified logical unit (LU) to the Microsoft® Windows® logical unit application (LUA) application. **SLI_OPEN** establishes a session between the system services control point (SSCP) and the specified LU, as well as an LU-LU session.

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_OPEN.

```
struct LUA_COMMON {
    unsigned short   lua_verb;
    unsigned short   lua_verb_length;
    unsigned short   lua_prim_rc;
    unsigned long    lua_sec_rc;
    unsigned short   lua_opcode;
    unsigned long    lua_correlator;
    unsigned char    lua_luname[8];
    unsigned short   lua_extension_list_offset;
    unsigned short   lua_cobol_offset;
    unsigned long    lua_sid;
    unsigned short   lua_max_length;
    unsigned short   lua_data_length;
    char FAR *       lua_data_ptr;
    unsigned long    lua_post_handle;
    struct LUA_TH    lua_th;
    struct LUA_RH    lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char    lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char    lua_resv56[7];
    unsigned char    lua_encr_decr_option;
};
```

The following union describes the **LUA_SPECIFIC** member of the VCB used by **SLI_OPEN**. Other union members are omitted for clarity.

```
union LUA_SPECIFIC {
    struct union SLI_OPEN open;
};

The SLI_OPEN structure contains the following nested structures and members:
struct LUA_EXT_ENTRY {
    unsigned char lua_routine_type;
    unsigned char lua_module_name[9];
    unsigned char lua_procedure_name[33];
} ;

struct SLI_OPEN {
    unsigned char         lua_init_type;
    unsigned char         lua_resv65;
    unsigned short        lua_wait;
    struct LUA_EXT_ENTRY  lua_open_extension[3];
    unsigned char         lua_ending_delim;
} ;
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_SLI for Session Level Interface (SLI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_OPEN.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_OPEN requires this parameter.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Supplied parameter. Specifies the offset from the start of the VCB to the extension list of user-supplied dynamic-link libraries (DLLs). The value must be the beginning of a word boundary unless there is no extension list. In this case, the value must be set to zero.

If this option is not used by SLI_OPEN, this member should be set to zero.

lua_cobol_offset
Not used by LUA in Microsoft® Host Integration Server and should be zero.

lua_sid
Returned parameter. Specifies the session identifier.

lua_max_length
Not used by **SLI_OPEN** and should be set to zero.

lua_data_length
Supplied parameter. Specifies the actual length of the data being sent.

lua_data_ptr
Pointer to the application-supplied buffer that contains the data to be sent for **SLI_OPEN**.

Both SNA commands and data are placed in this buffer, and they can be in an Extended Binary Coded Decimal Interchange Code (EBCDIC) format.

When SLI_OPEN is issued, this parameter can be one of the following:

- The LOGON message for the SSCP normal flow when the initialization type is secondary with an unformatted LOGON message.
- The request/response unit (RU) for INITSELF. When the initialization type is secondary with INITSELF, the necessary data for the application is provided.
- For all other open types, this field should be set to zero.

This information is provided by the Windows LUA application.

lua_post_handle
Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th
Not used by **SLI_OPEN** and should be set to zero.

lua_rh
Not used by **SLI_OPEN** and should be set to zero.

lua_flag1
Not used by **SLI_OPEN** and should be set to zero.

lua_message_type
Not used by **SLI_OPEN** and should be set to zero.

lua_flag2
Returned parameter. Contains flags for messages returned by LUA. Its subparameters are as follows:

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_resv56
Supplied parameter. Reserved field used by **SLI_OPEN** and RUI_INIT. For more information, see the Remarks section.

lua_resv56[1]

Supplied parameter. This parameter must be set to zero.

lua_resv56[2]

Supplied parameter. Indicates whether an SLI application can access LUs configured as 3270 LUs, in addition to LUA LUs. If this parameter is set to 1, 3270 LUs can be accessed.

lua_resv56[3]

Supplied parameter. Indicates whether incomplete reads are supported. If this parameter is set to 1, incomplete or truncated reads are supported. For more details, see the remarks for RUI_READ.

lua_encr_decr_option
Not used by **SLI_OPEN** and should be set to zero.

open
The union member of **LUA_SPECIFIC** used by **SLI_OPEN**. A supplied set of parameters contained in an **SLI_OPEN** structure required with **SLI_OPEN**.

open.lua_init_type

Supplied parameter. Defines how the LU-LU session is initialized by the Windows LUA interface.

Valid values are as follows:

LUA_INIT_TYPE_SEC_IS

LUA_INIT_TYPE_SEC_LOG

LUA_INIT_TYPE_PRIM

LUA_INIT_TYPE_PRIM_SSCP

open.lua_resv65

Reserved field.

open.lua_wait

Supplied parameter. Represents a secondary retry wait time indicating the number of seconds the Windows LUA interface is to wait before retrying the transmission of the INITSELF or the LOGON message after the host sends any one of these messages:

- A negative response and the secondary return code is one of the following:

  RESOURCE_NOT_AVAILABLE
  (0x08010000)SESSION_LIMIT_EXCEEDED (0x08050000)
  SESSION_SERVICE_PATH_ERROR (0x087D0000)

  Note that SLI_OPEN terminates with an error if lua_wait is set to zero and one of the preceding occurs.

- A network services procedure error (NSPE) message.
- A NOTIFY command, which indicates a procedure error.

open.lua_open_extension

Supplied parameter. Contains a list of application-supplied extension DLLs to process the BIND, STSN, and CRV commands.

open.open_extension.lua_routine_type

The extension routine type. Legal values are:

LUA_ROUTINE_TYPE_BIND

LUA_ROUTINE_TYPE_CRV

LUA_ROUTINE_TYPE_END (indicates end of extension list)

LUA_ROUTINE_TYPE_STSN

open.open_extension.lua_module_name

Supplied parameter. Provides the ASCII module name for the user-supplied extension DLL. The module name can be up to eight characters long, with the remaining bytes set to 0x00.

open.open_extension.lua_procedure_name

Supplied parameter. Provides the procedure name in ASCII for the user-supplied extension DLL. The procedure name can be up to 32 characters long, with the remaining bytes set to 0x00.

open.lua_ending_delim

The extension list delimiter.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_INVALID_LUNAME

Secondary return code; an invalid **lua_luname** name was specified.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_BAD_DATA_PTR

Secondary return code; the **lua_data_ptr** parameter either does not contain a valid pointer or does not point to a read/write segment and supplied data is required.

LUA_DATA_SEGMENT_LENGTH_ERROR

Secondary return code; one of the following occurred:

- The supplied data segment for SLI_RECEIVE or SLI_SEND is not a read/write data segment as required.
- The supplied data segment for SLI_RECEIVE is not as long as that provided in lua_max_length.
- The supplied data segment for SLI_SEND is not as long as that provided in lua_data_length.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved parameter for the verb just issued is not set to zero.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Microsoft Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with a value for **lua_verb_length** unexpected by LUA.

LUA_INVALID_OPEN_INIT_TYPE

Secondary return code; the value in the **lua_init_type** contained in **SLI_OPEN** is invalid.

LUA_INVALID_OPEN_DATA

Secondary return code; the **lua_init_type** for the **SLI_OPEN** issued is set to LUA_INIT_TYPE_SEC_IS when the buffer for data does not have a valid INITSELF command.

LUA_INVALID_OPEN_ROUTINE_TYPE

Secondary return code; the **lua_open_routine_type** for the **SLI_OPEN** list of extension routines is invalid.

LUA_DATA_LENGTH_ERROR

Secondary return code; the application did not provide user-supplied data required by the verb issued. Note that when SLI_SEND is issued for an SNA LUSTAT command, status (in four bytes) is required, and that when **SLI_OPEN** is issued with secondary initialization, data is required.

LUA_INVALID_SLI_ENCR_OPTION

Secondary return code; the **lua_encr_decr_option** parameter was set to 128 in **SLI_OPEN**, which is not supported for the encryption/decryption processing option.

LUA_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NOT_ACTIVE

Secondary return code; LUA was not active within Microsoft Host Integration Server or SNA Server when an LUA verb was issued.

LUA_UNEXPECTED_SNA_SEQUENCE

Secondary return code; unexpected data or commands were received from the host while **SLI_OPEN** was processing.

LUA_NEG_RSP_FROM_BIND_ROUTINE

Secondary return code; the user-supplied SLI_BIND routine responded negatively to the BIND. **SLI_OPEN** ended unsuccessfully.

LUA_NEG_RSP_FROM_STSN_ROUTINE

Secondary return code; the user-supplied SLI STSN routine responded negatively to the STSN. **SLI_OPEN** ended unsuccessfully.

LUA_PROCEDURE_ERROR

Secondary return code; a host procedure error is indicated by the receipt of an NSPE or NOTIFY message. The return code is posted to **SLI_OPEN** when the retry option is not used. To use the reset option, set **lua_wait** to a value other than zero. The LOGON or INITSELF command will be retried until the host is ready or until you issue SLI_CLOSE.

LUA_RECEIVED_UNBIND

Secondary return code; the primary logical unit (PLU) sent an SNA UNBIND command to the LUA interface when a session was active. As a result, the session was stopped.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_NO_RUI_SESSION

Secondary return code; no session has been initialized for the LUA verb issued, or some verb other than **SLI_OPEN** was issued before the session was initialized.

LUA_RESOURCE_NOT_AVAILABLE

Secondary return code; the logical unit, physical unit, link, or link station specified in the request unit is unavailable. This return code is posted to **SLI_OPEN** when a resource is unavailable unless you use the retry option.

To use the retry option, set **lua_wait** to a value other than zero. The LOGON or INITSELF command will be retried until the host is ready or until you issue SLI_CLOSE.

LUA_SESSION_LIMIT_EXCEEDED

Secondary return code; the session requested was not activated because an NAU is at its session limit. This SNA sense code applies to the following requests: BID, CINIT, INIT, and ACTDRM.

The code will be posted to **SLI_OPEN** when an NAU is at its limit, unless you use the RETRY option.

To use the reset option, set **lua_wait** to a value other than zero. The LOGON or INITSELF command will be retried until the host is ready or until you issue **SLI_CLOSE**.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; an LU component is unavailable because it is not connected properly. Make sure that the power is on.

LUA_NEGOTIABLE_BIND_ERROR

Secondary return code; a negotiable BIND was received, which is only allowed by the SLI when a user-supplied SLI_BIND routine is provided with **SLI_OPEN**.

LUA_BIND_FM_PROFILE_ERROR

Secondary return code; only file management header profiles 3 and 4 are supported by the LUA interface. A file management profile other than 3 or 4 was found on the BIND.

LUA_BIND_TS_PROFILE_ERROR

Secondary return code; only Transmission Service (TS) profiles 3 and 4 are supported by the LUA interface. A TS profile other than 3 or 4 was found on the BIND.

LUA_BIND_LU_TYPE_ERROR

Secondary return code; only LU 0, LU 1, LU 2, and LU 3 are supported by LUA. An LU other than 0, 1, 2, or 3 was found.

LUA_SSCP_LU_SESSION_NOT_ACTIVE

Secondary return code; the required SSCP-LU is inactive. Specific sense code information is in bytes 2 and 3. Valid settings are 0x0000, 0x0001, 0x0002, 0x0003, and 0x0004.

LUA_SESSION_SERVICES_PATH_ERROR

Secondary return code; a request for session services cannot be rerouted to an SSCP-SSCP session path. Specific sense code information in bytes 2 and 3 gives more information about why the request cannot be rerouted.

LUA_UNSUCCESSFUL
Primary return code; the verb record supplied was valid but the verb did not complete successfully.

LUA_VERB_RECORD_SPANS_SEGMENTS

Secondary return code; the LUA VCB length parameter plus the segment offset is beyond the segment end.

LUA_SESSION_ALREADY_OPEN

Secondary return code; a session is already open for the LU name specified in **SLI_OPEN**.

LUA_INVALID_PROCESS

Secondary return code; the session for which an LUA verb was issued is unavailable because another process owns the session.

LUA_LINK_NOT_STARTED

Secondary return code; the LUA was not able to activate the data link during initialization of the session.

LUA_INVALID_ADAPTER

Secondary return code; the configuration for the data link control (DLC) is in error, or the configuration file is corrupted.

LUA_ENCR_DECR_LOAD_ERROR

Secondary return code; an unexpected return code was received from the OS/2 **DosLoadModule** function while attempting to load the user-provided encryption or decryption dynamic link module.

LUA_ENCR_DECR_PROC_ERROR

Secondary return code; an unexpected return code was received from the OS/2 **DosGetProcAddr** function while attempting to get the procedure address within the user-provided encryption or decryption dynamic link module.

LUA_NEG_NOTIFY_RSP

Secondary return code; the SSCP responded negatively to a NOTIFY request issued indicating that the secondary LU was capable of a session. The half-session component that received the request understood and supported the request but could not execute it.

LUA_LU_INOPERATIVE

Secondary return code; a severe error occurred while the SLI was attempting to stop the session. This LU is unavailable for any LUA requests until an activate logical unit (ACTLU) is received from the host.

LUA_CANCELED
Primary return code; the secondary return code gives the reason for canceling the command.

LUA_TERMINATED

Secondary return code; the session was terminated when a verb was pending. The verb process was canceled.

LUA_IN_PROGRESS
Primary return code; an asynchronous command was received but is not completed.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.

- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

LUA_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.

Remarks

For each **SLI_OPEN**, the Windows LUA interface:

- Starts the communication session.
- Reads and verifies a BIND command from the host, and passes it to the application if a BIND extension routine is supplied.
- Writes a BIND response.
- Reads and processes the STSN command and passes it to the application if a BIND extension is supplied (if necessary).
- Writes the STSN response (if necessary).
- Reads the CRV command (if necessary).
- Writes the CRV response (if necessary).
- Reads and processes the SDT command.
- Writes the SDT response.

The Windows LUA interface does the following additional functions for sessions that issue **SLI_OPEN** with the open type set to LUA_INIT_TYPE_SEC_IS or LUA_INIT_TYPE_SEC_LOG:

- Writes an INITSELF or an unformatted LOGON message.
- Reads and processes an INITSELF response or LOGON message response.

All SNA message traffic is administered by **SLI_OPEN** through the SDT command response.

To choose a certain LU configured for Windows LUA, the application sets lua_luname to the LU name in ASCII, padded with trailing spaces if necessary.

When SLI_OPEN is posted with LUA_OK in the lua_prim_rc parameter, SLI_OPEN successfully completed and the LU-LU data-flow session was established. The application can now issue SLI_BID, SLI_CLOSE, SLI_PURGE, SLI_RECEIVE, and SLI_SEND.

When SLI_OPEN is posted with a primary return code other than LUA_OK or LUA_IN_PROGRESS, the command did not successfully establish a session.

When using SLI_OPEN, a Windows LUA application must provide a session initialization type. Valid types are:

- Secondary with INITSELF
- Secondary with an Unformatted LOGON Message
- Primary Waiting for a BIND Command
- Primary with SSCP Access

- Secondary with INITSELF
- Secondary with an Unformatted LOGON Message
- Primary Waiting for a BIND Command
- Primary with SSCP Access
- BIND, CRV, and STSN Routines
- BIND Example
- Recovering from SESSION_FAILURE
- Ending a Pending SLI_OPEN

See Also

RUI_INIT, SLI_OPEN, SLI_RECEIVE, SLI_SEND

Secondary with INITSELF

To initialize a session by having the secondary issue an INITSELF command, set **open.lua_init_type** to LUA_INIT_TYPE_SEC_IS. When this type of session initialization is chosen, the application has to format and provide the INITSELF command. The address of the INITSELF command is specified by **lua_data_ptr**. The actual length of the INITSELF command is specified by **lua_data_length**.

Secondary with an Unformatted LOGON Message

To initialize a session by having the secondary issue an unformatted LOGON message, set **open.lua_init_type** to LUA_INIT_TYPE_SEC_LOG. The length of the user's EBCDIC LOGON message is then specified in **lua_data_length**. The address of the user's EBCDIC LOGON message length is specified by **lua_data_ptr**.

Primary Waiting for a BIND Command

To initialize a session by having the secondary wait for the primary to issue a BIND and SDT, set **open.lua_init_type** to LUA_INIT_TYPE_PRIM. Until the host begins a session with the Windows logical unit application (LUA) application using the BIND command followed by an SDT command, the **SLI_OPEN** issued stays IN_PROGRESS.

Primary with SSCP Access

To initialize a session by having the Session Level Interface (SLI) wait for a BIND and SDT but allow system services control point (SSCP) access, set **open.lua_init_type** to LUA_INIT_TYPE_PRIM_SSCP. Rather than sending commands to the host to begin a session, the SLI enables the Windows logical unit application (LUA) application to issue SLI_SEND and SLI_RECEIVE for the SSCP normal flow only. This allows the INITSELF commands or LOGON messages and responses to be transmitted between the Windows LUA application and the host. The application can have more than one INITSELF and LOGON message. For this type of session only, other SLI verbs can be issued before SLI_OPEN completes. When issuing **SLI_SEND**, an application should not specify any flow flag unless the application is sending a response, as specified in the **lua_message_type** parameter of **SLI_OPEN**. To obtain the INIT_COMPLETE status, the application must first issue **SLI_OPEN**, and then issue either SLI_BID or **SLI_RECEIVE**. The INIT_COMPLETE status notifies the application that the **SLI_SEND** and **SLI_RECEIVE** verbs for SSCP normal flow data can be issued.

BIND, CRV, and STSN Routines

For BIND and STSN routines supplied by the application, the names of dynamic-link libraries (DLLs) and the entry points for procedures are passed in the SLI_OPEN verb's verb control block (VCB). During **SLI_OPEN**, the BIND and STSN routines are called if the appropriate SNA request is received. When a BIND routine is not supplied by the application, the Session Level Interface (SLI) performs a minimal check of the BIND commands and responds as necessary. If no STSN routine is supplied and an STSN request arrives, a positive response is issued by the SLI. If a CRV request arrives, a negative response is issued by the SLI.

Names for BIND and STSN routines are provided as extensions of the SLI_OPEN verb's VCB. The lua_extension_list_offset parameter provides the offset from the start of the VCB to the first name in the extension list.

The function prototype for a user-defined BIND or STSN routine on Microsoft Windows Server 2003 or Windows 2000 is as follows:

```
VOID WINAPI UserFunction(
LUA_VERB_RECORD *lpVcb
);
```

The *lpVcb* parameter is a pointer to a logical unit application (LUA) VCB.

BIND Example

The following example illustrates checking the incoming BIND image using these features of SLI_OPEN.

```
lua_vcb.specific.open.lua_open_extension[0].lua_routine_type  =
    LUA_ROUTINE_TYPE_BIND;
strcpy(lua_vcb.specific.open.lua_open_extension[0].lua_module_name,
    "WINSLI32");
strcpy(lua_vcb.specific.open.lua_open_extension[0].lua_procedure_name,
    "BindValidation");
lua_vcb.specific.open.lua_open_extension[1].lua_routine_type =
     LUA_ROUTINE_TYPE_END;
```

Note that for Microsoft® Visual C++® 4.0 or later, and for Microsoft Windows Server 2003 or Windows 2000, the function prototype should be:

```
VOID WINAPI BindValidation (LUA_VERB_RECORD FAR * pVerb );
```

On Windows Server 2003 or Windows 2000, the WINAPI macro equates to _STDCall.

The BIND routine has access to the logical unit application (LUA) verb control block (VCB) passed to it. The BIND routine should validate the BIND and indicate the appropriate Session Level Interface (SLI) primary and secondary return code in the LUA verb record. Also, the routine may indicate the primary and secondary request/response unit (RU) sizes supported by the SLI program by setting bytes 10 and 11 in the common.lua_data_ptr field (where the BIND command is indicated).

The following are the Visual C++ compiler options for the module containing the callback:

```
 /FA -c -Zle -W3 -WX -Ge -Gy -Gz -Ox -Zd
 -DCONDITION_HANDLING -DSTD_CALL
 -Di386=1 -D_X86_ -DNT_UP -DWIN32 -DDEVL
 -D_DLL -D_MT  -DWIN32_SUPPORT
```

The following is the code generated for the callback:

```
PUBLIC _BindValidation@4
; COMDAT _BindValidation@4
_TEXT SEGMENT
   _pVerb$ = 8
   _BindValidation@4 PROC NEAR    ; COMDAT

   // pVerb->common.lua_prim_rc = LUA_STATE_CHECK;
   mov eax, DWORD PTR _pVerb$[esp-4]
   mov WORD PTR [eax+4], 512   ; 00000200H
   ret 4
_BindValidation@4 ENDP
_TEXT ENDS
```

The following is the code generated by SLI to call this callback:

```
   // (*aSCB->bind_rtn)(sliVCB);
   push    ebp
   call    DWORD PTR [ebx+188]
   // note there is no ADD ESP,4 following the call
```

The following is the client internal trace showing WINSLI detecting the user provided bind validation callback:

```
|00000157.000000f7 OUDMD  Opening User DLL Modules
|00000157.000000f7 OUDMD  Opening a Bind Routine
```

```
|00000157.000000f7 OUDMD  Opening DLL = WINSLI32
|00000157.000000f7 OUDMD  Loading Routine = BindValidation
```

The following is client internal trace showing the bind validation callback:

```
|00000157.0000015c CLUAD  Calling BIND Routine
|00000157.0000015c CLUAD  Return from BIND routine, prc=512
|00000157.0000015c CLUAD  Returned With Error From Routine
|00000157.0000015c FrRUI  Freeing RUI vcb = 0x14E424
|00000157.0000015c BINDP  USER BIND ROUTINE FAILED
```

The following is an API trace to show the bind validation error:

```
000015c SLI    ----------------------------------------------   11:11:52.28
000015c SLI    SLI_OPEN post
000015c SLI    SESSION_FAILURE - NEG_RSP_FROM_BIND_ROUTINE
000015c SLI    ---- Verb Parameter Block at address 00405150 ----
000015c SLI    52004900 000F0000 00000039 01000000
    <R.I........9....>
000015c SLI    00000000 4C553220 20202020 48000000
    <....LU2     H...>
000015c SLI    88E01400 00000400 C0904000 F4000000
    <h.........@.4...>
000015c SLI    00000000 00000000 00000040 00000000
    <...........@....>
000015c SLI    00000000 02000000 0157494E 534C4933
    <.........WINSLI3>
000015c SLI    32004269 6E645661 6C696461 74696F6E
    <2.BindValidation>
000015c SLI    00000000 00000000 00000000 00000000
    <................>
000015c SLI    00000000 00000000 00000000 00000000
    <................>
000015c SLI    00000000 00000000 00000000 00000000
    <................>
000015c SLI    00000000 00000000 00000000 00000000
    <................>
000015c SLI    00000000 00000000 00000000 00000000
    <................>
000015c SLI    00000000 00000000 00000000 00000000
    <................>
000015c SLI    00000000 00000000 0000
    <..........      >
000015c SLI    ---- Data at address 004090C0 ----
000015c SLI    86998584
    <fred            >
```

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Recovering from SESSION_FAILURE

If the SLI_OPEN completes with the primary return code of SESSION_FAILURE, the Windows logical unit application (LUA) interface enables you to reissue **SLI_OPEN** without issuing SLI_CLOSE.

Ending a Pending SLI_OPEN

To end a pending SLI_OPEN, issue SLI_CLOSE with **lua_flag2.close_abend** set to ON.

SLI_PURGE

The **SLI_PURGE** verb cancels SLI_RECEIVE verbs issued with a wait condition.

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_PURGE.

```
struct LUA_COMMON {
    unsigned short    lua_verb;
    unsigned short    lua_verb_length;
    unsigned short    lua_prim_rc;
    unsigned long     lua_sec_rc;
    unsigned short    lua_opcode;
    unsigned long     lua_correlator;
    unsigned char     lua_luname[8];
    unsigned short    lua_extension_list_offset;
    unsigned short    lua_cobol_offset;
    unsigned long     lua_sid;
    unsigned short    lua_max_length;
    unsigned short    lua_data_length;
    char FAR *        lua_data_ptr;
    unsigned long     lua_post_handle;
    struct LUA_TH     lua_th;
    struct LUA_RH     lua_rh;
    struct LUA_FLAG1  lua_flag1;
    unsigned char     lua_message_type;
    struct LUA_FLAG2  lua_flag2;
    unsigned char     lua_resv56[7];
    unsigned char     lua_encr_decr_option;
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_SLI for Session Level Interface (SLI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the logical unit application (LUA) VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_PURGE.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_PURGE only requires this parameter if lua_sid is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by **SLI_PURGE** and should be set to zero.

lua_cobol_offset
Not used by LUA in Microsoft® Host Integration Server or SNA Server and should be zero.

lua_sid
Supplied parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length
Not used by **SLI_PURGE** and should be set to zero.

lua_data_length
Not used by **SLI_PURGE** and should be set to zero.

lua_data_ptr
When **SLI_PURGE** is issued, this parameter points to the location of the SLI_RECEIVE verb's VCB that is to be canceled.

lua_post_handle
Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows® 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th
Not used by **SLI_PURGE** and should be set to zero.

lua_rh
Not used by **SLI_PURGE** and should be set to zero.

lua_flag1
Not used by **SLI_PURGE** and should be set to zero.

lua_message_type
Not used by **SLI_PURGE** and should be set to zero.

lua_flag2
Returned parameter. Contains flags for messages returned by LUA.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_resv56
Reserved and should be set to zero.

lua_encr_decr_option
Not used by **SLI_PURGE** and should be set to zero.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_INVALID_LUNAME

Secondary return code; an invalid **lua_luname** was specified.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_BAD_DATA_PTR

Secondary return code; the **lua_data_ptr** parameter either does not contain a valid pointer or does not point to a read/write segment and supplied data is required.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved parameter for the verb just issued is not set to zero.

LUA_INVALID_POST_HANDLE

Secondary return code; for the Microsoft Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with a value for **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_SLI_SESSION

Secondary return code; a session was not open or was down due to an SLI_CLOSE or session failure when a command was issued.

LUA_NO_RECEIVE_TO_PURGE

Secondary return code; no SLI_RECEIVE was outstanding when you issued **SLI_PURGE**. One of two situations caused the problem:

- **SLI_RECEIVE** completed before **SLI_PURGE** finished processing. You can change the application to take care of this problem because it is not an error condition.
- The lua_data_ptr parameter does not correctly point to the SLI_RECEIVE you want to purge.

LUA_SLI_PURGE_PENDING

Secondary return code; an **SLI_PURGE** was still active when another **SLI_PURGE** was issued. Only one **SLI_PURGE** can be active at a time.

LUA_SESSION_FAILURE
Primary return code; an error condition, specified in the secondary return code, caused the session to fail.

LUA_RECEIVED_UNBIND

Secondary return code; the primary logical unit (PLU) sent an SNA UNBIND command to the LUA interface when a session was active. As a result, the session was stopped.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; an LU component is unavailable because it is not connected properly. Make sure that the power is on.

LUA_UNSUCCESSFUL
Primary return code; the verb record supplied was valid but the verb did not complete successfully.

LUA_VERB_RECORD_SPANS_SEGMENTS

Secondary return code; the LUA VCB length parameter plus the segment offset is beyond the segment end.

LUA_NOT_ACTIVE

Secondary return code; LUA was not active within Microsoft Host Integration Server or SNA Server when an LUA verb was issued.

LUA_NOT_READY

Secondary return code; one of the following caused the SLI session to be temporarily suspended:

- An SNA UNBIND type 0x02 command was received, which indicates a new BIND is coming. If the UNBIND type 0x02 is received after the beginning SLI_OPEN is complete, the session is suspended until a BIND, optional CRV and STSN, and SDT flows are received. These routines are re-entrant because they have to be called again. The session resumes after the SLI processes the SDT command. If the UNBIND type 0x02 is received while the **SLI_OPEN** is still processing, the primary return code is SESSION_FAILURE, not LUA_STATUS.
- The receipt of an SNA CLEAR caused the suspension. Receipt of an SNA SDT will cause the session to resume.

LUA_INVALID_PROCESS

Secondary return code; the session for which a Request Unit Interface (RUI) verb was issued is unavailable because another OS/2 process owns the session.

LUA_LU_INOPERATIVE

Secondary return code; a severe error occurred while the RUI was attempting to stop the session. This LU is unavailable for any LUA requests until an activate logical unit (ACTLU) is received from the host.

LUA_CANCELED
Primary return code; the secondary return code gives the reason for canceling the command.

LUA_TERMINATED

Secondary return code; the session was terminated when a verb was pending. The verb process was canceled.

LUA_IN_PROGRESS
Primary return code; an asynchronous command was received but is not completed.
LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

LUA_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.

Remarks

SLI_PURGE cancels SLI_RECEIVE commands with a wait condition.

Typically, SLI_PURGE is issued if SLI_RECEIVE takes too long to complete. To cancel an SLI_RECEIVE, lua_data_ptr has to point to the SLI_RECEIVE VCB to cancel. The primary return code of the SLI_RECEIVE will be set to LUA_CANCELED when SLI_PURGE succeeds in canceling SLI_RECEIVE.

See Also

RUI_INIT, SLI_OPEN, SLI_PURGE, SLI_RECEIVE, SLI_SEND

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SLI_RECEIVE

The **SLI_RECEIVE** verb receives responses, SNA commands, and data into a Microsoft® Windows® logical unit application (LUA) application's buffer. **SLI_RECEIVE** also provides the current status of the session to the Windows LUA application.

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_RECEIVE.

```
struct LUA_COMMON {
    unsigned short    lua_verb;
    unsigned short    lua_verb_length;
    unsigned short    lua_prim_rc;
    unsigned long     lua_sec_rc;
    unsigned short    lua_opcode;
    unsigned long     lua_correlator;
    unsigned char     lua_luname[8];
    unsigned short    lua_extension_list_offset;
    unsigned short    lua_cobol_offset;
    unsigned long     lua_sid;
    unsigned short    lua_max_length;
    unsigned short    lua_data_length;
    char FAR *        lua_data_ptr;
    unsigned long     lua_post_handle;
    struct LUA_TH     lua_th;
    struct LUA_RH     lua_rh;
    struct LUA_FLAG1  lua_flag1;
    unsigned char     lua_message_type;
    struct LUA_FLAG2  lua_flag2;
    unsigned char     lua_resv56[7];
    unsigned char     lua_encr_decr_option;
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_SLI for Session Level Interface (SLI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_RECEIVE.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_RECEIVE only requires this parameter if lua_sid is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by **SLI_RECEIVE** and should be set to zero.

lua_cobol_offset
Not used by LUA in Microsoft® Host Integration Server or SNA Server and should be zero.

lua_sid
Supplied and returned parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length
Specifies the length of received buffer for RUI_READ and **SLI_RECEIVE**.

lua_data_length

Returned parameter. Specifies the length of data returned in the receive buffer.

lua_data_ptr

Pointer to the application-supplied buffer that is to receive the data from an **SLI_RECEIVE** verb. Both SNA commands and data are placed in this buffer, and they can be in an Extended Binary Coded Decimal Interchange Code (EBCDIC) format.

When SLI_RECEIVE is issued, this parameter points to the location to receive the data from the host.

lua_post_handle

Supplied parameter. Used under Microsoft® Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th

Returned parameter. Contains the SNA transmission header (TH) of the message received. Various subparameters are returned for read and bid functions. Its subparameters are as follows:

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits. Defines the type of data segment. The following values are valid:

0x0 Middle segment
0x04 Last segment
0x08 First segment
0x0C Only segment

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh

Returned parameter. Contains the SNA request/response header (RH) of the message sent or received. Its subparameters are as follows:

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

Request/response unit (RU) category, two bits. The following values are valid:

LUA_RH_FMD (**0x00**) FM data segment
LUA_RH_NC (**0x20**) Network control
LUA_RH_DFC (**0x40**) Data flow control
LUA_RH_SC (**0x60**) Session control

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. This parameter is used by RUI_BID, RUI_READ, RUI_WRITE, SLI_BID, **SLI_RECEIVE**, and SLI_SEND. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

System services control point (SSCP) expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

Set **lua_flag1.bid_enable** to 1 to re-enable the most recent SLI_BID (equivalent to issuing **SLI_BID** again with exactly the same parameters as before), or set it to zero if you do not want to re-enable **SLI_BID**. Note that re-enabling the previous **SLI_BID** reuses the VCB originally allocated for it, so this VCB must not have been freed or modified.

Set lua_flag1.nowait to 1 to indicate that you want SLI_RECEIVE to return immediately whether or not data is available to be read, or set it to zero if you want the verb to wait for data before returning.

Set one or more of the following flags to 1 to indicate from which message flow to read data:

lua_flag1.sscp_exp

lua_flag1.lu_exp

lua_flag1.sscp_norm

lua_flag1.lu_norm

If more than one flag is set, the highest-priority data available is returned. The order of priorities (highest first) is: SSCP expedited, LU expedited, SSCP normal, LU normal. The equivalent flag in the **lua_flag2** group is set to indicate from which flow the data was read.

lua_message_type

Specifies the type of the inbound or outbound SNA commands and data. Returned parameter. Specifies the type of SNA message indicated to **SLI_RECEIVE**. Possible values are:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_RSP

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIND

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SIGNAL

LUA_MESSAGE_TYPE_STSN

The SLI receives and responds to the BIND and STSN requests through the LUA interface extension routines.

LU-DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2

Returned parameter. Contains flags for messages returned by LUA. Returned by RUI_BID, RUI_READ, **RUI_WRITE**, **SLI_BID**, **SLI_RECEIVE**, and SLI_SEND. Its subparameters are as follows:

lua_flag2.bid_enable

Indicates that **RUI_BID** was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56
Not used by **SLI_RECEIVE** and should be set to zero.
lua_encr_decr_option
Not used by **SLI_RECEIVE** and should be set to zero.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_INVALID_LUNAME

Secondary return code; an invalid **lua_luname** was specified.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_BAD_DATA_PTR

Secondary return code; the **lua_data_ptr** parameter either does not contain a valid pointer or does not point to a read/write segment and supplied data is required.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved parameter for the verb just issued is not set to zero.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Microsoft Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_BID_VERB_SEGMENT_ERROR

Secondary return code; the buffer with the SLI_BID VCB was released before the **SLI_RECEIVE** with **lua_flag1.bid_enable** set to 1 was issued.

LUA_NO_PREVIOUS_BID_ENABLED

Secondary return code; **SLI_BID** was not issued prior to issuing **SLI_RECEIVE** with **lua_flag1.bid_enable**.

LUA_BID_ALREADY_ENABLED

Secondary return code; **SLI_RECEIVE** was issued with **lua_flag1.bid_enable** when **SLI_BID** was already active.

LUA_INVALID_FLOW

Secondary return code; the **lua_flag1** flow flags were set incorrectly when a verb was issued:

- When issuing SLI_SEND to send an SNA response, set only one **lua_flag1** flow flag.
- When issuing SLI_RECEIVE, set at least one lua_flag1 flow flag.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with a value for **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_SLI_SESSION

Secondary return code; a session was not open or was down due to an SLI_CLOSE or session failure when a command was issued.

LUA_RECEIVE_ON_FLOW_PENDING

Secondary return code; an **SLI_RECEIVE** was still outstanding when this application issued another **SLI_RECEIVE** for an SNA flow.

LUA_SESSION_FAILURE

Primary return code; an error condition, specified in the secondary return code, caused the session to fail.

LUA_RUI_WRITE_FAILURE

Secondary return code; an unexpected error was posted to the SLI by RUI_WRITE.

LUA_RECEIVED_UNBIND

Secondary return code; the primary logical unit (PLU) sent an SNA UNBIND command to the LUA interface when a session was active. As a result, the session was stopped.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_NO_RUI_SESSION

Secondary return code; no session has been initialized for the LUA verb issued or some verb other than SLI_OPEN was issued before the session was initialized.

LUA_MODE_INCONSISTENCY

Secondary return code; performing this function is not allowed by the current status. The request sent to the half-session component was not executed even though it was understood and supported. This SNA sense code is also an exception request sense code.

LUA_RECEIVER_IN_TRANSMIT_MODE

Secondary return code; either resources needed to handle normal flow data were not available or the state of the half-duplex contention was not received when a normal-flow request was received. The result is a race condition. This SNA sense code is also an exception request sense code.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; an LU component is unavailable because it is not connected properly. Make sure that the power is on.

LUA_FUNCTION_NOT_SUPPORTED

Secondary return code; LUA does not support the requested function. A control character, an RU parameter, or a formatted request code may have specified the function. Specific sense code information is in bytes 2 and 3.

LUA_CHAINING_ERROR

Secondary return code; the sequence of the chain indicator settings is in error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_BRACKET

Secondary return code; the sender failed to enforce the session bracket rules. Note that contention and race conditions are exempt from this error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DIRECTION

Secondary return code; while the half-duplex flip-flop state was NOT_RECEIVE, a request for normal flow was received. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_QUIESCED

Secondary return code; a data flow control (DFC) or function management data (FMD) request was received from a half-session that sent either a SHUTC command or QC command, and the DFC or FMD request has not responded to a RELQ command. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_NO_BEGIN_BRACKET

Secondary return code; the receiver has already sent a positive response to a BIS command when a BID or an FMD request specifying BBI=BB was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_IMMEDIATE_REQUEST_MODE_ERROR

Secondary return code; the request violated the immediate request mode protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_QUEUED_RESPONSE_ERROR

Secondary return code; the request violated the queued response protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_ERP_SYNC_EVENT_ERROR

Secondary return code; a violation of the ERP synchronous event protocol occurred. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_RSP_CORRELATION_ERROR

Secondary return code; a response was sent that does not correspond to a previously received request or a response was received that does not correspond to a previously sent request.

LUA_RSP_PROTOCOL_ERROR

Secondary return code; a violation of the response protocol was found in the response received from the primary half-session.

LUA_BB_NOT_ALLOWED

Secondary return code; the begin bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EB_NOT ALLOWED

Secondary return code; the end bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EXCEPTION_RSP_NOT_ALLOWED

Secondary return code; when an exception response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_DEFINITE_RSP_NOT_ALLOWED

Secondary return code; when a definite response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_ALLOWED

Secondary return code; the change-direction indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NO_RESPONSE_NOT_ALLOWED

Secondary return code; a request other than an EXR contained a NO RESPONSE. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CHAINING_NOT_SUPPORTED

Secondary return code; the chaining indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_BRACKETS_NOT_SUPPORTED

Secondary return code; the bracket indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_SUPPORTED

Secondary return code; the change-direction indicator was set, but LUA does not support change-direction for this situation. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_FI

Secondary return code; the format indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_ALTERNATE_CODE_NOT_SUPPORTED

Secondary return code; the code selection indicator was set, but LUA does not support code selection for this session. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_RU_CATEGORY

Secondary return code; the request unit category indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_REQUEST_CODE

Secondary return code; the request code was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_SPEC_OF_SDI_RTI

Secondary return code; the SDI and the RTI were not specified correctly on a response. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_DR1I_DR2I_ERI

Secondary return code; the DR1I, the DR2I, and the ERI were specified incorrectly. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_QRI

Secondary return code; the queued response indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_EDI

Secondary return code; the EDI was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_PDI

Secondary return code; the PDI was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_UNSUCCESSFUL
Primary return code; the verb record supplied was valid but the verb did not complete successfully.

LUA_DATA_TRUNCATED

Secondary return code; the data was truncated because the data received was longer than the buffer length specified in **lua_max_length**.

LUA_DATA_SEGMENT_LENGTH_ERROR

Secondary return code; one of the following has occurred:

- The supplied data segment for **SLI_RECEIVE** or SLI_SEND is not a read/write data segment as required.
- The supplied data segment for SLI_RECEIVE is not as long as that provided in lua_max_length.
- The supplied data segment for SLI_SEND is not as long as that provided in lua_data_length.

LUA_NO_DATA

Secondary return code; no data was available to read when **SLI_RECEIVE** containing a no wait parameter was issued.

LUA_VERB_RECORD_SPANS_SEGMENTS

Secondary return code; the LUA VCB length parameter plus the segment offset is beyond the segment end.

LUA_NOT_ACTIVE

Secondary return code; LUA was not active within Microsoft Host Integration Server or SNA Server when an LUA verb was issued.

LUA_NOT_READY

Secondary return code; one of the following has caused the SLI session to be temporarily suspended:

- An SNA UNBIND type 0x02 command was received, which indicates a new BIND is coming. If the UNBIND type 0x02 is received after the beginning SLI_OPEN is complete, the session is suspended until a BIND, optional CRV and STSN, and SDT flows are received. These routines are re-entrant because they have to be called again. The session resumes after the SLI processes the SDT command. If the UNBIND type 0x02 is received while the **SLI_OPEN** is still processing, the primary return code is LUA_SESSION_FAILURE, not LUA_STATUS.
- The receipt of an SNA CLEAR caused the suspension. Receipt of an SNA SDT will cause the session to resume.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_INVALID_PROCESS

Secondary return code; the session for which an LUA verb was issued is unavailable because another OS/2 process owns the session.

LUA_LU_INOPERATIVE

Secondary return code; a severe error occurred while the LUA was attempting to stop the session. This LU is unavailable for any LUA requests until an activate logical unit (ACTLU) is received from the host.

LUA_RECEIVE_CORRELATION_TABLE_FULL

Secondary return code; the session receive correlation table for the flow requested reached its capacity.

LUA_NEGATIVE_RESPONSE
Primary return code; either the LUA sent a negative response to a message received from the primary logical unit (PLU) because an error was found in the message, or the application responded negatively to a chain for which the end-of-chain has arrived.

LUA_MODE_INCONSISTENCY

Secondary return code; performing this function is not allowed by the current status. The request sent to the half-session component was not executed even though it was understood and supported. This SNA sense code is also an exception request sense code.

LUA_FUNCTION_NOT_SUPPORTED

Secondary return code; the LUA does not support the requested function. A control character, an RU parameter, or a formatted request code may have specified the function. Specific sense code information is in bytes 2 and 3.

LUA_DATA_TRAFFIC_RESET

Secondary return code; a half-session of an active session but with inactive data traffic received a normal flow DFC or FMD request. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_NOT_RESET

Secondary return code; while the data traffic state was not reset, the session control request was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_SC_PROTOCOL_VIOLATION

Secondary return code; a violation of SC protocol occurred. A request (that is permitted only after an SC request and a positive response to that request have been successfully exchanged) was received before the required exchange. Byte 4 of the sense data contains the request code. No user data exists for this sense code. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_INVALID_SC_OR_NC_RH

Secondary return code; the RH of an SC or NC request was invalid.

LUA_PACING_NOT_SUPPORTED

Secondary return code; the request contained a pacing indicator when support of pacing for this session does not exist for the receiving half-session or boundary function half-session. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NAU_INOPERATIVE

Secondary return code; the network addressable unit is not able to process responses or requests. Delivery to the receiver could not take place for one of the following reasons:

- A path information unit error
- A path outage
- An invalid sequence of requests for activation

If a path error is received during an active session, it usually means there is no longer a valid path to the session partner.

LUA_CANCELED
Primary return code; the secondary return code gives the reason for canceling the command.

LUA_PURGED

Secondary return code; SLI_PURGE was issued and canceled **SLI_RECEIVE**.

LUA_NO_SLI_SESSION

Secondary return code; a session was not open or was down due to an SLI_CLOSE or session failure when a command was issued.

LUA_CANCEL_COMMAND_RECEIVED

Secondary return code; the host sent an SNA CANCEL command to cancel the data chain currently being received by **SLI_RECEIVE**.

LUA_TERMINATED

Secondary return code; the session was terminated when a verb was pending. The verb process has been canceled.

LUA_IN_PROGRESS
Primary return code; an asynchronous command was received but is not completed.
LUA_STATUS
Primary return code; the secondary return code contains SLI status information for the application.

LUA_READY

Secondary return code; following a NOT READY status, this status is issued to notify you that the SLI is ready to process commands.

LUA_NOT_READY

Secondary return code; the SLI session is temporarily suspended for the following reason:

- An SNA UNBIND type 0x02 command was received, which means a new BIND is coming. If the UNBIND type 0x02 is received after the beginning SLI_OPEN is complete, the session is suspended until a BIND, optional CRV and STSN, and SDT flows are received. These routines are re-entrant because they have to be called again. The session resumes after the SLI processes the SDT command. If the UNBIND type 0x02 is received while the **SLI_OPEN** is still processing, the primary return code is session-failure, not status.
- The receipt of an SNA CLEAR caused the suspension. Receipt of an SNA SDT will cause the session to resume.

LUA_INIT_COMPLETE

Secondary return code; the LUA interface initialized the session while SLI_OPEN was processing. LUA applications that issue **SLI_OPEN** with **lua_open_type_prim_sscp** receive this status on **SLI_RECEIVE** or SLI_BID.

LUA_SESSION_END_REQUESTED

Secondary return code; the LUA interface received an SNA SHUTD from the host, which means the host is ready to shut down the session.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.

Remarks

SLI_RECEIVE receives responses, SNA commands, and request unit data from the host. **SLI_RECEIVE** also provides the status of the session to the Windows LUA application. An SLI_OPEN request must complete before **SLI_RECEIVE** can be issued. However, if **SLI_OPEN** is issued with **lua_init_type** set to LUA_INIT_TYPE_PRIM_SSCP, an **SLI_RECEIVE** over the SSCP normal flow can be issued as soon as **SLI_OPEN** returns an IN_PROGRESS.

Data is received by the application in one of four session flows. The four session flows, from highest to lowest priority are:

- SSCP expedited
- LU expedited
- SSCP normal
- LU normal

The data flow type that **SLI_RECEIVE** will process is specified in **lua_flag1**. The application can also specify whether it wants to look at more than one type of data flow. When multiple flow bits are set, the highest priority is received first. When **SLI_RECEIVE** completes processing, **lua_flag2** indicates the specific type of flow for which data has been received by the Windows LUA application.

If SLI_BID successfully completes before SLI_RECEIVE is issued, the Windows LUA interface can be instructed to reuse the last SLI_BID verb's VCB. To do this, issue SLI_RECEIVE with lua_flag1.bid_enable set to 1.

When using lua_flag1.bid_enable, the SLI_BID storage must not be freed because the last SLI_BID verb's VCB is used. Also, when using lua_flag1.bid_enable, the successful completion of SLI_BID will be posted.

If SLI_RECEIVE is issued with lua_flag1.nowait when no data is available to receive, LUA_NO_DATA will be the secondary return code set by the Windows LUA interface.

Session Status Return Values

If LUA_STATUS is the primary return code, the secondary return code can be one of the following:

LUA_READY

LUA_NOT_READY

LUA_SESSION_END_REQUESTED

LUA_INIT_COMPLETE

In addition, if LUA_STATUS is the primary return code, the following parameters are used:

lua_sec_rc

lua_sid

LUA_READY is returned after an LUA_NOT_READY status and indicates that the SLI is again ready to perform all commands.

LUA_NOT_READY indicates that the SLI session is suspended because the SLI has received either an SNA CLEAR command or an SNA UNBIND command with an 0x02 UNBIND type (UNBIND with BIND forthcoming). Depending on what caused the suspension, the session can be reactivated as follows:

- When the suspension is caused by an SNA CLEAR, receiving an SNA SDT reactivates the session.
- When an SNA UNBIND type BIND forthcoming causes suspension of the session and the SLI_OPEN that opened the session is completed, the session is suspended until the SLI receives a BIND and SDT command. The session can also optionally receive an STSN command. As a result, user-supplied routines issued with the initial SLI_OPEN must be re-entered because they will be recalled.

The application can send SSCP data after a CLEAR or UNBIND type BIND forthcoming arrives and before the NOT_READY status is read. The application can send and receive SSCP data after reading a NOT_READY.

When an SNA UNBIND type BIND forthcoming arrives before completion of the SLI_OPEN that opened the session, LUA_SESSION_FAILURE (not LUA_STATUS) is the primary return code.

LUA_SESSION_END_REQUESTED indicates that the application received an SNA SHUTD from the host. The Windows LUA application should issue SLI_CLOSE to close the session when convenient.

LUA_INIT_COMPLETE is returned only when lua_init_type for SLI_OPEN is LUA_INIT_TYPE_PRIM_SSCP. The status means that the SLI_OPEN has been processed sufficiently to allow SSCP data to now be sent or received.

Exception Requests

If a host application request unit is converted into an EXR, sense data will be returned. When SLI_BID completes with the returned verb parameters set as shown, an EXR conversion occurs.

Member	Set to
lua_prim_rc	OK (0x0000)
lua_sec_rc	OK (0x00000000)
lua_rh.rri	bit off (request unit)
lua_rh.sdi	bit on (includes sense data)

Of the seven bytes of data in **lua_peek_data**, bytes 0 through 3 define the error detected. The following table indicates possible sense data and the values of bytes 0 through 3.

Sense data	Value of bytes 0–3
LUA_MODE_INCONSISTENCY	0x08090000
LUA_BRACKET_RACE_ERROR	0x080B0000
LUA_BB_REJECT_NO_RTR	0x08130000
LUA_RECEIVER_IN_TRANSMIT_MODE	0x081B0000
LUA_CRYPTOGRAPHY_FUNCTION_INOP	0x08480000
LUA_SYNC_EVENT_RESPONSE	0x10010000
LUA_RU_DATA_ERROR	0x10020000
LUA_RU_LENGTH_ERROR	0x10020000
LUA_INCORRECT_SEQUENCE_NUMBER	0x20010000

The information returned to bytes 3 through 6 in **lua_peek_data** is determined by the first three bytes of the initial request unit that caused the error.

See Also

RUI_INIT, RUI_PURGE, RUI_READ, RUI_WRITE, SLI_BID, SLI_CLOSE, SLI_OPEN, SLI_PURGE, SLI_SEND

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SLI_RECEIVE_EX

The **SLI_RECEIVE_EX** verb receives responses, SNA commands, and data into a Microsoft® Windows® logical unit application (LUA) application's buffer. **SLI_RECEIVE_EX** also provides the current status of the session to the Windows LUA application.

The SLI_RECEIVE_EX verb also supports inbound chaining. The maximum length of data that can be received by a single verb is 4,294,967,295 bytes. This is compared to a maximum of 65,535 bytes that can be received by the SLI_RECEIVE verb.

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_RECEIVE_EX.

```
struct LUA_COMMON {
    unsigned short    lua_verb;
    unsigned short    lua_verb_length;
    unsigned short    lua_prim_rc;
    unsigned long     lua_sec_rc;
    unsigned short    lua_opcode;
    unsigned long     lua_correlator;
    unsigned char     lua_luname[8];
    unsigned short    lua_extension_list_offset;
    unsigned short    lua_cobol_offset;
    unsigned long     lua_sid;
    unsigned short    lua_max_length;
    unsigned short    lua_data_length;
    char FAR *        lua_data_ptr;
    unsigned long     lua_post_handle;
    struct LUA_TH     lua_th;
    struct LUA_RH     lua_rh;
    struct LUA_FLAG1  lua_flag1;
    unsigned char     lua_message_type;
    struct LUA_FLAG2  lua_flag2;
    unsigned char     lua_resv56[7];
    unsigned char     lua_encr_decr_option;
};
```

The following union describes the **LUA_SPECIFIC** member of the VCB used by **SLI_RECEIVE_EX**. Other union members are omitted for clarity.

```
union LUA_SPECIFIC {
    struct SLI_RECEIVE_EX_SPECIFIC {
        unsigned long lua_data_length_ex;
        unsigned long lua_max_length_ex;
    };
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_SLI for Session Level Interface (SLI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_RECEIVE_EX.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_RECEIVE_EX only requires this parameter if lua_sid is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by **SLI_RECEIVE_EX** and should be set to zero.

lua_cobol_offset
Not used by LUA in Microsoft® Host Integration Server and should be zero.

lua_sid
Supplied and returned parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length
This supplied parameter is reserved and must be set to zero.

The maximum length of data returned in a receive buffer must be set in the lua_max_length_ex parameter.

lua_data_length
This parameter is reserved and must be set to zero.

The length of data returned in the receive buffer is set in the lua_data_length_ex parameter.

lua_data_ptr
Pointer to the application-supplied buffer that is to receive the data from an **SLI_RECEIVE_EX** verb. Both SNA commands and data are placed in this buffer, and they can be in an Extended Binary Coded Decimal Interchange Code (EBCDIC) format.

When SLI_RECEIVE_EX is issued, this parameter points to the location to receive the data from the host.

lua_post_handle
Supplied parameter. Used under Microsoft® Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th
Returned parameter. Contains the SNA transmission header (TH) of the message received. Various subparameters are returned for read and bid functions. Its subparameters are as follows:

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits. Defines the type of data segment. The following values are valid:

0x00 Middle segment
0x04 Last segment
0x08 First segment
0x0C Only segment

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh
Returned parameter. Contains the SNA request/response header (RH) of the message sent or received. Its subparameters are as follows:

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

RU category, two bits. The following values are valid:

LUA_RH_FMD (**0x00**) FM data segment
LUA_RH_NC (**0x20**) Network control
LUA_RH_DFC (**0x40**) Data flow control
LUA_RH_SC (**0x60**) Session control

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. This parameter is used by RUI_BID, RUI_READ, RUI_WRITE, SLI_BID, **SLI_RECEIVE_EX**, and SLI_SEND_EX. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

System services control point (SSCP) expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

Set **lua_flag1.bid_enable** to 1 to re-enable the most recent SLI_BID (equivalent to issuing **SLI_BID** again with exactly the same parameters as before), or set it to zero if you do not want to re-enable **SLI_BID**. Note that re-enabling the previous **SLI_BID** reuses the VCB originally allocated for it, so this VCB must not have been freed or modified.

Set lua_flag1.nowait to 1 to indicate that you want SLI_RECEIVE_EX to return immediately whether or not data is available to be read, or set it to zero if you want the verb to wait for data before returning.

Set one or more of the following flags to 1 to indicate from which message flow to read data:

lua_flag1.sscp_exp

lua_flag1.lu_exp

lua_flag1.sscp_norm

lua_flag1.lu_norm

If more than one flag is set, the highest-priority data available is returned. The order of priorities (highest first) is: SSCP expedited, LU expedited, SSCP normal, LU normal. The equivalent flag in the **lua_flag2** group is set to indicate from which flow the data was read.

lua_message_type
Specifies the type of the inbound or outbound SNA commands and data. Returned parameter. Specifies the type of SNA message indicated to **SLI_RECEIVE_EX**. Possible values are:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_RSP

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIND

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SIGNAL

LUA_MESSAGE_TYPE_STSN

The SLI receives and responds to the BIND and STSN requests through the LUA interface extension routines.

LU-DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2

Returned parameter. Contains flags for messages returned by LUA. Returned by RUI_BID, RUI_READ, **RUI_WRITE**, **SLI_BID**, **SLI_RECEIVE**, and SLI_SEND_EX. Its subparameters are as follows:

lua_flag2.bid_enable

Indicates that **RUI_BID** was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56

Not used by **SLI_RECEIVE** and should be set to zero.

lua_encr_decr_option

Not used by **SLI_RECEIVE** and should be set to zero.

lua_max_length_ex

Specifies the length of received buffer for **SLI_RECEIVE_EX**.

lua_data_length_ex

The union member of **LUA_SPECIFIC** used by **SLI_RECEIVE_EX**. Returned parameter. Specifies the length of data returned in the receive buffer.

Return Codes

LUA_OK

Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_PARAMETER_CHECK

Primary return code; the verb did not execute because of a parameter error.

LUA_INVALID_LUNAME

Secondary return code; an invalid **lua_luname** was specified.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_BAD_DATA_PTR

Secondary return code; the **lua_data_ptr** parameter either does not contain a valid pointer or does not point to a read/write segment and supplied data is required.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved parameter for the verb just issued is not set to zero.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Microsoft Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_BID_VERB_SEGMENT_ERROR

Secondary return code; the buffer with the SLI_BID VCB was released before the **SLI_RECEIVE_EX** with **lua_flag1.bid_enable** set to 1 was issued.

LUA_NO_PREVIOUS_BID_ENABLED

Secondary return code; **SLI_BID** was not issued prior to issuing **SLI_RECEIVE_EX** with **lua_flag1.bid_enable**.

LUA_BID_ALREADY_ENABLED

Secondary return code; **SLI_RECEIVE_EX** was issued with **lua_flag1.bid_enable** when **SLI_BID** was already active.

LUA_INVALID_FLOW

Secondary return code; the **lua_flag1** flow flags were set incorrectly when a verb was issued:

- When issuing SLI_SEND_EX_sna_SLI_SEND_EX_lua to send an SNA response, set only one lua_flag1 flow flag.
- When issuing SLI_RECEIVE, set at least one lua_flag1 flow flag.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with a value for **lua_verb_length** unexpected by LUA.

LUA_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_SLI_SESSION

Secondary return code; a session was not open or was down due to an SLI_CLOSE or session failure when a command was issued.

LUA_RECEIVE_ON_FLOW_PENDING

Secondary return code; an **SLI_RECEIVE_EX** was still outstanding when this application issued another **SLI_RECEIVE_EX** for an SNA flow.

LUA_SESSION_FAILURE

Primary return code; an error condition, specified in the secondary return code, caused the session to fail.

LUA_RUI_WRITE_FAILURE

Secondary return code; an unexpected error was posted to the SLI by RUI_WRITE.

LUA_RECEIVED_UNBIND

Secondary return code; the primary logical unit (PLU) sent an SNA UNBIND command to the LUA interface when a session was active. As a result, the session was stopped.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_NO_RUI_SESSION

Secondary return code; no session has been initialized for the LUA verb issued or some verb other than SLI_OPEN was issued before the session was initialized.

LUA_MODE_INCONSISTENCY

Secondary return code; performing this function is not allowed by the current status. The request sent to the half-session component was not executed even though it was understood and supported. This SNA sense code is also an exception request sense code.

LUA_RECEIVER_IN_TRANSMIT_MODE

Secondary return code; either resources needed to handle normal flow data were not available or the state of the half-duplex contention was not received when a normal-flow request was received. The result is a race condition. This SNA sense code is also an exception request sense code.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; an LU component is unavailable because it is not connected properly. Make sure that the power is on.

LUA_FUNCTION_NOT_SUPPORTED

Secondary return code; LUA does not support the requested function. A control character, a request/response unit (RU) parameter, or a formatted request code may have specified the function. Specific sense code information is in bytes 2 and 3.

LUA_CHAINING_ERROR

Secondary return code; the sequence of the chain indicator settings is in error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_BRACKET

Secondary return code; the sender failed to enforce the session bracket rules. Note that contention and race conditions are exempt from this error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DIRECTION

Secondary return code; while the half-duplex flip-flop state was NOT_RECEIVE, a request for normal flow was received. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_QUIESCED

Secondary return code; a data flow control (DFC) or function management data (FMD) request was received from a half-session that sent either a SHUTC command or QC command, and the DFC or FMD request has not responded to a RELQ command. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_NO_BEGIN_BRACKET

Secondary return code; the receiver has already sent a positive response to a BIS command when a BID or an FMD request specifying BBI=BB was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_IMMEDIATE_REQUEST_MODE_ERROR

Secondary return code; the request violated the immediate request mode protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_QUEUED_RESPONSE_ERROR

Secondary return code; the request violated the queued response protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_ERP_SYNC_EVENT_ERROR

Secondary return code; a violation of the ERP synchronous event protocol occurred. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_RSP_CORRELATION_ERROR

Secondary return code; a response was sent that does not correspond to a previously received request or a response was received that does not correspond to a previously sent request.

LUA_RSP_PROTOCOL_ERROR

Secondary return code; a violation of the response protocol was found in the response received from the primary half-session.

LUA_BB_NOT_ALLOWED

Secondary return code; the begin bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EB_NOT ALLOWED

Secondary return code; the end bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EXCEPTION_RSP_NOT_ALLOWED

Secondary return code; when an exception response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_DEFINITE_RSP_NOT_ALLOWED

Secondary return code; when a definite response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_ALLOWED

Secondary return code; the change-direction indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NO_RESPONSE_NOT_ALLOWED

Secondary return code; a request other than an EXR contained a NO RESPONSE. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CHAINING_NOT_SUPPORTED

Secondary return code; the chaining indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_BRACKETS_NOT_SUPPORTED

Secondary return code; the bracket indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_SUPPORTED

Secondary return code; the change-direction indicator was set, but LUA does not support change-direction for this situation. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_FI

Secondary return code; the format indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_ALTERNATE_CODE_NOT_SUPPORTED

Secondary return code; the code selection indicator was set, but LUA does not support code selection for this session. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_RU_CATEGORY

Secondary return code; the request unit category indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_REQUEST_CODE

Secondary return code; the request code was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_SPEC_OF_SDI_RTI

Secondary return code; the SDI and the RTI were not specified correctly on a response. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_DR1I_DR2I_ERI

Secondary return code; the DR1I, the DR2I, and the ERI were specified incorrectly. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_QRI

Secondary return code; the queued response indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_EDI

Secondary return code; the EDI was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_PDI

Secondary return code; the PDI was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_UNSUCCESSFUL

Primary return code; the verb record supplied was valid but the verb did not complete successfully.

LUA_DATA_TRUNCATED

Secondary return code; the data was truncated because the data received was longer than the buffer length specified in **lua_max_length_ex**.

LUA_DATA_SEGMENT_LENGTH_ERROR

Secondary return code; one of the following has occurred:

- The supplied data segment for **SLI_RECEIVE_EX** or SLI_SEND_EX is not a read/write data segment as required.
- The supplied data segment for SLI_RECEIVE_EX is not as long as that provided in lua_max_length_ex.
- The supplied data segment for SLI_SEND_EX is not as long as that provided in lua_data_length_ex.

LUA_NO_DATA

Secondary return code; no data was available to read when **SLI_RECEIVE_EX** containing a no wait parameter was issued.

LUA_VERB_RECORD_SPANS_SEGMENTS

Secondary return code; the LUA VCB length parameter plus the segment offset is beyond the segment end.

LUA_NOT_ACTIVE

Secondary return code; LUA was not active within Microsoft Host Integration Server or SNA Server when an LUA verb was issued.

LUA_NOT_READY

Secondary return code; one of the following has caused the SLI session to be temporarily suspended:

- An SNA UNBIND type 0x02 command was received, which indicates a new BIND is coming. If the UNBIND type 0x02 is received after the beginning SLI_OPEN is complete, the session is suspended until a BIND, optional CRV and STSN, and SDT flows are received. These routines are re-entrant because they have to be called again. The session resumes after the SLI processes the SDT command. If the UNBIND type 0x02 is received while the **SLI_OPEN** is still processing, the primary return code is LUA_SESSION_FAILURE, not LUA_STATUS.
- The receipt of an SNA CLEAR caused the suspension. Receipt of an SNA SDT will cause the session to resume.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_INVALID_PROCESS

Secondary return code; the session for which an LUA verb was issued is unavailable because another process owns the session.

LUA_LU_INOPERATIVE

Secondary return code; a severe error occurred while the LUA was attempting to stop the session. This LU is unavailable for any LUA requests until an activate logical unit (ACTLU) is received from the host.

LUA_RECEIVE_CORRELATION_TABLE_FULL

Secondary return code; the session receive correlation table for the flow requested reached its capacity.

LUA_NEGATIVE_RESPONSE

Primary return code; either the LUA sent a negative response to a message received from the primary logical unit (PLU) because an error was found in the message, or the application responded negatively to a chain for which the end-of-chain has arrived.

LUA_MODE_INCONSISTENCY

Secondary return code; performing this function is not allowed by the current status. The request sent to the half-session component was not executed even though it was understood and supported. This SNA sense code is also an exception request sense code.

LUA_FUNCTION_NOT_SUPPORTED

Secondary return code; the LUA does not support the requested function. A control character, an RU parameter, or a formatted request code may have specified the function. Specific sense code information is in bytes 2 and 3.

LUA_DATA_TRAFFIC_RESET

Secondary return code; a half-session of an active session but with inactive data traffic received a normal flow DFC or FMD request. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_NOT_RESET

Secondary return code; while the data traffic state was not reset, the session control request was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_SC_PROTOCOL_VIOLATION

Secondary return code; a violation of SC protocol occurred. A request (that is permitted only after an SC request and a positive response to that request have been successfully exchanged) was received before the required exchange. Byte 4 of the sense data contains the request code. No user data exists for this sense code. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_INVALID_SC_OR_NC_RH

Secondary return code; the RH of an SC or NC request was invalid.

LUA_PACING_NOT_SUPPORTED

Secondary return code; the request contained a pacing indicator when support of pacing for this session does not exist for the receiving half-session or boundary function half-session. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NAU_INOPERATIVE

Secondary return code; the network addressable unit is not able to process responses or requests. Delivery to the receiver could not take place for one of the following reasons:

- A path information unit error
- A path outage
- An invalid sequence of requests for activation

If a path error is received during an active session, it usually means there is no longer a valid path to the session partner.

LUA_CANCELED
Primary return code; the secondary return code gives the reason for canceling the command.

LUA_PURGED

Secondary return code; SLI_PURGE was issued and canceled **SLI_RECEIVE**.

LUA_NO_SLI_SESSION

Secondary return code; a session was not open or was down due to an SLI_CLOSE or session failure when a command was issued.

LUA_CANCEL_COMMAND_RECEIVED

Secondary return code; the host sent an SNA CANCEL command to cancel the data chain currently being received by **SLI_RECEIVE_EX**.

LUA_TERMINATED

Secondary return code; the session was terminated when a verb was pending. The verb process has been canceled.

LUA_IN_PROGRESS
Primary return code; an asynchronous command was received but is not completed.

LUA_STATUS
Primary return code; the secondary return code contains SLI status information for the application.

LUA_READY

Secondary return code; following a NOT READY status, this status is issued to notify you that the SLI is ready to process commands.

LUA_NOT_READY

Secondary return code; the SLI session is temporarily suspended for the following reason:

- An SNA UNBIND type 0x02 command was received, which means a new BIND is coming. If the UNBIND type 0x02 is received after the beginning SLI_OPEN is complete, the session is suspended until a BIND, optional CRV and STSN, and SDT flows are received. These routines are re-entrant because they have to be called again. The session resumes after the SLI processes the SDT command. If the UNBIND type 0x02 is received while the **SLI_OPEN** is still processing, the primary return code is session-failure, not status.
- The receipt of an SNA CLEAR caused the suspension. Receipt of an SNA SDT will cause the session to resume.

LUA_INIT_COMPLETE

Secondary return code; the LUA interface initialized the session while SLI_OPEN was processing. LUA applications that issue **SLI_OPEN** with **lua_open_type_prim_sscp** receive this status on **SLI_RECEIVE** or SLI_BID.

LUA_SESSION_END_REQUESTED

Secondary return code; the LUA interface received an SNA SHUTD from the host, which means the host is ready to shut down the session.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).

- The SnaBase at the TP's computer encountered an ABEND.

LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.

Remarks

SLI_RECEIVE_EX receives responses, SNA commands, and request unit data from the host. **SLI_RECEIVE_EX** also provides the status of the session to the Windows LUA application.

The difference between SLI_RECEIVE_EX and SLI_RECEIVE is that the SLI_RECEIVE_EX verb supports inbound chaining and can receive up to 4,295 kilobytes (KB) in a single verb request. In contrast, SLI_RECEIVE is limited to receiving up to 64 KB in a verb request.

An SLI_OPEN request must complete before SLI_RECEIVE_EX can be issued. However, if SLI_OPEN is issued with lua_init_type set to LUA_INIT_TYPE_PRIM_SSCP, an SLI_RECEIVE_EX over the SSCP normal flow can be issued as soon as SLI_OPEN returns an IN_PROGRESS.

Data is received by the application in one of four session flows. The four session flows, from highest to lowest priority are:

- SSCP expedited
- LU expedited
- SSCP normal
- LU normal

The data flow type that **SLI_RECEIVE_EX** will process is specified in **lua_flag1**. The application can also specify whether it wants to look at more than one type of data flow. When multiple flow bits are set, the highest priority is received first. When **SLI_RECEIVE_EX** completes processing, **lua_flag2** indicates the specific type of flow for which data has been received by the Windows LUA application.

If SLI_BID successfully completes before SLI_RECEIVE is issued, the Windows LUA interface can be instructed to reuse the last SLI_BID verb's VCB. To do this, issue SLI_RECEIVE_EX with lua_flag1.bid_enable set to 1.

When using lua_flag1.bid_enable, the SLI_BID storage must not be freed because the last SLI_BID verb's VCB is used. Also, when using lua_flag1.bid_enable, the successful completion of SLI_BID will be posted.

If SLI_RECEIVE_EX is issued with lua_flag1.nowait when no data is available to receive, LUA_NO_DATA will be the secondary return code set by the Windows LUA interface.

Session Status Return Values

If LUA_STATUS is the primary return code, the secondary return code can be one of the following:

LUA_READY

LUA_NOT_READY

LUA_SESSION_END_REQUESTED

LUA_INIT_COMPLETE

In addition, if LUA_STATUS is the primary return code, the following parameters are used:

lua_sec_rc

lua_sid

LUA_READY is returned after an LUA_NOT_READY status and indicates that the SLI is again ready to perform all commands.

LUA_NOT_READY indicates that the SLI session is suspended because the SLI has received either an SNA CLEAR command or an SNA UNBIND command with an 0x02 UNBIND type (UNBIND with BIND forthcoming). Depending on what caused the suspension, the session can be reactivated as follows:

- When the suspension is caused by an SNA CLEAR, receiving an SNA SDT reactivates the session.
- When an SNA UNBIND type BIND forthcoming causes suspension of the session and the SLI_OPEN that opened the session is completed, the session is suspended until the SLI receives a BIND and SDT command. The session can also optionally receive an STSN command. As a result, user-supplied routines issued with the initial SLI_OPEN must be re-entered because they will be recalled.

The application can send SSCP data after a CLEAR or UNBIND type BIND forthcoming arrives and before the NOT_READY status is read. The application can send and receive SSCP data after reading a NOT_READY.

When an SNA UNBIND type BIND forthcoming arrives before completion of the SLI_OPEN that opened the session, LUA_SESSION_FAILURE (not LUA_STATUS) is the primary return code.

LUA_SESSION_END_REQUESTED indicates that the application received an SNA SHUTD from the host. The Windows LUA application should issue SLI_CLOSE to close the session when convenient.

LUA_INIT_COMPLETE is returned only when lua_init_type for SLI_OPEN is LUA_INIT_TYPE_PRIM_SSCP. The status means that the SLI_OPEN has been processed sufficiently to allow SSCP data to now be sent or received.

Exception Requests

If a host application request unit is converted into an EXR, sense data will be returned. When SLI_BID completes with the returned verb parameters set as shown, an EXR conversion occurs.

Member	Set to
lua_prim_rc	OK (0x0000)
lua_sec_rc	OK (0x00000000)
lua_rh.rri	bit off (request unit)
lua_rh.sdi	bit on (includes sense data)

Of the seven bytes of data in **lua_peek_data**, bytes 0 through 3 define the error detected. The following table indicates possible sense data and the values of bytes 0 through 3.

Sense data	Value of bytes 0–3
LUA_MODE_INCONSISTENCY	0x08090000
LUA_BRACKET_RACE_ERROR	0x080B0000
LUA_BB_REJECT_NO_RTR	0x08130000
LUA_RECEIVER_IN_TRANSMIT_MODE	0x081B0000
LUA_CRYPTOGRAPHY_FUNCTION_INOP	0x08480000
LUA_SYNC_EVENT_RESPONSE	0x10010000
LUA_RU_DATA_ERROR	0x10020000
LUA_RU_LENGTH_ERROR	0x10020000
LUA_INCORRECT_SEQUENCE_NUMBER	0x20010000

The information returned to bytes 3 through 6 in **lua_peek_data** is determined by the first three bytes of the initial request unit that caused the error.

See Also

RUI_INIT, RUI_PURGE, RUI_READ, RUI_WRITE, SLI_BID, SLI_CLOSE, SLI_OPEN, SLI_PURGE, SLI_SEND_EX

SLI_SEND

The **SLI_SEND** verb sends responses, SNA commands, and data from a Microsoft® Windows® logical unit application (LUA) application to a host logical unit (LU).

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_SEND.

```
struct LUA_COMMON {
    unsigned short    lua_verb;
    unsigned short    lua_verb_length;
    unsigned short    lua_prim_rc;
    unsigned long     lua_sec_rc;
    unsigned short    lua_opcode;
    unsigned long     lua_correlator;
    unsigned char     lua_luname[8];
    unsigned short    lua_extension_list_offset;
    unsigned short    lua_cobol_offset;
    unsigned long     lua_sid;
    unsigned short    lua_max_length;
    unsigned short    lua_data_length;
    char FAR *        lua_data_ptr;
    unsigned long     lua_post_handle;
    struct LUA_TH     lua_th;
    struct LUA_RH     lua_rh;
    struct LUA_FLAG1  lua_flag1;
    unsigned char     lua_message_type;
    struct LUA_FLAG2  lua_flag2;
    unsigned char     lua_resv56[7];
    unsigned char     lua_encr_decr_option;
};
```

The following union describes the **LUA_SPECIFIC** member of the VCB used by **SLI_SEND**. Other union members are omitted for clarity.

```
union LUA_SPECIFIC {
    unsigned char lua_sequence_number[2];
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_SLI for Session Level Interface (SLI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_SEND.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_SEND only requires this parameter if lua_sid is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by **SLI_SEND** and should be set to zero.

lua_cobol_offset

Not used by LUA in Microsoft® Host Integration Server or SNA Server and should be zero.

lua_sid

Supplied and returned parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length

Not used by **SLI_SEND** and should be set to zero.

lua_data_length

Supplied parameter. Specifies the length of data being sent.

lua_data_ptr

Pointer to the application-supplied buffer that contains the data to be sent to the host by **SLI_SEND**.

Both SNA commands and data are placed in this buffer, and they can be in an Extended Binary Coded Decimal Interchange Code (EBCDIC) format.

lua_post_handle

Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th

Returned parameter. Contains the SNA transmission header (TH) of the message received. Various subparameters are set for write functions and returned for read and bid functions. Its subparameters are as follows:

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits. Defines the type of data segment. The following values are valid:

0x00 Middle segment
0x04 Last segment
0x08 First segment
0x0C Only segment

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh

Supplied parameter. Contains the SNA request/response header (RH) of the message sent or received. It is set for RUI_WRITE and **SLI_SEND**, and returned by RUI_READ and RUI_BID. For the RH for **SLI_SEND**, all fields except the queued-response indicator (**lua_rh.qri**) and pacing indicator (**lua_rh.pi**) are used.

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

RU category, two bits.

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

System services control point (SSCP) expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

Set one of the following flags to 1 to indicate on which message flow the data is to be sent:

lua_flag1.sscp_exp

lua_flag1.sscp_norm

lua_flag1.lu_exp

lua_flag1.lu_norm

lua_message_type

Specifies the type of the inbound or outbound SNA commands and data. This is a supplied parameter for **SLI_SEND**.

Possible values are as follows:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_RSP

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RQR

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SIGNAL

The SLI receives and responds to the BIND and STSN requests through the LUA interface extension routines.

LU-DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2

Returned parameter. Contains flags for messages returned by LUA. Its subparameters are as follows:

lua_flag2.bid_enable

Indicates that RUI_BID was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56
Reserved and should be set to zero.

lua_encr_decr_option
Not used by **SLI_SEND** and should be set to zero.

lua_sequence_number
The union member of **LUA_SPECIFIC** used by **SLI_SEND**. Returned parameter. Contains the sequence number for either the first in the chain request unit or the only segment in the chain request unit. Note that this parameter is not byte-reversed.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_INVALID_LUNAME

Secondary return code; an invalid **lua_luname** was specified.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_BAD_DATA_PTR

Secondary return code; the **lua_data_ptr** parameter either does not contain a valid pointer or does not point to a read/write segment and supplied data is required.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved parameter for the verb just issued is not set to zero.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Microsoft Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_INVALID_FLOW

Secondary return code; the **lua_flag1** flow flags were set incorrectly when a verb was issued:

- When issuing **SLI_SEND** to send an SNA response, set only one **lua_flag1** flow flag.
- When issuing SLI_RECEIVE, set at least one lua_flag1 flow flag.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with a value for **lua_verb_length** unexpected by LUA.

LUA_REQUIRED_FIELD_MISSING

Secondary return code; the verb that was issued either did not include a data pointer (if the data count was not zero) or did not include an **lua_flag1** flow flag.

LUA_INVALID_MESSAGE_TYPE

Secondary return code; the **lua_message_type** parameter is not recognized by the LUA interface.

LUA_DATA_LENGTH_ERROR

Secondary return code; the application did not provide user-supplied data required by the verb issued. Note that when **SLI_SEND** is issued for an SNA LUSTAT command, status (in four bytes) is required, and that when SLI_OPEN is issued with secondary initialization, data is required.

LUA_STATE_CHECK
Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_SLI_SESSION

Secondary return code; a session was not open or was down due to an SLI_CLOSE or session failure when a command was issued.

LUA_MAX_NUMBER_OF_SENDS

Secondary return code; the application issued a third **SLI_SEND** before one completed.

LUA_SEND_ON_FLOW_PENDING

Secondary return code; an **SLI_SEND** was still outstanding when the application issued another **SLI_SEND** for an SNA flow.

LUA_SESSION_FAILURE
Primary return code; an error condition, specified in the secondary return code, caused the session to fail.

LUA_RECEIVED_UNBIND

Secondary return code; the primary logical unit (PLU) sent an SNA UNBIND command to the LUA interface when a session was active. As a result, the session was stopped.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_NO_RUI_SESSION

Secondary return code; no session has been initialized for the LUA verb issued, or some verb other than SLI_OPEN was issued before the session was initialized.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; an LU component is unavailable because it is not connected properly. Make sure that the power is on.

LUA_DATA_SEGMENT_LENGTH_ERROR

Secondary return code; one of the following has occurred:

- The supplied data segment for SLI_RECEIVE or **SLI_SEND** is not a read/write data segment as required.
- The supplied data segment for SLI_RECEIVE is not as long as that provided in lua_max_length.
- The supplied data segment for SLI_SEND is not as long as that provided in lua_data_length.

LUA_VERB_RECORD_SPANS_SEGMENTS

Secondary return code; the LUA VCB length parameter plus the segment offset is beyond the segment end.

LUA_NOT_ACTIVE

Secondary return code; LUA was not active within Microsoft Host Integration Server or SNA Server when an LUA verb was issued.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_INVALID_PROCESS

Secondary return code; the session for which an LUA verb was issued is unavailable because another OS/2 process owns the session.

LUA_LU_INOPERATIVE

Secondary return code; a severe error occurred while the LUA was attempting to stop the session. This LU is unavailable for any LUA requests until an activate logical unit (ACTLU) is received from the host.

LUA_MODE_INCONSISTENCY

Secondary return code; performing this function is not allowed by the current status. The request sent to the half-session component was not executed even though it was understood and supported. This SNA sense code is also an exception request sense code.

LUA_INSUFFICIENT_RESOURCES

Secondary return code; a temporary condition of insufficient resources caused the request receiver to be unable to perform. The request sent to the half-session component was not executed, even though it was understood and supported.

LUA_SEND_CORRELATION_TABLE_FULL

Secondary return code; the session send correlation table for the flow requested reached its capacity.

LUA_RU_LENGTH_ERROR

Secondary return code; the request/response unit (RU) request was an incorrect length (either too short or too long). The request unit was not interpreted or processed even though it was delivered to the half-session component. The half-session capabilities do not match. This SNA sense code is also an exception request sense code.

LUA_FUNCTION_NOT_SUPPORTED

Secondary return code; LUA does not support the requested function. A control character, an RU parameter, or a formatted request code may have specified the function. Specific sense code information is in bytes 2 and 3.

LUA_HDX_BRACKET_STATE_ERROR

Secondary return code; the existing state error prevented the current request from being sent. The determination was made by a protocol computer.

LUA_RESPONSE_ALREADY_SENT

Secondary return code; a response for the chain was already sent so that the current request was not sent. The determination was made by a protocol computer.

LUA_EXR_SENSE_INCORRECT

Secondary return code; the application responded negatively to an exception request. The sense code was unacceptable.

LUA_RESPONSE_OUT_OF_ORDER

Secondary return code; the current response was not for the oldest request. The determination was made by a protocol computer.

LUA_CHAIN_RESPONSE_REQUIRED

Secondary return code; a CHASE response was still outstanding when a more recent request was attempted. The determination was made by a protocol computer.

LUA_BRACKET

Secondary return code; the sender failed to enforce the session bracket rules. Note that contention and race conditions are exempt from this error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DIRECTION

Secondary return code; while the half-duplex flip-flop state was NOT_RECEIVE, a request for normal flow was received. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_RESET

Secondary return code; a half-session of an active session but with inactive data traffic received a normal flow data flow control (DFC) or function management data (FMD) request. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_QUIESCED

Secondary return code; a DFC or FMD request was received from a half-session that sent either a SHUTC command or QC command, and the DFC or FMD request has not responded to a RELQ command. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_NOT_RESET

Secondary return code; while the data traffic state was not reset, the session control request was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_NO_BEGIN_BRACKET

Secondary return code; the receiver has already sent a positive response to a BIS command when a BID or an FMD request specifying BBI=BB was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_SC_PROTOCOL_VIOLATION

Secondary return code; a violation of SC protocol occurred. A request (that is permitted only after an SC request and a positive response to that request have been successfully exchanged) was received before the required exchange. Byte 4 of the sense data contains the request code. No user data exists for this sense code. An invalid header request or data flow control state was found. Delivery to the half-session component was prevented.

LUA_IMMEDIATE_REQUEST_MODE_ERROR

Secondary return code; the request violated the immediate request mode protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_QUEUED_RESPONSE_ERROR

Secondary return code; the request violated the queued response protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_ERP_SYNC_EVENT_ERROR

Secondary return code; a violation of the ERP synchronous event protocol occurred. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_RSP_BEFORE_SENDING_REQ

Secondary return code; a previously received request has not been responded to yet and an attempt was made in half-duplex send/receive mode to send a normal flow request. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_RSP_CORRELATION_ERROR

Secondary return code; a response was sent that does not correspond to a previously received request or a response was received that does not correspond to a previously sent request.

LUA_BB_NOT_ALLOWED

Secondary return code; the begin bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EB_NOT ALLOWED

Secondary return code; the end bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EXCEPTION_RSP_NOT_ALLOWED

Secondary return code; when an exception response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_DEFINITE_RSP_NOT_ALLOWED

Secondary return code; when a definite response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_ALLOWED

Secondary return code; the change-direction indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NO_RESPONSE_NOT_ALLOWED

Secondary return code; a request other than an EXR contained a "no response." The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CHAINING_NOT_SUPPORTED

Secondary return code; the chaining indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_BRACKETS_NOT_SUPPORTED

Secondary return code; the bracket indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_SUPPORTED

Secondary return code; the change-direction indicator was set, but LUA does not support change-direction for this situation. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_FI

Secondary return code; the format indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_ALTERNATE_CODE_NOT_SUPPORTED

Secondary return code; the code selection indicator was set, but LUA does not support code selection for this session. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_REQUEST_CODE

Secondary return code; the request code was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_SPEC_OF_SDI_RTI

Secondary return code; the SDI and the RTI were not specified correctly on a response. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_DR1I_DR2I_ERI

Secondary return code; the DR1I, the DR2I, and the ERI were specified incorrectly. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_QRI

Secondary return code; the queued response indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_EDI

Secondary return code; the EDI was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_PDI

Secondary return code; the PDI was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NO_SESSION

Secondary return code; a request to activate a session is required because no active half-session in the receiving end node for the origination-destination pair exists, or no active boundary function half-session component for the origination-destination pair in a node that supplies the boundary function exists. Delivery of the request could not take place for one of the following reasons:

- A path information unit error
- A path outage
- An invalid sequence of requests for activation

If a path error is received during an active session, that usually indicates there is no longer a valid path to the session partner.

LUA_CANCELED
Primary return code; the secondary return code gives the reason for canceling the command.

LUA_TERMINATED

Secondary return code; the session was terminated when a verb was pending. The verb process has been canceled.

LUA_IN_PROGRESS
Primary return code; an asynchronous command was received but is not completed.
LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.
LUA_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.
LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.
LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.
LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.

Remarks

SLI_SEND sends responses, SNA commands, and data from the Windows LUA application to a host LU. A session must already be open to issue **SLI_SEND** for a particular LU-LU session flow. To send data on the SSCP normal flow prior to the completion of SLI_OPEN, the session must have been initialized as primary with SSCP access. In addition, the session status must be INIT_COMPLETE.

The settings for lua_message_type determine the type of processing that will be done by SLI_SEND. The following table indicates the parameters to set based on the value of lua_message_type.

SLI_SEND parameter	LU_DATA SSCP_DATA	BID BIS RTR	CHASE QC	LUSTAT_LU LUSTAT_SSCP	QEC RELQ SBI SIGNAL	RQR	RSP
lua_data _length	Req.	0	0	Req.	0	0	Req. (0 if no data)
lua_data _ptr	Req. (0 if no data)	0	0	Req.	0	0	Req. (0 if no data)
lua_flag1 flow flags	0	0	0	0	0	0	Req. (set one)
lua_rh	FI DRL1 DRL2 RI BBI EBI CDI CSI EDI	SDI QRI	SDI QRI EBI CDI	SDI QRI DRL1 DRL2 RI BBI EBI CDI	SDI	0	RRI RI
lua_th	0	0	0	0	0	0	SNF

The location provided in **lua_data_ptr** and the length provided in **lua_data_length** determine the data that the SLI sends. The data will be chained by the SLI verbs if necessary.

When sending a response, the type of response determines the SLI_SEND information required. For all responses, you must:

- Set the selected **lua_flag1** flow flag.
- Provide the sequence number in lua_th.snf for the request to which you are responding.
- Set lua_message_type to LUA_MESSAGE_TYPE_RSP.

For multichain message responses, the sequence number of the last received chain element must be used. For a response to a multichain message ending with a CANCEL command, the CANCEL command sequence number is used.

For positive responses that only require the request code, set lua_rh.ri to zero (indicating that the response is positive) and lua_data_length to zero (indicating no data is provided). The request code is filled in by the SLI, using the sequence number provided.

For negative responses in which lua_rh.ri is set to 1, set the lua_data_ptr to the SNA sense code address and the lua_data_length to the SNA sense code length (four bytes). The sequence number is used by the SLI to fill in the request code.

See Also

RUI_INIT, RUI_READ, RUI_WRITE, SLI_BID, SLI_CLOSE, SLI_OPEN, SLI_RECEIVE

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SLI_SEND_EX

The **SLI_SEND_EX** verb sends responses, SNA commands, and data from a Microsoft® Windows® logical unit application (LUA) application to a host logical unit (LU).

The SLI_SEND_EX verb also supports inbound chaining. The maximum length of data that can be sent by a single verb is 4,294,967,295 bytes. This is compared to a maximum of 65,535 bytes that can be sent by the SLI_SEND verb.

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_SEND_EX.

```
struct LUA_COMMON {
    unsigned short    lua_verb;
    unsigned short    lua_verb_length;
    unsigned short    lua_prim_rc;
    unsigned long     lua_sec_rc;
    unsigned short    lua_opcode;
    unsigned long     lua_correlator;
    unsigned char     lua_luname[8];
    unsigned short    lua_extension_list_offset;
    unsigned short    lua_cobol_offset;
    unsigned long     lua_sid;
    unsigned short    lua_max_length;
    unsigned short    lua_data_length;
    char FAR *        lua_data_ptr;
    unsigned long     lua_post_handle;
    struct LUA_TH     lua_th;
    struct LUA_RH     lua_rh;
    struct LUA_FLAG1  lua_flag1;
    unsigned char     lua_message_type;
    struct LUA_FLAG2  lua_flag2;
    unsigned char     lua_resv56[7];
    unsigned char     lua_encr_decr_option;
};
```

The following union describes the **LUA_SPECIFIC** member of the VCB used by **SLI_SEND_EX**. Other union members are omitted for clarity.

```
union LUA_SPECIFIC {
    struct SLI_SEND_EX_SPECIFIC {
        unsigned char lua_sequence_number[2];
        unsigned long lua_data_length_ex;
    };
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_SLI for Session Level Interface (SLI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_SEND_EX.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_SEND only requires this parameter if lua_sid is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset

Not used by **SLI_SEND_EX** and should be set to zero.

lua_cobol_offset

Not used by LUA in Microsoft® Host Integration Server or SNA Server and should be set to zero.

lua_sid

Supplied and returned parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length

Not used by **SLI_SEND_EX** and should be set to zero.

lua_data_length

This parameter is reserved and must be set to zero.

The length of data to be sent is set in the lua_data_length_ex parameter.

lua_data_ptr

Pointer to the application-supplied buffer that contains the data to be sent to the host by **SLI_SEND_EX**.

Both SNA commands and data are placed in this buffer, and they can be in an Extended Binary Coded Decimal Interchange Code (EBCDIC) format.

lua_post_handle

Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th

Returned parameter. Contains the SNA transmission header (TH) of the message received. Various subparameters are set for write functions and returned for read and bid functions. Its subparameters are as follows:

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits. Defines the type of data segment. The following values are valid:

0x00 Middle segment
0x04 Last segment
0x08 First segment
0x0C Only segment

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh

Supplied parameter. Contains the SNA request/response header (RH) of the message sent or received. It is set for RUI_WRITE and **SLI_SEND**, and returned by RUI_READ and RUI_BID. For the RH for **SLI_SEND_EX**, all fields except the queued-response indicator (**lua_rh.qri**) and pacing indicator (**lua_rh.pi**) are used.

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

Request/response unit (RU) category, two bits.

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

System services control point (SSCP) expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

Set one of the following flags to 1 to indicate on which message flow the data is to be sent:

lua_flag1.sscp_exp

lua_flag1.sscp_norm

lua_flag1.lu_exp

lua_flag1.lu_norm

lua_message_type

Specifies the type of the inbound or outbound SNA commands and data. This is a supplied parameter for **SLI_SEND_EX**.

Possible values are as follows:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_RSP

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RQR

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SIGNAL

The SLI receives and responds to the BIND and STSN requests through the LUA interface extension routines.

LU-DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2

Returned parameter. Contains flags for messages returned by LUA. Its subparameters are as follows:

lua_flag2.bid_enable

Indicates that RUI_BID was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56
Reserved and should be set to zero.

lua_encr_decr_option
Not used by **SLI_SEND_EX** and should be set to zero.

lua_sequence_number
The union member of **LUA_SPECIFIC** used by **SLI_SEND_EX**. Returned parameter. Contains the sequence number for either the first in the chain request unit or the only segment in the chain request unit. Note that this parameter is not byte-reversed.

lua_data_length_ex
The union member of **LUA_SPECIFIC** used by **SLI_SEND_EX**. Supplied parameter. Specifies the length of data being sent.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_PARAMETER_CHECK
Primary return code; the verb did not execute because of a parameter error.

LUA_INVALID_LUNAME

Secondary return code; an invalid **lua_luname** was specified.

LUA_BAD_SESSION_ID

Secondary return code; an invalid value for **lua_sid** was specified in the VCB.

LUA_BAD_DATA_PTR

Secondary return code; the **lua_data_ptr** parameter either does not contain a valid pointer or does not point to a read/write segment and supplied data is required.

LUA_RESERVED_FIELD_NOT_ZERO

Secondary return code; a reserved parameter for the verb just issued is not set to zero.

LUA_INVALID_POST_HANDLE

Secondary return code; for a Microsoft Windows Server 2003 or Windows 2000 system using events as the asynchronous posting method, the Windows LUA VCB does not contain a valid event handle.

LUA_INVALID_FLOW

Secondary return code; the **lua_flag1** flow flags were set incorrectly when a verb was issued:

- When issuing **SLI_SEND_EX** to send an SNA response, set only one **lua_flag1** flow flag.
- When issuing SLI_RECEIVE_EX, set at least one lua_flag1 flow flag.

LUA_VERB_LENGTH_INVALID

Secondary return code; an LUA verb was issued with a value for **lua_verb_length** unexpected by LUA.

LUA_REQUIRED_FIELD_MISSING

Secondary return code; the verb that was issued either did not include a data pointer (if the data count was not zero) or did not include an **lua_flag1** flow flag.

LUA_INVALID_MESSAGE_TYPE

Secondary return code; the **lua_message_type** parameter is not recognized by the LUA interface.

LUA_DATA_LENGTH_ERROR

Secondary return code; the application did not provide user-supplied data required by the verb issued. Note that when **SLI_SEND_EX** is issued for an SNA LUSTAT command, status (in four bytes) is required, and that when SLI_OPEN is issued with secondary initialization, data is required.

LUA_STATE_CHECK

Primary return code; the verb did not execute because it was issued in an invalid state.

LUA_NO_SLI_SESSION

Secondary return code; a session was not open or was down due to an SLI_CLOSE or session failure when a command was issued.

LUA_MAX_NUMBER_OF_SENDS

Secondary return code; the application issued a third **SLI_SEND** or an **SLI_SEND_EX** before one completed.

LUA_SEND_ON_FLOW_PENDING

Secondary return code; an **SLI_SEND** or an **SLI_SEND_EX** was still outstanding when the application issued another **SLI_SEND_EX** for an SNA flow.

LUA_SESSION_FAILURE

Primary return code; an error condition, specified in the secondary return code, caused the session to fail.

LUA_RECEIVED_UNBIND

Secondary return code; the primary logical unit (PLU) sent an SNA UNBIND command to the LUA interface when a session was active. As a result, the session was stopped.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_NO_RUI_SESSION

Secondary return code; no session has been initialized for the LUA verb issued, or some verb other than SLI_OPEN was issued before the session was initialized.

LUA_LU_COMPONENT_DISCONNECTED

Secondary return code; an LU component is unavailable because it is not connected properly. Make sure that the power is on.

LUA_DATA_SEGMENT_LENGTH_ERROR

Secondary return code; one of the following has occurred:

- The supplied data segment for SLI_RECEIVE_EX or **SLI_SEND_EX** is not a read/write data segment as required.
- The supplied data segment for SLI_RECEIVE_EX is not as long as that provided in lua_max_length_ex.
- The supplied data segment for SLI_SEND_EX is not as long as that provided in lua_data_length_ex.

LUA_VERB_RECORD_SPANS_SEGMENTS

Secondary return code; the LUA VCB length parameter plus the segment offset is beyond the segment end.

LUA_NOT_ACTIVE

Secondary return code; LUA was not active within Microsoft Host Integration Server or SNA Server when an LUA verb was issued.

LUA_SLI_LOGIC_ERROR

Secondary return code; the LUA interface found an internal error in logic.

LUA_INVALID_PROCESS

Secondary return code; the session for which an LUA verb was issued is unavailable because another OS/2 process owns the session.

LUA_LU_INOPERATIVE

Secondary return code; a severe error occurred while the LUA was attempting to stop the session. This LU is unavailable for any LUA requests until an activate logical unit (ACTLU) is received from the host.

LUA_MODE_INCONSISTENCY

Secondary return code; performing this function is not allowed by the current status. The request sent to the half-session component was not executed even though it was understood and supported. This SNA sense code is also an exception request sense code.

LUA_INSUFFICIENT_RESOURCES

Secondary return code; a temporary condition of insufficient resources caused the request receiver to be unable to perform. The request sent to the half-session component was not executed, even though it was understood and supported.

LUA_SEND_CORRELATION_TABLE_FULL

Secondary return code; the session send correlation table for the flow requested reached its capacity.

LUA_RU_LENGTH_ERROR

Secondary return code; the RU request was an incorrect length (either too short or too long). The request unit was not interpreted or processed even though it was delivered to the half-session component. The half-session capabilities do not match. This SNA sense code is also an exception request sense code.

LUA_FUNCTION_NOT_SUPPORTED

Secondary return code; LUA does not support the requested function. A control character, an RU parameter, or a formatted request code may have specified the function. Specific sense code information is in bytes 2 and 3.

LUA_HDX_BRACKET_STATE_ERROR

Secondary return code; the existing state error prevented the current request from being sent. The determination was made by a protocol computer.

LUA_RESPONSE_ALREADY_SENT

Secondary return code; a response for the chain was already sent so that the current request was not sent. The determination was made by a protocol computer.

LUA_EXR_SENSE_INCORRECT

Secondary return code; the application responded negatively to an exception request. The sense code was unacceptable.

LUA_RESPONSE_OUT_OF_ORDER

Secondary return code; the current response was not for the oldest request. The determination was made by a protocol computer.

LUA_CHAIN_RESPONSE_REQUIRED

Secondary return code; a CHASE response was still outstanding when a more recent request was attempted. The determination was made by a protocol computer.

LUA_BRACKET

Secondary return code; the sender failed to enforce the session bracket rules. Note that contention and race conditions are exempt from this error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DIRECTION

Secondary return code; while the half-duplex flip-flop state was NOT_RECEIVE, a request for normal flow was received. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_RESET

Secondary return code; a half-session of an active session but with inactive data traffic received a normal flow data flow control (DFC) or function management data (FMD) request. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_QUIESCED

Secondary return code; a DFC or FMD request was received from a half-session that sent either a SHUTC command or QC command, and the DFC or FMD request has not responded to a RELQ command. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_DATA_TRAFFIC_NOT_RESET

Secondary return code; while the data traffic state was not reset, the session control request was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_NO_BEGIN_BRACKET

Secondary return code; the receiver has already sent a positive response to a BIS command when a BID or an FMD request specifying BBI=BB was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_SC_PROTOCOL_VIOLATION

Secondary return code; a violation of SC protocol occurred. A request (that is permitted only after an SC request and a positive response to that request have been successfully exchanged) was received before the required exchange. Byte 4 of the sense data contains the request code. No user data exists for this sense code. An invalid header request or data flow control state was found. Delivery to the half-session component was prevented.

LUA_IMMEDIATE_REQUEST_MODE_ERROR

Secondary return code; the request violated the immediate request mode protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_QUEUED_RESPONSE_ERROR

Secondary return code; the request violated the queued response protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_ERP_SYNC_EVENT_ERROR

Secondary return code; a violation of the ERP synchronous event protocol occurred. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_RSP_BEFORE_SENDING_REQ

Secondary return code; a previously received request has not been responded to yet and an attempt was made in half-duplex send/receive mode to send a normal flow request. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

LUA_RSP_CORRELATION_ERROR

Secondary return code; a response was sent that does not correspond to a previously received request or a response was received that does not correspond to a previously sent request.

LUA_BB_NOT_ALLOWED

Secondary return code; the begin bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EB_NOT ALLOWED

Secondary return code; the end bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_EXCEPTION_RSP_NOT_ALLOWED

Secondary return code; when an exception response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_DEFINITE_RSP_NOT_ALLOWED

Secondary return code; when a definite response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_ALLOWED

Secondary return code; the change-direction indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NO_RESPONSE_NOT_ALLOWED

Secondary return code; a request other than an EXR contained a "no response." The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CHAINING_NOT_SUPPORTED

Secondary return code; the chaining indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_BRACKETS_NOT_SUPPORTED

Secondary return code; the bracket indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_CD_NOT_SUPPORTED

Secondary return code; the change-direction indicator was set, but LUA does not support change-direction for this situation. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_FI

Secondary return code; the format indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_ALTERNATE_CODE_NOT_SUPPORTED

Secondary return code; the code selection indicator was set, but LUA does not support code selection for this session. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_REQUEST_CODE

Secondary return code; the request code was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_SPEC_OF_SDI_RTI

Secondary return code; the SDI and the RTI were not specified correctly on a response. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_DR1I_DR2I_ERI

Secondary return code; the DR1I, the DR2I, and the ERI were specified incorrectly. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_QRI

Secondary return code; the queued response indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_EDI

Secondary return code; the EDI was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_INCORRECT_USE_OF_PDI

Secondary return code; the PDI was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

LUA_NO_SESSION

Secondary return code; a request to activate a session is required because no active half-session in the receiving end node for the origination-destination pair exists, or no active boundary function half-session component for the origination-destination pair in a node that supplies the boundary function exists. Delivery of the request could not take place for one of the following reasons:

- A path information unit error
- A path outage
- An invalid sequence of requests for activation

If a path error is received during an active session, that usually indicates there is no longer a valid path to the session partner.

LUA_CANCELED
Primary return code; the secondary return code gives the reason for canceling the command.

LUA_TERMINATED

Secondary return code; the session was terminated when a verb was pending. The verb process has been canceled.

LUA_IN_PROGRESS
Primary return code; an asynchronous command was received but is not completed.

LUA_COMM_SUBSYSTEM_ABENDED
Primary return code; indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node has been broken (a LAN error).
- The SnaBase at the TP's computer encountered an ABEND.

LUA_COMM_SUBSYSTEM_NOT_LOADED
Primary return code; a required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

LUA_INVALID_VERB_SEGMENT
Primary return code; the VCB extended beyond the end of the data segment.

LUA_UNEXPECTED_DOS_ERROR
Primary return code; after issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

LUA_STACK_TOO_SMALL
Primary return code; the stack size of the application is too small to execute the verb. Increase the stack size of your application.

LUA_INVALID_VERB
Primary return code; either the verb code or the operation code, or both, is invalid. The verb did not execute.

Remarks

SLI_SEND_EX sends responses, SNA commands, and data from the Windows LUA application to a host LU.

The difference between SLI_SEND_EX and SLI_SEND is that the SLI_SEND_EX verb supports inbound chaining and can send up to a maximum of 4,295 kilobytes (KB) in a single verb request. In contrast, SLI_SEND is limited to sending up to 64 KB in a verb request. A single SLI_SEND_EX or SLI_SEND verb defines a chain. A single SLI_RECEIVE_EX or SLI_RECEIVE verb receives a whole chain.

A session must already be open to issue SLI_SEND_EX for a particular LU-LU session flow. To send data on the SSCP normal flow prior to the completion of SLI_OPEN, the session must have been initialized as primary with SSCP access. In addition, the session status must be INIT_COMPLETE.

The settings for lua_message_type determine the type of processing that will be done by SLI_SEND_EX. The following table indicates the parameters to set based on the value of lua_message_type.

SLI_SEND_EX parameter	LU_DATA SSCP_DATA	BID BIS RTR	CHASE QC	LUSTAT_LU LUSTAT_SSCP	QEC RELQ SBI SIGNAL	RQR	RSP
lua_data _length	Req.	0	0	Req.	0	0	Req. (0 if no data)
lua_data _ptr	Req. (0 if no data)	0	0	Req.	0	0	Req. (0 if no data)
lua_flag1 flow flags	0	0	0	0	0	0	Req. (set one)
lua_rh	FI DRL1 DRL2 RI BBI EBI CDI CSI EDI	SDI QRI	SDI QRI EBI CDI	SDI QRI DRL1 DRL2 RI BBI EBI CDI	SDI	0	RRI RI
lua_th	0	0	0	0	0	0	SNF

The location provided in **lua_data_ptr** and the length provided in **lua_data_length_ex** determine the data that the SLI sends. The data will be chained by the SLI verbs if necessary.

When sending a response, the type of response determines the SLI_SEND_EX information required. For all responses, you must:

- Set the selected **lua_flag1** flow flag.
- Provide the sequence number in lua_th.snf for the request to which you are responding.
- Set lua_message_type to LUA_MESSAGE_TYPE_RSP.

For multichain message responses, the sequence number of the last received chain element must be used. For a response to a multichain message ending with a CANCEL command, the CANCEL command sequence number is used.

For positive responses that only require the request code, set lua_rh.ri to zero (indicating that the response is positive) and lua_data_length to zero (indicating no data is provided). The request code is filled in by the SLI, using the sequence number provided.

For negative responses in which lua_rh.ri is set to 1, set the lua_data_ptr to the SNA sense code address and the lua_data_length to the SNA sense code length (four bytes). The sequence number is used by the SLI to fill in the request code.

See Also

RUI_INIT, RUI_READ, RUI_WRITE, SLI_BID, SLI_CLOSE, SLI_OPEN, SLI_RECEIVE_EX

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SLI_BIND_ROUTINE

The **SLI_BIND_ROUTINE** verb notifies the Microsoft® Windows® logical unit application (LUA) application that a BIND request has come from the host and allows the user-supplied routine to examine the request and formulate a response.

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_BIND_ROUTINE.

```
struct LUA_COMMON {
    unsigned short    lua_verb;
    unsigned short    lua_verb_length;
    unsigned short    lua_prim_rc;
    unsigned long     lua_sec_rc;
    unsigned short    lua_opcode;
    unsigned long     lua_correlator;
    unsigned char     lua_luname[8];
    unsigned short    lua_extension_list_offset;
    unsigned short    lua_cobol_offset;
    unsigned long     lua_sid;
    unsigned short    lua_max_length;
    unsigned short    lua_data_length;
    char FAR *        lua_data_ptr;
    unsigned long     lua_post_handle;
    struct LUA_TH     lua_th;
    struct LUA_RH     lua_rh;
    struct LUA_FLAG1  lua_flag1;
    unsigned char     lua_message_type;
    struct LUA_FLAG2  lua_flag2;
    unsigned char     lua_resv56[7];
    unsigned char     lua_encr_decr_option;
};
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_SLI for Session Level Interface (SLI) verbs.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_BIND_ROUTINE.

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_BIND_ROUTINE only requires this parameter if lua_sid is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Not used by **SLI_BIND_ROUTINE** and should be set to zero.

lua_cobol_offset
Not used by LUA in Microsoft® Host Integration Server or SNA Server and should be zero.

lua_sid
Supplied parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length
Not used by **SLI_BIND_ROUTINE** and should be set to zero.

lua_data_length
Returned parameter. Specifies the length of the BIND request/response unit (RU) data returned in the data buffer.

lua_data_ptr
For the **SLI_BIND_ROUTINE** this parameter contains the address of the BIND RU.

lua_post_handle
Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th
Supplied parameter. Contains the SNA transmission header (TH) of the message received. Various subparameters are returned for read and bid functions.

lua_rh
Supplied parameter. Contains the SNA request/response header (RH) of the message sent or received.

lua_flag1
Supplied parameter. Contains a data structure containing flags for messages supplied by the application.

lua_message_type
Supplied parameter. Specifies the type of SNA data or command sent to the host.

lua_flag2
Returned parameter. Contains flags for messages returned by LUA.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56
Reserved and should be set to zero.

lua_encr_decr_option
Not used by **SLI_BIND_ROUTINE** and should be set to zero.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_NEGATIVE_RSP
Primary return code; either the LUA sent a negative response to a message received from the primary logical unit (PLU) because an error was found in the message, or the application responded negatively to a chain for which the end-of-chain has arrived.

Remarks

SLI_BIND_ROUTINE provides a mechanism for the Windows LUA application to examine BIND requests that are received from the host. The Windows LUA uses a user-supplied dynamic-link library (DLL) to notify the Windows LUA application that a BIND request has been received. The user-supplied DLL routine then examines the contents of the BIND and formulates a response for the request.

The DLL name for the routine is provided as extensions of the SLI_OPEN verb's VCB. The lua_extension_list_offset parameter provides the offset from the start of the VCB to the first name in the extension list.

The Windows LUA interface assigns storage space where the VCB is structured. The VCB of SLI_BIND_ROUTINE contains lua_th and lua_rh. The address of the BIND RU is specified in lua_data_ptr and the length of the RU is specified in lua_data_length.

When SLI_BIND_ROUTINE returns to the Windows LUA, processing of SLI_BIND_ROUTINE is completed. The BIND response should overwrite the BIND RU. When the BIND is accepted, the primary return code should be set to LUA_OK. If the BIND is rejected, the primary return code should be set to LUA_NEGATIVE_RSP and the BIND buffer contains the negative sense code. The lua_data_ptr parameter should not be modified.

If a negative response is returned from SLI_BIND_ROUTINE, SLI_OPEN is canceled. The lua_prim_rc of the SLI_OPEN is set to LUA_SESSION_FAILURE, and the lua_sec_rc is set to LUA_NEG_RSP_FROM_BIND_ROUTINE.

See Also

RUI_INIT, RUI_PURGE, RUI_READ, RUI_WRITE, SLI_OPEN, SLI_PURGE, SLI_RECEIVE, SLI_SEND

SLI_STSN_ROUTINE

The **SLI_STSN_ROUTINE** verb notifies the Microsoft® Windows® logical unit application (LUA) application that an STSN command has come from the host and allows the user-supplied routine to examine the request and formulate a response.

The following structure describes the LUA_COMMON member of the verb control block (VCB) used by SLI_STSN_ROUTINE.

```
struct LUA_COMMON {
    unsigned short    lua_verb;
    unsigned short    lua_verb_length;
    unsigned short    lua_prim_rc;
    unsigned long     lua_sec_rc;
    unsigned short    lua_opcode;
    unsigned long     lua_correlator;
    unsigned char     lua_luname[8];
    unsigned short    lua_extension_list_offset;
    unsigned short    lua_cobol_offset;
    unsigned long     lua_sid;
    unsigned short    lua_max_length;
    unsigned short    lua_data_length;
    char FAR *        lua_data_ptr;
    unsigned long     lua_post_handle;
    struct LUA_TH     lua_th;
    struct LUA_RH     lua_rh;
    struct LUA_FLAG1  lua_flag1;
    unsigned char     lua_message_type;
    struct LUA_FLAG2  lua_flag2;
    unsigned char     lua_resv56[7];
    unsigned char     lua_encr_decr_option;
};
```

Members

lua_verb

Supplied parameter. Contains the verb code, LUA_VERB_SLI for Session Level Interface (SLI) verbs.

lua_verb_length

Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc

Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc

Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode

Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, LUA_OPCODE_SLI_STSN_ROUTINE.

lua_correlator

Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname

Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_STSN_ROUTINE only requires this parameter if lua_sid is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset

Not used by **SLI_STSN_ROUTINE** and should be set to zero.

lua_cobol_offset

Not used by LUA in Microsoft® Host Integration Server or SNA Server and should be zero.

lua_sid

Supplied parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length

Not used by **SLI_STSN_ROUTINE** and should be set to zero.

lua_data_length
Returned parameter. Specifies the length of the STSN request/response unit (RU) data returned in the data buffer.

lua_data_ptr
For the **SLI_STSN_ROUTINE** this parameter contains the address of the STSN RU.

lua_post_handle
Supplied parameter. Used under Microsoft Windows Server™ 2003 or Windows 2000 Server if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

For all other environments, this parameter is reserved and should be set to zero.

lua_th
Returned parameter. Contains the SNA transmission header (TH) of the message received. Various subparameters are returned for read and bid functions.

lua_rh
Returned parameter. Contains the SNA request/response header (RH) of the message sent or received.

lua_flag1
Supplied parameter. Contains a data structure containing flags for messages supplied by the application.

lua_message_type
Supplied parameter. Specifies the type of SNA data or command sent to the host.

lua_flag2
Returned parameter. Contains flags for messages returned by LUA.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates system services control point (SSCP) expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56
Reserved and should be set to zero.

lua_encr_decr_option
Not used by **SLI_STSN_ROUTINE** and should be set to zero.

Return Codes

LUA_OK
Primary return code; the verb executed successfully.

LUA_SEC_OK

Secondary return code; no additional information exists for LUA_OK.

LUA_NEGATIVE_RSP
Primary return code; either the LUA sent a negative response to a message received from the primary logical unit (PLU) because an error was found in the message, or the application responded negatively to a chain for which the end-of-chain has arrived.

Remarks

SLI_STSN_ROUTINE provides a mechanism for the Windows LUA application to examine and respond to STSN commands. The Windows LUA notifies the Windows LUA application that an STSN command has been received from the host. This is done through a user-supplied dynamic-link library (DLL). The user's DLL examines the STSN request and formulates a response to the request.

The DLL name for the routine is provided as extensions of the SLI_OPEN verb's VCB. The lua_extension_list_offset parameter provides the offset from the start of the VCB to the first name in the extension list.

The Windows LUA interface assigns storage space where the VCB is structured. The VCB of the SLI_STSN_ROUTINE contains lua_th and lua_rh. The address of the STSN RU is specified in lua_data_ptr and the length of the RU is specified in lua_data_length.

When SLI_STSN_ROUTINE returns to the Windows LUA, processing of the SLI_STSN_ROUTINE is completed. The STSN response should overwrite the STSN RU. When the STSN is accepted, the primary return code should be set to LUA_OK. If the STSN is rejected, the primary return code should be set to LUA_NEGATIVE_RSP and the STSN buffer contains the negative sense code. The lua_data_ptr parameter should not be modified.

If a negative response is returned from SLI_STSN_ROUTINE, SLI_OPEN is canceled. The lua_prim_rc of the SLI_OPEN is set to LUA_SESSION_FAILURE, and the lua_sec_rc is set to LUA_NEG_RSP_FROM_STSN_ROUTINE.

See Also

RUI_INIT, RUI_PURGE, RUI_READ, RUI_WRITE, SLI_OPEN, SLI_PURGE, SLI_RECEIVE, SLI_SEND

LUA Extensions for the Windows Environment

The extensions described in this section are designed for Microsoft® Windows®. They provide support for programming compatibility and optimum application performance in 32-bit operating environments. These extensions are supported on Microsoft Windows Server™ 2003, Windows XP Professional, and Windows 2000 Server.

The Windows logical unit application (LUA) programming interface enables multithreaded Windows-based processes. A process contains one or more threads of execution. For each extension, this section provides a definition of the function with syntax, return codes, and remarks for using the extension.

These functions can be grouped into two categories depending on whether Request Unit Interface (RUI) or Session Level Interface (SLI) verbs are used.

This section contains:

RUI
SLI
WinRUI
WinRUICleanup
WinRUIGetLastInitStatus
WinRUIStartup
WinSLI
WinSLICleanup
WinSLIStartup

RUI

The **RUI** function provides event notification for all Request Unit Interface (RUI) verbs.

```
void WINAPI RUI(
  LUA_VERB_RECORD FAR *lpVCB
);
```

Parameters

lpVCB
Pointer to the logical unit application (LUA) verb control block (VCB), **LUA_VERB_RECORD**.

Return Values

The code returned in **lua_prim_rc** indicates whether asynchronous notification will occur. If the field is set to LUA_IN_PROGRESS, asynchronous notification will occur through event signaling. If the flag is not LUA_IN_PROGRESS, the request completed synchronously. Examine the primary return code and secondary return code for any errors.

Remarks

The application must provide a handle to an event in the **lua_post_handle** parameter of the VCB. The event must be in the not-signaled state.

When the asynchronous operation is complete, the application is notified through the signaling of the event. Upon signaling of the event, examine the primary return code and secondary return code for any error conditions.

See Also

WinRUI

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SLI

The **SLI** function provides event notification for all Session Level Interface (SLI) verbs.

```
void WINAPI SLI(
  LUA_VERB_RECORD FAR *lpVCB
);
```

Parameters

lpVCB
Pointer to the logical unit application (LUA) verb control block (VCB), **LUA_VERB_RECORD**.

Return Values

The code returned in **lua_prim_rc** indicates whether asynchronous notification will occur. If the field is set to LUA_IN_PROGRESS, asynchronous notification will occur through event signaling. If the flag is not LUA_IN_PROGRESS, the request completed synchronously. Examine the primary return code and secondary return code for any errors.

Remarks

The application must provide a handle to an event in the **lua_post_handle** parameter of the VCB. The event must be in the not-signaled state.

When the asynchronous operation is complete, the application is notified through the signaling of the event. Upon signaling of the event, examine the primary return code and secondary return code for any error conditions.

See Also

WinSLI

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

WinRUI

The **WinRUI** function provides asynchronous message notification for all Microsoft® Windows®-based Request Unit Interface (RUI) verbs.

```
int WINAPI WinRUI(
  HWND hWnd,
  LUA_VERB_RECORD FAR *lpVCB
);
```

Parameters

hWnd
  Handle of window to receive message.
lpVCB
  Pointer to the logical unit application (LUA) verb control block (VCB), **LUA_VERB_RECORD**.

Return Values

The function returns a value indicating whether the request was accepted by the Windows-based RUI for processing. A returned value of zero indicates that the request was accepted and will be processed. A value other than zero indicates an error. Possible error codes are as follows:

WLUAINVALIDHANDLE
  The window handle provided is invalid.
WLUASTARTUPNOTCALLED
  The application has not initiated a session using WinRUIStartup.

The value returned in **lua_flag2.async** indicates whether asynchronous notification will occur. If the flag is set (nonzero), asynchronous notification will occur through a message posted to the application's message queue. If the flag is not set, the request completed synchronously. Examine the primary return code and secondary return code for any error conditions.

Remarks

When the asynchronous operation is complete, the application's window *hWnd* receives the message returned by **RegisterWindowMessage** with "WinRUI" as the input string. The *lParam* argument contains the address of the VCB being posted as complete. The *wParam* argument is undefined.

> **Note** It is possible for the request to be accepted for processing (the function call returns zero) but rejected later with a primary return code and secondary return code set in the VCB. Examine the primary return code and secondary return code for any error conditions.

If the application calls **WinRUI** without first initializing the session using **WinRUIStartup**, an error is returned.

See Also

RUI, WinRUIStartup

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

WinRUICleanup

The **WinRUICleanup** function terminates and deregisters an application using Request Unit Interface (RUI) verbs from a Microsoft® Windows® logical unit application (LUA) implementation.

```
BOOL WINAPI WinRUICleanup(void);
```

Return Values

The return code specifies whether the deregistration was successful. If the value is not zero, the application was successfully deregistered. If the value is zero, the application was not deregistered.

Remarks

Use **WinRUICleanup** to indicate deregistration of a Windows LUA application from a Windows LUA implementation. This function can be used, for example, to free up resources allocated to the specific application.

If **WinRUICleanup** is called while LUs are in session (RUI_TERM not issued), the cleanup code should issue an **RUI_TERM** close type ABEND for the application for all open sessions.

See Also

RUI_TERM, WinRUIStartup

WinRUIGetLastInitStatus

The **WinRUIGetLastInitStatus** function enables an application to determine the status of an RUI_INIT, so that the application can evaluate whether the **RUI_INIT** should be timed out. This extension can be used to initiate status reporting, terminate status reporting, or find the current status. For details, see the Remarks section.

```
int WINAPI WinRUIGetLastInitStatus(
  DWORD dwSid,
  HANDLE hStatusHandle,
  DWORD dwNotifyType,
  BOOL bClearPrevious
);
```

Parameters

dwSid

Specifies the RUI session identifier of the session for which status will be determined. If *dwSid* is zero, *hStatusHandle* is used to report status on all sessions. Note that the **lua_sid** parameter in the RUI_INIT verb control block (VCB) is valid as soon as the call to RUI or WinRUI for the **RUI_INIT** returns.

hStatusHandle

Specifies a handle used for signaling the application that the status for the session (specified by *dwSid*) has changed. Can be a window handle, an event handle, or NULL; *dwNotifyType* must be set accordingly:

- If *hStatusHandle* is a window handle, status is sent to the application through a window message. The message is obtained from **RegisterWindowMessage** using the string "WinRUI". The parameter *wParam* contains the session status. (For more information, see Return Codes.) Depending on the value of *dwNotifyType*, *lParam* contains either the RUI session identifier of the session, or the value of **lua_correlator** from the RUI_INIT verb.
- If *hStatusHandle* is an event handle, when the status for the session specified by *dwSid* changes, the event is put into the signaled state. The application must then make a further call to **WinRUIGetLastInitStatus** to find out the new status. Note that the event should not be the same as one used for signaling completion of any RUI verb.
- If *hStatusHandle* is NULL, the status of the session specified by *dwSid* is returned in the return code. In this case, *dwSid* must not be zero unless *bClearPrevious* is TRUE. If *hStatusHandle* is NULL, *dwNotifyType* is ignored.

dwNotifyType

Specifies the type of indication required. This determines the contents of the *lParam* of the window message, and how **WinRUIGetLastInitStatus** interprets *hStatusHandle*. Allowed values are:

WLUA_NTFY_EVENT

The *hStatusHandle* parameter contains an event handle.

WLUA_NTFY_MSG_CORRELATOR

The *hStatusHandle* parameter contains a window handle, and the *lParam* of the returned window message should contain the value of the **lua_correlator** field on the RUI_INIT.

WLUA_NTFY_MSG_SID

The *hStatusHandle* parameter contains a window handle, and the *lParam* of the returned window message should contain the LUA session identifier.

bClearPrevious

If TRUE, status messages are no longer sent for the session identified by *dwSid*. If *dwSid* is zero, status messages are no longer sent for any session. If *bClearPrevious* is TRUE, *hStatusHandle* and *dwNotifyType* are ignored.

Return Values

WLUASYSNOTREADY

SNABASE is not running.

WLUANTFYINVALID

The *dwNotifyType* parameter is invalid.

WLUAINVALIDHANDLE

The *hStatusHandle* parameter does not contain a valid handle.

WLUASTARTUPNOTCALLED

WinRUIStartup has not been called.

WLUALINKINACTIVE

The link to the host is not yet active.

WLUALINKACTIVATING

The link to the host is being activated.

WLUAPUINACTIVE

The link to the host is active, but no ACTPU has yet been received.

WLUAPUACTIVE

An ACTPU has been received.

WLUAPUREACTIVATED

The physical unit (PU) has been reactivated.

WLUALUINACTIVE

The link to the host is active, and an ACTPU has been received, but no ACTLU has been received.

WLUALUACTIVE

The LU is active.

WLUALUREACTIVATED

The LU has been reactivated.

WLUAUNKNOWN

The session is in an unknown status. (This is an internal error.)

WLUAGETLU

The session is waiting for an Open(SSCP) response from the node.

WLUASIDINVALID

The security ID (SID) specified does not match any known by the RUI.

WLUASIDZERO

The *hStatusHandle* parameter is NULL and *bClearPrevious* is FALSE, but *dwSid* is zero.

WLUAGLOBALHANDLER

The *dwSid* parameter is zero, and messages from all sessions will be notified. (This is a normal return code, not an error.)

Remarks

This extension is intended to be used with either a window handle or an event handle to enable asynchronous notification of status changes. It can also be used alone to find the current status of a session.

With a window handle

There are two ways to use this extension with a window handle:

```
WinRUIGetLastInitStatus(Sid,Handle,WLUA_NTFY_MSG_CORRELATOR,FALSE);
```

—or—

```
WinRUIGetLastInitStatus(Sid,Handle,WLUA_NTFY_MSG_SID,FALSE);
```

With this implementation, changes in status are reported by a window message sent to the window handle specified. If WLUA_NTFY_MSG_CORRELATOR is specified, the *lParam* field in the window message contains the **lua_correlator** field for the session. If WLUA_NTFY_MSG_SID is specified, the *lParam* field in the window message contains the LUA session identifier for the session.

When the extension has been used with a window handle, use the following to cancel status reporting:

```
WinRUIGetLastInitStatus(Sid,NULL,0,TRUE);
```

For this implementation, note that if *Sid* is nonzero, status is only reported for that session. If *Sid* is zero, status is reported for all sessions.

With an event handle

To use this extension with an event handle, implement it as follows:

```
WinRUIGetLastInitStatus(Sid,Handle,WLUA_NOTIFY_EVENT,FALSE);
```

The event whose handle is given will be signaled when a change in state occurs. Because no information is returned when an event is signaled, a further call must be issued to find out the status.

```
Status = WinRUIGetLastInitStatus(Sid,NULL,0,0,FALSE);
```

Note that in this case, a *Sid* must be specified.

When the extension has been used with an event handle, use the following to cancel the reporting of status:

```
WinRUIGetLastInitStatus(Sid,NULL,0,TRUE);
```

Query current status

To use this extension to query the current status of a session, it is not necessary to use an event or window handle. Instead, use the following:

```
Status = WinRUIGetLastInitStatus(Sid,NULL,0,0,FALSE);
```

See Also

RUI, RUI_INIT, WinRUI, WinRUIStartup

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

WinRUIStartup

The **WinRUIStartup** function enables an application using Request Unit Interface (RUI) verbs to specify the version of Windows logical unit application (LUA) required and to retrieve details of the specific Microsoft® Windows® LUA implementation. This function must be called by an application to register itself with a Windows LUA implementation before issuing any further Windows LUA calls.

```
int WINAPI WinRUIStartup(
  WORD wVersionRequired,
  LUADATA FAR *lpLuaData
);
```

Parameters

wVersionRequired
Specifies the version of Windows LUA support required. The high-order byte specifies the minor version (revision) number. The low-order byte specifies the major version number.
lpLuaData
Pointer to the **LUADATA** structure containing the returned version number information.

Return Values

The return code specifies whether the application was registered successfully and whether the Windows LUA implementation can support the specified version number. If the value is zero, it was registered successfully and the specified version can be supported. Otherwise, the return code is one of the following:

WLUASYSNOTREADY
The underlying network subsystem is not ready for network communication.
WLUAVERNOTSUPPORTED
The version of Windows LUA support requested is not provided by this particular Windows LUA implementation.
WLUAINVALID
The Windows LUA version specified by the application is not supported by this dynamic-link library (DLL).
WLUAFAILURE
A failure occurred while the Windows® LUA DLL was initializing. This usually occurs because an operating system call failed.
WLUAINITREJECT
WinRUIStartup was called multiple times.

Remarks

To support future Windows LUA implementations and applications that may have functionality differences, a negotiation takes place in **WinRUIStartup**. An application passes to **WinRUIStartup** the Windows LUA version that it can use. If this version is lower than the lowest version supported by the Windows LUA DLL, the DLL cannot support the application and **WinRUIStartup** fails. If the version is not lower, however, the call succeeds and returns the highest version of Windows LUA supported by the DLL. If this version is lower than the lowest version supported by the application, the application either fails its initialization or attempts to find another Windows LUA DLL on the system.

This negotiation allows both a Windows LUA DLL and a Windows LUA application to support a range of Windows LUA versions. An application can successfully use a DLL if there is any overlap in the versions. The following table illustrates how **WinRUIStartup** works in conjunction with different application and DLL versions.

LUA App versions	**LUA DLL versions**	**To WinRUIStartup**	**From WinRUIStartup**	**Result**
1.0	1.0	1.0	1.0	Use 1.0
1.0, 2.0	1.0	2.0	1.0	Use 1.0
1.0	1.0, 2.0	1.0	2.0	Use 1.0
1.0	2.0, 3.0	1.0	WLUAINVALID	Fail
2.0, 3.0	1.0	3.0	1.0	App fails
1.0, 2.0, 3.0	1.0, 2.0, 3.0	3.0	3.0	Use 3.0

> **Note** The application that uses RUI verbs must call **WinRUIStartup** prior to issuing any other LUA commands. However, **WinRUIStartup** needs to be called only once per application. If it is called multiple times, the subsequent calls will be rejected.

Details of the actual LUA implementation are described in the **WLUADATA** structure, defined as follows:

```
typedef struct { WORD wVersion;
            char szDescription[WLUADESCRIPTION_LEN+1];
            } LUADATA;
```

Having made its last Windows LUA call, an application should call the **WinRUICleanup** routine.

Each LUA application that uses RUI verbs must make a **WinRUIStartup** call before issuing any other LUA calls.

See Also

WinRUICleanup

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WinSLI

The **WinSLI** function provides asynchronous message notification for all Microsoft® Windows®-based Session Level Interface (SLI) verbs.

```
int WINAPI WinSLI(
  HWND hWnd,
  LUA_VERB_RECORD FAR *lpVCB
);
```

Parameters

hWnd
  Handle of window to receive message.
lpVCB
  Pointer to the logical unit application (LUA) verb control block (VCB), **LUA_VERB_RECORD**.

Return Values

The function returns a value indicating whether the request was accepted by the Windows-based SLI for processing. A returned value of zero indicates that the request was accepted and will be processed. A value other than zero indicates an error. Possible error codes are as follows:

WLUAINVALIDHANDLE
  The window handle provided is invalid.
WLUASTARTUPNOTCALLED
  The application has not initiated a session using WinSLIStartup.

The value returned in **lua_flag2.async** indicates whether asynchronous notification will occur. If the flag is set (nonzero), asynchronous notification will occur through a message posted to the application's message queue. If the flag is not set, the request completed synchronously. Examine the primary return code and secondary return code for any error conditions.

Remarks

When the asynchronous operation is complete, the application's window *hWnd* receives the message returned by **RegisterWindowMessage** with "WinSLI" as the input string. The *lParam* argument contains the address of the VCB being posted as complete. The *wParam* argument is undefined.

> **Note** It is possible for the request to be accepted for processing (the function call returns zero) but rejected later with a primary return code and secondary return code set in the VCB. Examine the primary return code and secondary return code for any error conditions.

If the application calls **WinSLI** without first initializing the session using **WinSLIStartup**, an error is returned.

See Also

SLI, WinSLIStartup

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WinSLICleanup

The **WinSLICleanup** function terminates and deregisters an application using Session Level Interface (SLI) verbs from a Microsoft® Windows® logical unit application (LUA) implementation.

```
BOOL WINAPI WinSLICleanup(void);
```

Return Values

The return code specifies whether the deregistration was successful. If the value is not zero, the application was successfully deregistered. If the value is zero, the application was not deregistered.

Remarks

Use **WinSLICleanup** to indicate deregistration of a Windows LUA application from a Windows LUA implementation. This function can be used, for example, to free up resources allocated to the specific application.

If **WinSLICleanup** is called while LUs are in session (SLI_CLOSE not issued), the cleanup code should issue an **SLI_CLOSE** close type ABEND for the application for all open sessions.

See Also

SLI_CLOSE, WinSLIStartup

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

WinSLIStartup

The **WinSLIStartup** function allows an application using the Session Level Interface (SLI) verbs to specify the version of Microsoft® Windows® logical unit application (LUA) required and to retrieve details of the specific Windows LUA implementation. This function must be called by an application to register itself with a Windows LUA implementation before issuing any further Windows LUA calls.

```
int WINAPI WinSLIStartup(
  WORD wVersionRequired,
  LUADATA FAR *lpLuaData
);
```

Parameters

wVersionRequired
Specifies the version of Windows LUA support required. The high-order byte specifies the minor version (revision) number. The low-order byte specifies the major version number.

lpLuaData
Pointer to the **LUADATA** structure containing the returned version number information.

Return Values

The return code specifies whether the application was registered successfully and whether the Windows LUA implementation can support the specified version number. If the value is zero, it was registered successfully and the specified version can be supported. Otherwise, the return code is one of the following:

WLUASYSNOTREADY
The underlying network subsystem is not ready for network communication.

WLUAVERNOTSUPPORTED
The version of Windows LUA support requested is not provided by this particular Windows LUA implementation.

WLUAINVALID
The Windows LUA version specified by the application is not supported by this dynamic-link library (DLL).

WLUAFAILURE
A failure occurred while the Windows LUA DLL was initializing. This usually occurs because an operating system call failed.

WLUAINITREJECT
WinSLIStartup was called multiple times.

Remarks

To support future Windows LUA implementations and applications that may have functionality differences, a negotiation takes place in **WinSLIStartup**. An application passes to **WinSLIStartup** the Windows LUA version that it can use. If this version is lower than the lowest version supported by the Windows LUA DLL, the DLL cannot support the application and **WinSLIStartup** fails. If the version is not lower, however, the call succeeds and returns the highest version of Windows LUA supported by the DLL. If this version is lower than the lowest version supported by the application, the application either fails its initialization or attempts to find another Windows LUA DLL on the system.

This negotiation allows both a Windows LUA DLL and a Windows LUA application to support a range of Windows LUA versions. An application can successfully use a DLL if there is any overlap in the versions. The following table illustrates how **WinSLIStartup** works in conjunction with different application and DLL versions.

App versions	**LUA DLL versions**	**To WinSLIStartup**	**From WinSLIStartup**	**Result**
1.0	1.0	1.0	1.0	Use 1.0
1.0, 2.0	1.0	2.0	1.0	Use 1.0
1.0	1.0, 2.0	1.0	2.0	Use 1.0
1.0	2.0, 3.0	1.0	WLUAINVALID	Fail
2.0, 3.0	1.0	3.0	1.0	App fails
1.0, 2.0, 3.0	1.0, 2.0, 3.0	3.0	3.0	Use 3.0

> **Note** The application that uses SLI verbs must call **WinSLIStartup** prior to issuing any other LUA commands. However, **WinSLIStartup** needs to be called only once per application. If it is called multiple times, the subsequent calls will be rejected.

Details of the actual LUA implementation are described in the **WLUADATA** structure, defined as follows:

```
typedef struct { WORD wVersion;
            char szDescription[WLUADESCRIPTION_LEN+1];
            } LUADATA;
```

Having made its last Windows LUA call, an application should call the **WinSLICleanup** routine.

Each LUA application that uses SLI verbs must make a **WinSLIStartup** call before issuing any other LUA calls.

See Also

WinSLICleanup

SNA Services Enhancement to the Windows LUA Environment

This section describes the Microsoft® Host Integration Server extension to Microsoft Windows® logical unit application (LUA) that converts primary and secondary return codes in the verb control block (VCB) to a printable string.

This section contains:

- GetLuaReturnCode

GetLuaReturnCode

The **GetLuaReturnCode** function converts the primary and secondary return codes in the verb control block (VCB) to a printable string. This function provides a standard set of error strings for use by logical unit application (LUA) applications.

```
int WINAPI GetLuaReturnCode(
    struct LUA_COMMON FAR *vpb,
    UINT buffer_length,
    unsigned char FAR *buffer_addr
);
```

Parameters

vpb
Supplied parameter. Specifies the address of the verb control block.
buffer_length
Supplied parameter. Specifies the length of the buffer pointed to by *buffer_addr*. The recommended length is 256.
buffer_addr
Supplied/returned parameter. Specifies the address of the buffer that will hold the formatted, null-terminated string.

Return Codes

0x20000001
The parameters are invalid; the function could not read from the specified verb control block or could not write to the specified buffer.
0x20000002
The specified buffer is too small.
0x20000003
The LUA string library LUAST32.DLL could not be loaded.

Remarks

The descriptive error string returned in *buffer_addr* does not terminate with a newline character (**\n**).

The descriptive error strings are contained in LUAST32.DLL and can be customized for different languages.

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LUA Verb Control Blocks

When an application issues a Microsoft® Windows® logical unit application (LUA) verb, the verb is coded within the application as a precisely defined verb control block (VCB). The total length of this VCB is variable and is defined by **lua_verb_length**.

This section defines the structure of individual Windows LUA VCBs.

This section contains:

- Common Structure of LUA VCBs
- Values for lua_message_type
- Command-Specific Structure of LUA VCBs

Common Structure of LUA VCBs

The following data structure shows the parameters that are common to all Microsoft® Windows® logical unit application (LUA) verbs.

```
struct LUA_COMMON {
    unsigned short lua_verb;
    unsigned short lua_verb_length;
    unsigned short lua_prim_rc;
    unsigned long  lua_sec_rc;
    unsigned short lua_opcode;
    unsigned long  lua_correlator;
    unsigned char  lua_luname[8];
    unsigned short lua_extension_list_offset;
    unsigned short lua_cobol_offset;
    unsigned long  lua_sid;
    unsigned short lua_max_length;
    unsigned short lua_data_length;
    char FAR *     lua_data_ptr;
    unsigned long  lua_post_handle;
    struct LUA_TH  lua_th;
    struct LUA_RH  lua_rh;
    struct LUA_FLAG1 lua_flag1;
    unsigned char  lua_message_type;
    struct LUA_FLAG2 lua_flag2;
    unsigned char  lua_resv56[7];
    unsigned char  lua_encr_decr_option;
} LUA_COMMON;
```

Members

lua_verb
Supplied parameter. Contains the verb code, LUA_VERB_RUI for Request Unit Interface (RUI) verbs or LUA_VERB_SLI for SLI verbs. For both of these macros the value is 0x5200.

lua_verb_length
Supplied parameter. Specifies the length in bytes of the LUA VCB. It must contain the length of the verb record being issued.

lua_prim_rc
Primary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_sec_rc
Secondary return code set by LUA at the completion of the verb. The valid return codes vary depending on the LUA verb issued.

lua_opcode
Supplied parameter. Contains the LUA command code (verb operation code) for the verb to be issued, for example, LUA_OPCODE_RUI_BID for the RUI_BID verb. Valid values are as follows:

LUA_OPCODE_SLI_OPEN

LUA_OPCODE_SLI_CLOSE

LUA_OPCODE_SLI_RECEIVE

LUA_OPCODE_SLI_SEND

LUA_OPCODE_SLI_PURGE

LUA_OPCODE_SLI_BID

LUA_OPCODE_SLI_BIND_ROUTINE

LUA_OPCODE_SLI_STSN_ROUTINE

LUA_OPCODE_SLI_CRV_ROUTINE

LUA_OPCODE_RUI_INIT

LUA_OPCODE_RUI_TERM

LUA_OPCODE_RUI_READ

LUA_OPCODE_RUI_WRITE

LUA_OPCODE_RUI_PURGE

LUA_OPCODE_RUI_BID

lua_correlator
Supplied parameter. Contains a user-supplied value that links the verb with other user-supplied information. LUA does not use or change this information. This parameter is optional.

lua_luname
Supplied parameter. Specifies the ASCII name of the local LU used by the Windows LUA session.

SLI_OPEN and RUI_INIT require this parameter. Other Windows LUA verbs only require this parameter if **lua_sid** is zero.

This parameter is eight bytes long, padded on the right with spaces (0x20) if the name is shorter than eight characters.

lua_extension_list_offset
Specifies the offset from the start of the VCB to the extension list of user-supplied dynamic-link libraries (DLLs). This parameter is not used by RUI in Microsoft® Host Integration Server and should be set to zero. The value must be the beginning of a word boundary unless there is no extension list.

lua_cobol_offset
Offset of the COBOL extension. Not used by LUA in Host Integration Server and should be zero.

lua_sid
Supplied and returned parameter. Specifies the session identifier and is returned by SLI_OPEN and RUI_INIT. Other verbs use this parameter to identify the session used for the command. If other verbs use the **lua_luname** parameter to identify sessions, set the **lua_sid** parameter to zero.

lua_max_length
Specifies the length of received buffer for RUI_READ and SLI_RECEIVE. For other RUI and SLI verbs, it is not used and should be set to zero.

lua_data_length
Specifies the length of the data being sent or received. It specifies the length of data returned in **lua_peek_data** for the RUI_BID verb.

lua_data_ptr
Pointer to an application-supplied buffer.

When SLI_RECEIVE or RUI_READ is issued, this parameter points to the location to receive the data from the host.

When SLI_SEND or RUI_WRITE is issued, this parameter points to the location of the application's data to be sent to the host.

When SLI_PURGE or RUI_PURGE is issued, this parameter points to the location of the **SLI_RECEIVE** or **RUI_READ** verb's VCB that is to be canceled.

When SLI_OPEN is issued, this parameter can be one of the following:

- The logon message for the SSCP normal flow when the initialization type is secondary with an unformatted logon message.
- The request/response unit (RU) for INITSELF. When the initialization type is secondary with INITSELF, the necessary data for the application is provided.
- For all other open types, this field should be set to zero.

For other RUI and Session Level Interface (SLI) verbs, this parameter is not used and should be set to zero. Both SNA commands and data are placed in this buffer, and they can be in an EBCDIC format.

This information is provided by the Windows LUA application.

lua_post_handle
Supplied parameter. Used under Microsoft Windows® 2000 and Windows Server™ 2003 if asynchronous notification is to be accomplished by events. This variable contains the handle of the event to be signaled or a window handle.

lua_th
Returned parameter. Contains the SNA transmission header (TH) of the message sent or received. Various subparameters are set for write functions and returned for read and bid functions. The subparameters are as follows:

lua_th.flags_fid

Format identification type 2, four bits.

lua_th.flags_mpf

Segmenting mapping field, two bits. Defines the type of data segment. The following values are valid:

0x00 Middle segment
0x04 Last segment
0x08 First segment
0x0C Only segment

lua_th.flags_odai

Originating address field–destination address field (OAF–DAF) assignor indicator, one bit.

lua_th.flags_efi

Expedited flow indicator, one bit.

lua_th.daf

Destination address field (DAF), an unsigned char.

lua_th.oaf

Originating address field (OAF), an unsigned char.

lua_th.snf

Sequence number field, an unsigned char[2].

lua_rh

Returned parameter. Contains the SNA request/response header (RH) of the message sent or received. It is set for the write function and returned by the read and bid functions. Its sub parameters are as follows:

lua_rh.rri

Request-response indicator, one bit.

lua_rh.ruc

RU category, two bits. The following values are valid:

LUA_RH_FMD (**0x00**) FM data segment
LUA_RH_NC (**0x20**) Network control
LUA_RH_DFC (**0x40**) Data flow control
LUA_RH_SC (**0x60**) Session control

lua_rh.fi

Format indicator, one bit.

lua_rh.sdi

Sense data included indicator, one bit.

lua_rh.bci

Begin chain indicator, one bit.

lua_rh.eci

End chain indicator, one bit.

lua_rh.dr1i

Definite response 1 indicator, one bit.

lua_rh.dr2i

Definite response 2 indicator, one bit.

lua_rh.ri

Exception response indicator (for a request), or response type indicator (for a response), one bit.

lua_rh.qri

Queued response indicator, one bit.

lua_rh.pi

Pacing indicator, one bit.

lua_rh.bbi

Begin bracket indicator, one bit.

lua_rh.ebi

End bracket indicator, one bit.

lua_rh.cdi

Change direction indicator, one bit.

lua_rh.csi

Code selection indicator, one bit.

lua_rh.edi

Enciphered data indicator, one bit.

lua_rh.pdi

Padded data indicator, one bit.

lua_flag1

Supplied parameter. Contains a data structure containing flags for messages supplied by the application. This parameter is used by RUI_BID, RUI_READ, RUI_WRITE, SLI_BID, SLI_RECEIVE, and SLI_SEND. For other LUA verbs this parameter is not used and should be set to zero. Its subparameters are as follows:

lua_flag1.bid_enable

Bid enable indicator, one bit.

lua_flag1.close_abend

Close immediate indicator, one bit.

lua_flag1.nowait

No wait for data flag, one bit.

lua_flag1.sscp_exp

SSCP expedited flow, one bit.

lua_flag1.sscp_norm

SSCP normal flow, one bit.

lua_flag1.lu_exp

LU expedited flow, one bit.

lua_flag1.lu_norm

LU normal flow, one bit.

lua_message_type

Specifies the type of the inbound or outbound SNA commands and data. This is a returned parameter for RUI_INIT and SLI_OPEN and a supplied parameter for SLI_SEND. For other LUA verbs this variable is not used and should be set to zero.

Possible values are:

LUA_MESSAGE_TYPE_LU_DATA

LUA_MESSAGE_TYPE_SSCP_DATA

LUA_MESSAGE_TYPE_BID

LUA_MESSAGE_TYPE_BIND

LUA_MESSAGE_TYPE_BIS

LUA_MESSAGE_TYPE_CANCEL

LUA_MESSAGE_TYPE_CHASE

LUA_MESSAGE_TYPE_CLEAR

LUA_MESSAGE_TYPE_CRV

LUA_MESSAGE_TYPE_LUSTAT_LU

LUA_MESSAGE_TYPE_LUSTAT_SSCP

LUA_MESSAGE_TYPE_QC

LUA_MESSAGE_TYPE_QEC

LUA_MESSAGE_TYPE_RELQ

LUA_MESSAGE_TYPE_RQR

LUA_MESSAGE_TYPE_RTR

LUA_MESSAGE_TYPE_SBI

LUA_MESSAGE_TYPE_SHUTD

LUA_MESSAGE_TYPE_SIGNAL

LUA_MESSAGE_TYPE_SDT

LUA_MESSAGE_TYPE_STSN

LUA_MESSAGE_TYPE_UNBIND

The SLI receives and responds to the BIND, CRV, and STSN requests through the LUA interface extension routines.

LU_DATA, LUSTAT_LU, LUSTAT_SSCP, and SSCP_DATA are not SNA commands.

lua_flag2

Returned parameter. Contains flags for messages returned by LUA. This parameter is returned by RUI_BID, RUI_READ, RUI_WRITE, SLI_BID, SLI_RECEIVE, and SLI_SEND. For other LUA verbs this parameter is not used and should be set to zero. Its subparameters are as follows:

lua_flag2.bid_enable

Indicates that **RUI_BID** was successfully re-enabled if set to 1.

lua_flag2.async

Indicates that the LUA interface verb completed asynchronously if set to 1.

lua_flag2.sscp_exp

Indicates SSCP expedited flow if set to 1.

lua_flag2.sscp_norm

Indicates SSCP normal flow if set to 1.

lua_flag2.lu_exp

Indicates LU expedited flow if set to 1.

lua_flag2.lu_norm

Indicates LU normal flow if set to 1.

lua_resv56

This supplied parameter is a reserved field used by SLI_OPEN and RUI_INIT. For all other LUA verbs, this parameter is reserved and should be set to zero.

lua_encr_decr_option

This parameter is a field for cryptography options. On **RUI_INIT**, only the following are supported:

- **lua_encr_decr_option** = 0
- **lua_encr_decr_option** = 128

For all other LUA verbs, this parameter is reserved and should be set to zero.

Values for lua_message_type

The following table describes the possible values for **lua_message_type**.

Message type	SNA data	SLI_SEND	SLI_BID SLI_RECEIVE	RUI_BID RUI_READ
0xC8	BID	X	X	X
0x31	BIND		Extension*	X
0x70	BIS	X	X	X
0x83	CANCEL	X	X	X
0x84	CHASE	X	X	X
0xA1	CLEAR			X
0xD0	CRV			X
0x01	LU_DATA**	X	X	X
0x04	LUSTAT_LU**	X	X	X
0x14	LUSTAT_SSCP**	X	X	X
0x81	QC	X	X	X
0x80	QEC	X	X	X
0x82	RELQ	X	X	X
0xA3	RQR	X		X
0x02	RSP	X	X	
0x05	RTR	X	X	X
0x71	SBI	X	X	X
0xC0	SHUTD			X
0xC9	SIGNAL	X	X	X
0xA0	SDT			X
0x11	SSCP_DATA**	X	X	X
0xA2	STSN		Extension*	X
0x32	UNBIND			X

*The SLI receives and responds to the BIND, CRV, and STSN requests through the LUA interface extension routines.

**Not an SNA command.

Command-Specific Structure of LUA VCBs

The following union shows the specific data structure that is included for functions that use the **LUA_SPECIFIC** part of a verb control block. The only logical unit application (LUA) verbs that use this union are RUI_BID, SLI_BID, SLI_OPEN, and SLI_SEND.

```
union LUA_SPECIFIC {
    struct SLI_OPEN open;
    unsigned char lua_sequence_number[2];
    unsigned char lua_peek_data[12];
} LUA_SPECIFIC;
```

Members

open
The union member of **LUA_SPECIFIC** used by the **SLI_OPEN** verb.

lua_sequence_number
The union member of **LUA_SPECIFIC** used by the **SLI_SEND** verb. Returned parameter. Sequence number of the RU to the host. It contains the sequence number for either the first in the chain request unit or the only segment in the chain request unit. Note that this parameter is not byte-reversed.

lua_peek_data
The union member of **LUA_SPECIFIC** used by the **RUI_BID** and **SLI_BID** verbs. Returned parameter. Contains up to 12 bytes of the data waiting to be read. It is a preview (up to 12 bytes) of the request/response unit (RU) data waiting to be read. The **lua_data_length** parameter contains the exact length of the data peeked at.

The following topic describes command-specific parameters for **SLI_OPEN**.

This section contains:

- SLI_OPEN VCB Structure

SLI_OPEN VCB Structure

The following structure shows the **SLI_OPEN** fields of the **LUA SPECIFIC** union member for the SLI_OPEN verb.

```
struct SLI_OPEN {
    unsigned char lua_init_type;
    unsigned char lua_resv65;
    unsigned short lua_wait;
    struct LUA_EXT_ENTRY lua_open_extension[3];
    unsigned char lua_ending_delim;
} SLI_OPEN;
```

Members

lua_init_type

Type of session initiation, which determines how the LU-LU session is initialized by the Windows LUA interface. The following values are valid:

lua_init_type_sec_is

Secondary-initiated and sends the INITSELF command supplied in the OPEN data buffer.

lua_init_type_sec_log

Secondary-initiated with an unformatted LOGON message in the OPEN data buffer.

lua_init_type_prim

Primary-initiated and waits on the BIND command.

lua_init_type_prim_sscp

Primary-initiated with SSCP access.

lua_resv65

Reserved field.

lua_wait

Secondary retry wait time. Specifies how many seconds the Windows LUA interface is to wait before retransmitting the INITSELF or the LOGON message after receiving one of the following:

- A NOTIFY command (indicating a procedure error)
- A network services procedure error message
- A negative response with one of the following secondary return codes:

  RESOURCE_NOT_AVAILABLE
  SESSION_LIMIT_EXCEEDED
  SESSION_SERVICE_PATH_ERROR

lua_open_extension

Supplied parameter. Specifies any user-supplied dynamic-link libraries (DLLs) used to process specific LUA messages.

lua_ending_delim

Extension list delimiter.

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LUA Common Return Codes

This section describes the primary and, if applicable, secondary return codes that are common to the logical unit application (LUA) verbs. The return codes are listed in hexadecimal order.

Verb-specific return codes are described for the individual verbs in LUA RUI Verbs and LUA SLI Verbs.

This section contains:

- LUA Primary Return Codes
- LUA Secondary Return Codes

LUA Primary Return Codes

0x0000

LUA_OK
The verb executed successfully.

0x0001

LUA_PARAMETER_CHECK
The verb did not execute because of a parameter error.

0x0002

LUA_STATE_CHECK
The verb did not execute because it was issued in an invalid state.

0x000F

LUA_SESSION_FAILURE
A required Microsoft® Host Integration Server component (such as the local node) has terminated.

0x0014

LUA_UNSUCCESSFUL
The verb record supplied was valid, but the verb did not complete successfully.

0x0018

LUA_NEGATIVE_RESPONSE
Either the logical unit application (LUA) sent a negative response to a message received from the primary logical unit (PLU) because an error was found in the message, or the application responded negatively to a chain for which the end-of-chain has arrived.

0x0021

LUA_CANCELED
The secondary return code gives the reason for canceling the command.

0x0030

LUA_IN_PROGRESS
An asynchronous command was received but is not completed.

0x0040

LUA_STATUS
The secondary return code contains Session Level Interface (SLI) status information for the application.

0xF003

LUA_COMM_SUBSYSTEM_ABENDED
Indicates one of the following conditions:

- The node used by this conversation encountered an ABEND.
- The connection between the transaction program (TP) and the physical unit (PU) 2.1 node was broken (a LAN error).
- The SnaBase at the TP’s computer encountered an ABEND.

0xF004

LUA_COMM_SUBSYSTEM_NOT_LOADED
A required component could not be loaded or terminated while processing the verb. Thus, communication could not take place. Contact the system administrator for corrective action.

0xF008

LUA_INVALID_VERB_SEGMENT
The verb control block (VCB) extended beyond the end of the data segment.

0xF011

LUA_UNEXPECTED_DOS_ERROR

After issuing an operating system call, an unexpected operating system return code was received and is specified in the secondary return code.

0xF015

LUA_STACK_TOO_SMALL

The stack size of the application is too small to execute the verb. Increase the stack size of your application.

0xFFFF

LUA_INVALID_VERB

Either the verb code or the operation code, or both, is invalid. The verb did not execute.

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LUA Secondary Return Codes

0x00000000

LUA_SEC_RC_OK
No additional information exists for LUA_OK.

0x00000001

LUA_INVALID_LUNAME
An invalid **lua_luname** name was specified.

0x00000002

LUA_BAD_SESSION_ID
An invalid value for **lua_sid** was specified in the verb control block (VCB).

0x00000003

LUA_DATA_TRUNCATED
The data was truncated because the data received was longer than the buffer length specified in **lua_max_length**.

0x00000004

LUA_BAD_DATA_PTR
The **lua_data_ptr** parameter either does not contain a valid pointer or does not point to a read/write segment, and supplied data is required.

0x00000005

LUA_DATA_LENGTH_ERROR
One of the following occurred:

- The supplied data segment for **SLI_RECEIVE** or **SLI_SEND** is not a read/write data segment as required.
- The supplied data segment for **SLI_RECEIVE** is not as long as that provided in **lua_max_length**.
- The supplied data segment for **SLI_SEND** is not as long as that provided in **lua_data_length**.

0x00000006

LUA_RESERVED_FIELD_NOT_ZERO
A reserved parameter for the verb just issued is not set to zero.

0x00000007

LUA_INVALID_POST_HANDLE
For a Microsoft Windows Server™ 2003 or Windows® 2000 system using events as the asynchronous posting method, the Windows-based logical unit application (LUA) VCB does not contain a valid event handle.

0x0000000C

LUA_PURGED
SLI_PURGE was issued and canceled **SLI_RECEIVE**.

0x0000000F

LUA_BID_VERB_ERROR
The buffer with the **SLI_BID** VCB was released before the **SLI_RECEIVE** with **lua_flag1.bid_enable** set to 1 was issued.

0x00000010

LUA_NO_PREVIOUS_BID_ENABLED
SLI_BID was not issued prior to issuing **SLI_RECEIVE** with **bid_enable**.

0x00000011

LUA_NO_DATA
No data was available to read when **SLI_RECEIVE** containing a no-wait parameter was issued.

0x00000012

LUA_BID_ALREADY_ENABLED

SLI_RECEIVE was issued with **bid_enable** when **SLI_BID** was already active.

0x00000013

LUA_VERB_RECORD_SPANS_SEGMENTS
The LUA VCB length parameter plus the segment offset is beyond the segment end.

0x00000014

LUA_INVALID_FLOW
The **lua_flag1** flow flags were set incorrectly when a verb was issued as follows:

- When issuing **SLI_SEND** to send an SNA response, set only one **lua_flag1** flow flag.
- When issuing **SLI_RECEIVE**, set at least one **lua_flag1** flow flag.

0x00000015

LUA_NOT_ACTIVE
LUA was not active within Microsoft® Host Integration Server when an LUA verb was issued.

0x00000016

LUA_VERB_LENGTH_INVALID
An LUA verb was issued with the value of **lua_verb_length** unexpected by the LUA.

0x00000019

LUA_REQUIRED_FIELD_MISSING
The verb that was issued either did not include a data pointer (if the data count was not zero) or did not include an **lua_flag1** flow flag.

0x00000030

LUA_READY
Following a NOT_READY status, this status is issued to notify you that the Session Level Interface (SLI) is ready to process commands.

0x00000031

LUA_NOT_READY
One of the following caused the SLI session to be temporarily suspended:

- An SNA UNBIND type 0x02 command was received, indicating a new BIND is coming.

  If the UNBIND type 0x02 is received after the beginning **SLI_OPEN** is complete, the session is suspended until a BIND, optional CRV and STSN, and SDT flows are received. These routines are re-entrant because they must be called again. The session resumes after the SLI processes the SDT command. If the UNBIND type 0x02 is received while **SLI_OPEN** is still processing, the primary return code is session-failure, not status.

- The receipt of an SNA CLEAR caused the suspension.

  Receipt of an SNA SDT will cause the session to resume.

0x00000032

LUA_INIT_COMPLETE
The LUA interface initialized the session while **SLI_OPEN** was processing. LUA applications that issue **SLI_OPEN** with **lua_open_type_prim_sscp** receive this status on **SLI_RECEIVE** or **SLI_BID**.

0x00000033

LUA_SESSION_END_REQUESTED
The LUA interface received an SNA shutdown command (SHUTD) from the host, indicating the host is ready to shut down the session.

0x00000034

LUA_NO_SLI_SESSION
A session was not open or was down due to an **SLI_CLOSE** or session failure when a command was issued.

0x00000035

LUA_SESSION_ALREADY_OPEN
A session is already open for the logical unit (LU) name specified in **SLI_OPEN**.

0x00000036

LUA_INVALID_OPEN_INIT_TYPE
The value in the **lua_init_type** contained in **SLI_OPEN** is invalid.

0x00000037

LUA_INVALID_OPEN_DATA
The **lua_init_type** for the **SLI_OPEN** issued is set to LUA_INIT_TYPE_SEC_IS when the buffer for data does not have a valid INITSELF command.

0x00000038

LUA_UNEXPECTED_SNA_SEQUENCE
Unexpected data or commands were received from the host while **SLI_OPEN** was processing.

0x00000039

LUA_NEG_RSP_FROM_BIND_ROUTINE
The user-supplied SLI_BIND routine responded negatively to the BIND. **SLI_OPEN** ended unsuccessfully.

0x0000003B

LUA_NEG_RSP_FROM_STSN_ROUTINE
The user-supplied SLI STSN routine responded negatively to the STSN. **SLI_OPEN** ended unsuccessfully.

0x0000003E

LUA_INVALID_OPEN_ROUTINE_TYPE
The **lua_open_routine_type** for the **SLI_OPEN** list of extension routines is invalid.

0x0000003F

LUA_MAX_NUMBER_OF_SENDS
The application issued a third **SLI_SEND** before one completed.

0x00000040

LUA_SEND_ON_FLOW_PENDING
An **SLI_SEND** was still outstanding when the application issued another **SLI_SEND** for an SNA flow.

0x00000041

LUA_INVALID_MESSAGE_TYPE
The **lua_message_type** parameter is not recognized by the LUA interface.

0x00000042

LUA_RECEIVE_ON_FLOW_PENDING
An **SLI_RECEIVE** was still outstanding when this application issued another **SLI_RECEIVE** for an SNA flow.

0x00000043

LUA_DATA_LENGTH_ERROR
The application did not provide user-supplied data required by the verb issued. Note that when **SLI_SEND** is issued for an SNA LUSTAT command, status (in four bytes) is required, and that when **SLI_OPEN** is issued with secondary initialization, data is required.

0x00000044

LUA_CLOSE_PENDING
One of the following occurred:

- A CLOSE_ABEND was still pending when another CLOSE_ABEND was issued. You can issue a CLOSE_ABEND if a CLOSE_NORMAL is pending.
- Either a CLOSE_ABEND or a CLOSE_NORMAL was still pending when a CLOSE_NORMAL was issued.

0x00000046

LUA_NEGATIVE_RSP_CHASE

A negative response to an SNA CHASE command from the host was received by the LUA interface while **SLI_CLOSE** was being processed. **SLI_CLOSE** continued processing to stop the session.

0x00000047

LUA_NEGATIVE_RSP_SHUTC
A negative response to an SNA SHUTC command from the host was received by the SLI while **SLI_CLOSE** was still being processed. **SLI_CLOSE** continued processing to stop the session.

0x00000048

LUA_NEGATIVE_RSP_RSHUTD
A negative response to an SNA RSHUTD command from the host was received by the LUA interface while **SLI_CLOSE** was being processed. **SLI_CLOSE** continued processing to stop the session.

0x0000004A

LUA_NO_RECEIVE_TO_PURGE
No **SLI_RECEIVE** was outstanding when you issued **SLI_PURGE**. One of two situations caused the problem:

- **SLI_RECEIVE** completed before **SLI_PURGE** finished processing.

  You can change the application to take care of this problem because it is not an error condition.

- The **lua_data_ptr** parameter does not correctly point to the **SLI_RECEIVE** you want to purge.

0x0000004D

LUA_CANCEL_COMMAND_RECEIVED
The host sent an SNA CANCEL command to cancel the data chain currently being received by **SLI_RECEIVE**.

0x0000004E

LUA_RUI_WRITE_FAILURE
An unexpected error was posted to the SLI by **RUI_WRITE**.

0x00000051

LUA_SLI_BID_PENDING
An SLI verb was still active when another **SLI_BID** was issued. Only one **SLI_BID** can be active at a time.

0x00000052

LUA_SLI_PURGE_PENDING
An **SLI_PURGE** was still active when another **SLI_PURGE** was issued. Only one **SLI_PURGE** can be active at a time.

0x00000053

LUA_PROCEDURE_ERROR
A host procedure error is indicated by the receipt of an NSPE or NOTIFY message. The return code is posted to **SLI_OPEN** when the retry option is not used. To use the reset option, set **lua_wait** to a value other than zero. The LOGON or INITSELF command will be retried until the host is ready or until you issue **SLI_CLOSE**.

0x00000054

LUA_INVALID_SLI_ENCR_OPTION
The **lua_encr_decr_option** parameter was set to 128 in **SLI_OPEN**, which is not supported for the encryption/decryption processing option.

0x00000055

LUA_RECEIVED_UNBIND
The primary LU sent an SNA UNBIND command to the LUA interface when a session was active. As a result, the session was stopped.

0x0000007F

LUA_SLI_LOGIC_ERROR
The LUA interface found an internal error in logic.

0x00000080

LUA_TERMINATED

The session was terminated when a verb was pending. The verb process has been canceled.

0x00000081

LUA_NO_RUI_SESSION
No session has been initialized for the LUA verb issued, or some verb other than **SLI_OPEN** was issued before the session was initialized.

0x00000083

LUA_INVALID_PROCESS
The session for which a Request Unit Interface (RUI) verb was issued is unavailable because another process owns the session.

0x0000008C

LUA_LINK_NOT_STARTED
The LUA was not able to activate the data link during initialization of the session.

0x0000008D

LUA_INVALID_ADAPTER
The configuration for the data link control (DLC) is in error, or the configuration file is corrupted.

0x0000008E

LUA_ENCR_DECR_LOAD_ERROR
An unexpected return code was received from the OS/2 **DosLoadModule** function while attempting to load the user-provided encryption or decryption dynamic link module.

0x0000008F

LUA_ENCR_DECR_LOAD_ERROR
An unexpected return code was received from the OS/2 **DosGetProcAddr** function while attempting to get the procedure address within the user-provided encryption or decryption dynamic link module.

0x000000BE

LUA_NEG_NOTIFY_RSP
The system services control point (SSCP) responded negatively to a NOTIFY request issued indicating that the secondary LU was capable of a session. The half-session component that received the request understood and supported the request but could not execute it.

0x000000FF

LUA_LU_INOPERATIVE
A severe error occurred while the RUI was attempting to stop the session. This LU is unavailable for any LUA requests until an ACTLU is received from the host.

0x08010000

LUA_RESOURCE_NOT_AVAILABLE
The logical unit, physical unit, link, or link station specified in the request unit is unavailable. This return code is posted to **SLI_OPEN** when a resource is unavailable unless you use the retry option.

To use the retry option, set **lua_wait** to a value other than zero. The LOGON or INITSELF command will be retried until the host is ready or until you issue **SLI_CLOSE**.

0x08050000

LUA_SESSION_LIMIT_EXCEEDED
The session requested was not activated because a network addressable unit (NAU) is at its session limit.

This SNA sense code applies to the following requests: BID, CINIT, INIT, and ACTDRM. The code will be posted to **SLI_OPEN** when an NAU is at its limit, unless you use the retry option.

To use the retry option, set **lua_wait** to a value other than zero. The LOGON or INITSELF command will be retried until the host is ready or until you issue **SLI_CLOSE**.

0x08090000

LUA_MODE_INCONSISTENCY
Performing this function is not allowed by the current status. The request sent to the half-session component was not executed even though it was understood and supported. This SNA sense code is also an exception request sense code.

0x08120000

LUA_INSUFFICIENT_RESOURCES
A temporary condition of insufficient resources caused the request receiver to be unable to perform. The request sent to the half-session component was not executed, even though it was understood and supported.

0x081B0000

LUA_RECEIVER_IN_TRANSMIT_MODE
Either resources needed to handle normal flow data were not available or the state of the half-duplex contention was not received when a normal-flow request was received. The result is a race condition. This SNA sense code is also an exception request sense code.

0x08310000

LUA_LU_COMPONENT_DISCONNECTED
An LU component is unavailable because it is not connected properly. Make sure that the power is on.

0x08350001

LUA_NEGOTIABLE_BIND_ERROR
A negotiable BIND was received, which is only allowed by the SLI when a user-supplied SLI_BIND routine is provided with **SLI_OPEN**.

0x08350002

LUA_BIND_FM_PROFILE_ERROR
Only file management header profiles 3 and 4 are supported by the LUA interface. A file management profile other than 3 or 4 was found on the BIND.

0x08350003

LUA_BIND_TS_PROFILE_ERROR
Only Transmission Service (TS) profiles 3 and 4 are supported by the LUA interface. A TS profile other than 3 or 4 was found on the BIND.

0x0835000E

LUA_BIND_LU_TYPE_ERROR
Only LU 0, LU 1, LU 2, and LU 3 are supported by LUA. An LU other than 0, 1, 2, or 3 was found.

0x08570000

LUA_SSCP_LU_SESSION_NOT_ACTIVE
The required SSCP-LU is inactive. Specific sense code information is in bytes 2 and 3. Valid settings are 0x0000, 0x0001, 0x0002, 0x0003, and 0x0004.

0x08780001

LUA_RECEIVE_CORRELATION_TABLE_FULL
The session receive correlation table for the flow requested reached its capacity.

0x08780002

LUA_SEND_CORR_TABLE_FULL
The session send correlation table for the flow requested reached its capacity.

0x087D0000

LUA_SESSION_SERVICE_PATH_ERROR
A request for session services cannot be rerouted to an SSCP-SSCP session path. Specific sense code information in bytes 2 and 3 gives more information about why the request cannot be rerouted.

0x10020000

LUA_RU_LENGTH_ERROR
The request/response unit (RU) request was an incorrect length (either too short or too long). The RU was not interpreted or processed even though it was delivered to the half-session component. The half-session capabilities do not match. This SNA sense code is also an exception request sense code.

0x10030000

LUA_FUNCTION_NOT_SUPPORTED

The LUA does not support the requested function. A control character, an RU parameter, or a formatted request code may have specified the function. Specific sense code information is in bytes 2 and 3.

0x10050121

LUA_HDX_BRACKET_STATE_ERROR
The existing state error prevented the current request from being sent. The determination was made by a protocol computer.

0x10050122

LUA_RESPONSE_ALREADY_SENT
A response for the chain was already sent so that the current request was not sent. The determination was made by a protocol computer.

0x10050123

LUA_EXR_SENSE_INCORRECT
The application responded negatively to an exception request. The sense code was unacceptable.

0x10050124

LUA_RESPONSE_OUT_OF_ORDER
The current response was not for the oldest request. The determination was made by a protocol computer.

0x10050125

LUA_CHASE_RESPONSE_REQUIRED
A CHASE response was still outstanding when a more recent request was attempted. The determination was made by a protocol computer.

0x20020000

LUA_CHAINING_ERROR
The sequence of the chain indicator settings is in error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x20030000

LUA_BRACKET
The sender failed to enforce the session bracket rules. Note that contention and race conditions are exempt from this error. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x20040000

LUA_DIRECTION
While the half-duplex flip-flop state was NOT_RECEIVE, a request for normal flow was received. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x20050000

LUA_DATA_TRAFFIC_RESET
A half-session of an active session with inactive data traffic received a normal flow DFC or FMD request. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x20060000

LUA_DATA_TRAFFIC_QUIESCED
A data flow control (DFC) or function management data (FMD) request was received from a half-session that sent either a SHUTC command or QC command, and the DFC or FMD request has not responded to a RELQ command. An invalid request header or request unit for the receiver's current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x20070000

LUA_DATA_TRAFFIC_NOT_RESET
While the data traffic state was not reset, the session control request was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x20080000

LUA_NO_BEGIN_BRACKET
The receiver has already sent a positive response to a Bracket Initiation Stopped (BIS) command when a BID or an FMD request specifying BBI=BB was received. An invalid request header or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x20090000

LUA_SC_PROTOCOL_VIOLATION
A violation of the session control (SC) protocol occurred. A request (that is permitted only after an SC request and a positive response to that request have been successfully exchanged) was received before the required exchange. Byte 4 of the sense data contains the request code. No user data exists for this sense code. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x200A0000

LUA_IMMEDIATE_REQUEST_MODE_ERROR
The request violated the immediate request mode protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x200B0000

LUA_QUEUED_RESPONSE_ERROR
The request violated the queued response protocol. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x200C0000

LUA_ERP_SYNC_EVENT_ERROR
A violation of the ERP synchronous event protocol occurred. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x200D0000

LUA_RSP_BEFORE_SENDING_REQ
A previously received request has not yet been responded to and an attempt was made in half-duplex send/receive mode to send a normal flow request. An invalid header request or request unit for the received current session control or data flow control state was found. Delivery to the half-session component was prevented.

0x200E0000

LUA_RSP_CORRELATION_ERROR
A response was sent that does not correspond to a previously received request or a response was received that does not correspond to a request sent previously.

0x200F0000

LUA_RSP_PROTOCOL_ERROR
A violation of the response protocol was found in the response received from the primary half-session.

0x40010000

LUA_INVALID_SC_OR_NC_RH
The request/response header (RH) of a session control (SC) or network control (NC) request was invalid.

0x40030000

LUA_BB_NOT_ALLOWED
The begin bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40040000

LUA_EB_NOT_ALLOWED
The end bracket indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40060000

LUA_EXCEPTION_RSP_NOT_ALLOWED
When an exception response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40070000

LUA_DEFINITE_RSP_NOT_ALLOWED
When a definite response was not allowed, one was requested. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40080000

LUA_PACING_NOT_SUPPORTED
The request contained a pacing indicator when support of pacing for this session does not exist for the receiving half-session or boundary function half-session. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40090000

LUA_CD_NOT_ALLOWED
The change-direction indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x400A0000

LUA_NO_RESPONSE_NOT_ALLOWED
A request other than an EXR contained a NO RESPONSE. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x400B0000

LUA_CHAINING_NOT_SUPPORTED
The chaining indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x400C0000

LUA_BRACKETS_NOT_SUPPORTED
The bracket indicators were incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x400D0000

LUA_CD_NOT_SUPPORTED
The change-direction indicator was set, but LUA does not support change-direction for this situation. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x400F0000

LUA_INCORRECT_USE_OF_FI
The format indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40100000

LUA_ALTERNATE_CODE_NOT_SUPPORTED
The code selection indicator was set, but LUA does not support code selection for this session. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40110000

LUA_INCORRECT_RU_CATEGORY

The request unit category indicator was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40120000

LUA_INCORRECT_REQUEST_CODE

The request code was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40130000

LUA_INCORRECT_SPEC_OF_SDI_RTI

The sense-data-included indicator (SDI) and the response-type indicator (RTI) were not specified correctly on a response. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40140000

LUA_INCORRECT_DR1I_DR2I_ERI

The DR1I, the DR2I, and the exception response indicator (ERI) were specified incorrectly. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40150000

LUA_INCORRECT_USE_OF QRI

The queued response indicator (QRI) was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40160000

LUA_INCORRECT_USE_OF_EDI

The EDI was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x40170000

LUA_INCORRECT_USE_OF_PDI

The padded data indicator (PDI) was incorrectly specified. The BIND options chosen previously or the architectural rules were violated by the request header parameter values. Delivery to the half-session component was prevented. The errors are not dependent on the current session state. The sender's failure to enforce session rules may have caused the errors.

0x80030000

LUA_NAU_INOPERATIVE

The network addressable unit (NAU) is not able to process responses or requests. Delivery to the receiver could not take place for one of the following reasons:

- A path information unit error
- A path outage
- An invalid sequence of requests for activation

If a path error is received during an active session that usually means there is no longer a valid path to the session partner.

0x80050000

LUA_NO_SESSION

A request to activate a session is required because no active half-session in the receiving end node for the origination-destination pair exists, or no active boundary function half-session component for the origination-destination pair in a node that supplies the boundary function exists. Delivery of the request could not take place for one of the following reasons:

- A path information unit error
- A path outage
- An invalid sequence of requests for activation

If a path error is received during an active session that usually indicates there is no longer a valid path to the session partner.

3270 Emulator Programmer's Reference

This section contains reference material for the 3270 Emulator.

For general information about programming for the 3270 Emulator, see the 3270 Emulator Programmer's Guide section of the SDK.

This section contains:

- DL-BASE/DMOD Entry Points
- FMI Message Formats
- FMI Extension for the Windows Environment

DL-BASE/DMOD Entry Points

This section provides definitions for the entry points to the DL-BASE and the Dynamic Access Module (DMOD).

This section contains:

- CMDGoTSR
- CMDSemClear
- CMDSemRequest
- CMDSemSet
- CMDSemWait
- CMDStartFG
- CMDStopFG
- RegisterSwitchProc
- routproc
- sbpibegt
- sbpiberl
- sbpuinit
- sbpurcvx
- sbpusend
- sbputerm
- sepdbubl
- sepdburl
- sepdchnk
- sepdcrec
- sepdgetinfo
- sepdrout
- sepwrout

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CMDGoTSR

The **CMDGoTSR** function initiates a background thread for the emulator, and then executes an MS-DOS® terminate-and-stay-resident (TSR) interrupt.

MS-DOS

```
SHORT APIENTRY CMDGoTSR(
    ULONG entryPoint,
    UCHAR FAR *stack,
    UCHAR FAR *topOfRam
   );
```

Parameters

entryPoint
Pointer to the function where the background thread will start execution.
stack
Pointer to the stack of the background thread.
topOfRam
Top of RAM; all memory above this address will be released by the Network Access Program (NAP) for LAN Manager or the NAP for NetWare (LMBASE and NWBASE, respectively).

Remarks

An emulator should complete its initialization, and then execute this call to go resident. A thread of execution will be created at the entry point specified.

This call will never return control to the calling program.

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CMDSemClear

The **CMDSemClear** function clears a RAM semaphore.

MS-DOS

```
USHORT FAR CMDSemClear(
    ULONG FAR *ramSem
   );
```

Parameters

ramSem
Address of the semaphore.

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CMDSemRequest

The **CMDSemRequest** function requests a RAM semaphore.

```
USHORT FAR CMDSemRequest(
    ULONG FAR *ramSem,
    ULONG timeOut
   );
```

Parameters

ramSem
  Address of the semaphore.
timeOut
  Length of time in milliseconds to wait before returning.

Return Values

0
  OK.
ERROR_SEM_TIMEOUT
  Time-out expired before semaphore operation completed.
ERROR_SEM_OWNED
  This thread or another thread owns the semaphore, and the calling thread specified zero time-out.

CMDSemSet

The **CMDSemSet** function sets a RAM semaphore.

```
USHORT FAR CMDSemSet(
    ULONG FAR *ramSem
   );
```

Parameters

ramSem
Address of the semaphore.

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CMDSemWait

The **CMDSemWait** function waits until a RAM semaphore is cleared.

```
USHORT FAR CMDSemWait(
    ULONG FAR *ramSem,
    ULONG timeOut
   );
```

Parameters

ramSem
Address of the semaphore.
timeOut
Length of time in milliseconds to wait before returning.

Return Values

0
OK.
ERROR_SEM_TIMEOUT
Time-out expired before semaphore operation completed.
ERROR_SEM_OWNED
This thread or another thread owns the semaphore, and the calling thread specified zero time-out.

CMDStartFG

The **CMDStartFG** function requests that scheduling of the foreground thread be resumed.

```
USHORT FAR CMDStartFG();
```

Return Values

0
  The foreground thread was successfully resumed.
nonzero
  The foreground thread could not be resumed.

Remarks

The emulator should issue this call after restoring the screen contents when returning to background operation.

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CMDStopFG

The **CMDStopFG** function requests that the foreground thread be suspended.

```
USHORT FAR CMDStopFG(
    USHORT timeOut
   );
```

Parameters

timeOut
Maximum time to wait for the foreground thread to return before stopping it.

Return Values

0
The foreground thread was successfully stopped.
nonzero
The foreground thread was stopped within MS-DOS.

Remarks

The emulator should issue this call when it wishes to enter the foreground. If the return value is nonzero, the foreground thread has been stopped within MS-DOS and it is not safe for the emulator to come to the foreground. Under these circumstances, the emulator should restart the foreground thread by calling CMDStartFG.

If the call was successful, the emulator should save the contents of the screen before writing to it. When returning to background operation, the emulator must restore the screen and call **CMDStartFG** to allow the previous foreground application to continue.

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RegisterSwitchProc

The **RegisterSwitchProc** function registers an application procedure that will be called whenever the 3270 emulator is about to be switched in or out of memory by the MS-DOS version 5, MS-DOS version 6, or Windows 3.*x* task-switching code.

MS-DOS

```
USHORT FAR RegisterSwitchProc(
    ULONG switchProc
   );
```

Parameters

switchProc

A far pointer to the function where task activity will be notified. The function is defined as follows:

```
VOID FAR PASCAL SwitchProc(
    USHORT inOut
   );
```

Parameters

inOut

Zero if emulator is about to be switched out of memory, 1 if emulator is about to be switched back into memory.

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routproc

The **routproc** function is a sample routing procedure. It must be supplied as part of the application. It is called by the Dynamic Access Module (DMOD) with a message that may or may not be for this application The DMOD calls routing procedures in turn until one accepts the message.

```
DWORD routproc(
    BUFHDR *msgptr,
    USHORT locl,
    USHORT retstat
   );
```

Parameters

msgptr
Pointer to the message passed by the DMOD to the routing procedure.
locl
Locality from which message was received (if *retstat* indicates message returned), or locality to which path was lost (if *retstat* indicates path error).
retstat
Reason for call:

CEDINMSG (1)—message returned.

CEDINLLN (2)—path error (see Remarks below).

Return Values

TRUE
The routing procedure has accepted the message.
FALSE
The message is not for this routing procedure.

Remarks

The routing procedure should first call sbpurcvx, which handles any Open response messages, as follows:

sbpurcvx(&*msgptr*, *locl*, *retstat***)**

A return code of TRUE from **sbpurcvx** indicates that **sbpurcvx** has accepted the message; an Open error response has been received for this application, and resource location is continuing. The routing procedure should not process the message any further and should return **TRUE** to prevent the DMOD from calling further routing procedures.

A return code of **FALSE** from **sbpurcvx** indicates that the routing procedure should:

- If the message is for this application, take responsibility for the message and return **TRUE** to prevent the DMOD from calling further routing procedures.
- If the message is not for this application, return **FALSE** so that the DMOD tries further routing procedures.

If a path error is returned, *msgptr* will not point to a valid message, and no more function management interface (FMI) messages will be returned for the locality value indicated. The application is responsible for ending all sessions using this locality. The routing procedure must return **FALSE**. This ensures that the lost locality is reported to all other routing procedures.

If the message is for this application, the routing procedure can either process the message immediately or put the message on an application queue, and then post the application using a semaphore. For more information, see Receiving Messages.

sbpibegt

The application calls the **sbpibegt** function to get a buffer element to append to an existing buffer.

```
VOID sbpibegt(
    PTRBFELT *eltptr
   );
```

Parameters

eltptr
Pointer to a pointer to an element. On return, this points to a pointer to the element obtained, or to NULL if an element was not obtained (an internal error).

Remarks

This function should only be used to get extra elements for an existing buffer. The sepdbubl function should be used to get a new buffer.

The new element should be added to the chain of elements from the existing buffer header and the count of the number of elements updated.

This function is typically used when a received buffer is being reused to transmit a message that is longer than the incoming message.

sbpiberl

The application calls the **sbpiberl** function to release a buffer element from an existing buffer.

```
VOID sbpiberl(
    PTRBFELT *eltptr
   );
```

Parameters

eltptr
Pointer to a pointer to the element to be released.

Remarks

This function should only be used to release surplus elements from a buffer. The sepdburl function should be called to release the entire buffer.

The released element should first be removed from the element chain and the count of the number of elements updated.

This function is typically used when a received buffer is being reused to transmit a message that is shorter than the incoming message.

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sbpuinit

The **sbpuinit** function initializes the DL-BASE.

```
USHORT sbpuinit(
    HANDLE *sema4ptr,
    USHORT proctype,
    USHORT servtype,
    UCHAR *uname
   );
```

Parameters

sema4ptr
Semaphore, created by Dynamic Access Module (DMOD), cleared by DMOD when a message is available. For MS-DOS, the application should supply the address of a 4-byte (long) integer. This address is for internal use by Microsoft® Host Integration Server 2004—the application should not subsequently attempt to reference the address.
proctype
Type of process: CLIENT–2.
servtype
Type of service/client: CES3270–2.
uname
Pointer to a character buffer of length at least 21 characters; the LAN Manager user name, or other identifying name appropriate to the network operating system, is returned to the application in this buffer. The application does not need to use this parameter, but can use it for display or logging.

Return Values

NO_ERROR
Initialization successful.

Any other return value indicates that the initialization failed. This is usually an operating system return code. The following values are also used:

DMLTABF (555)
L table is full.
DMMNWGI (562)
Failed to get network operating system information.
DMDSTFL (563)
Service table is full.
DMMPIPF (567)
Failed to make a named pipe.
DMCOMNM (582)
No name registered for this application.
DMCOMDUP (596)
A service is already running with the same name.
DMNOTLOG (598)
User is not logged on to network operating system.
DMCFGOPN (616)
Failed to open configuration file.
DMCFGREAD (618)
Failed to read from configuration file.
DMNONAP (625)
The Network Access Program (NAP) is not started.
DMMAXAPP (953)
Windows only:
Maximum number of concurrent applications exceeded.

Remarks

The **sbpuinit** entry point should always be called before any other DL-BASE or DMOD entry points except SNAGetVersion. For new emulators, sepdcrec should be called after **sbpuinit**. (Because of the order of calls used in older emulators, a call to **sepdcrec** before **sbpuinit** is still supported, but this order is not recommended.)

sbpurcvx

The **sbpurcvx** function processes Open responses from a routing procedure. An application can define a routing procedure that is called by the Dynamic Access Module (DMOD) when a message is received. This routing procedure should first call **sbpurcvx** to handle any Open response messages received. This ensures that Open responses intended for the Resource Locator are handled correctly.

```
USHORT sbpurcvx(
    BUFHDR * *msgptr,
    INTEGER locl,
    INTEGER retstat
   );
```

Parameters

msgptr
Pointer to the message returned by the DMOD to the routing procedure.

locl
Locality from which message was received (if *retstat* indicates message returned), or locality to which path was lost (if *retstat* indicates path error).

retstat
Reason for call:

CEDINMSG (1—message returned.

CEDINLLN (2)—path error.

Return Values

TRUE
The Resource Locator has accepted the message; the application should not process it any further.

FALSE
The message should be processed by the application.

Remarks

This function is called by a routing procedure that is called by the DMOD. It is not called directly by the application.

The parameters for **sbpurcvx** should be taken from the parameters for routproc. Note, however, that the first parameter to **sbpurcvx** is a pointer to a pointer to a buffer header (that is, a pointer to the corresponding parameter for the routing procedure, not the parameter itself).

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sbpusend

The **sbpusend** function sends a message from an application to a partner on an LPI connection.

```
VOID sbpusend(
    PTRBFHDR msgptr
   );
```

Parameters

msgptr
Pointer to the message to be sent.

Remarks

The message buffer is released after transmission by the Dynamic Access Module (DMOD). It cannot be accessed by the application again.

For an Open request message, the **destl** parameter can be zero. In this case, the Resource Locator will attempt to find a suitable destination for the Open message.

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sbputerm

The **sbputerm** function must be called when the application terminates. It frees the DL-BASE and Dynamic Access Module (DMOD) resources used by the application.

For Win32®, do not call **sbputerm** from an entry point in a detached DLL process because it may cause a deadlock inside the SNADMOD.DLL.

```
VOID sbputerm(void);
```

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sepdbubl

The application calls the **sepdbubl** function to get a buffer with a requested number of elements.

```
PTRBFHDR sepdbubl(
    USHORT noelts
   );
```

Parameters

noelts
Number of elements required.

Return Values

A pointer to the buffer obtained. NULL if a buffer could not be obtained.

Remarks

Each element has a size of 268—the constant SNANBEDA in the header file FMI.H.

The returned buffer consists of a header and the required number of elements. The header points to the first element, which points to the next element, and so on to make an element chain.

It is possible to add an element to an existing buffer by calling sbpibegt to get the extra element. The new element should be added to the element chain of the buffer, and the "number of elements" count should be updated.

The application must release any buffers that are not transmitted.

sepdburl

The application calls the **sepdburl** function to release a buffer.

```
VOID sepdburl(
    PTRBFHDR msgptr
   );
```

Parameters

msgptr
Pointer to the buffer to be released.

Remarks

It is important that buffers are released after use. This is done automatically when a message is transmitted. For messages received, it is the responsibility of the application to either release or reuse the buffer.

This function releases both the buffer header and any associated buffer elements. It is possible to release single elements from a buffer by using the function sbpiberl.

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sepdchnk

The **sepdchnk** function gets the function management interface (FMI) chunk size. The application calls this function to obtain the chunk size that should be used on the FMI. For more information on FMI chunking, see Pacing and Chunking.

```
VOID sepdchnk(
    USHORT *pipesizeptr,
    USHORT *chunksizeptr
   );
```

Parameters

pipesizeptr
Size in bytes of the pipe between the application and the local node.
chunksizeptr
Dynamic Access Module (DMOD) chunk size in bytes.

Remarks

The application does not need to use the pipe size returned by this call. (It is included on this call because the local node uses the same call to obtain both the pipe size and the chunk size.)

sepdcrec

The **sepdcrec** function gets configuration information. The application calls this function to obtain the 3270 configuration information for the name with which the user logged on to the network operating system. The call also registers this user name in the service table.

```
USHORT sepdcrec(
    UCHAR *pBuffer,
    USHORT length,
    USHORT *numbytes
   );
```

Parameters

pBuffer
Pointer to a buffer supplied by the application, in which configuration information is returned.
length
Size of the supplied buffer.
numbytes
Used by Microsoft® Host Integration Server 2004 to return the number of bytes of information returned in the buffer.

Return Values

NO_ERROR (0)
OK.
NOCSSRVR (1)
No configuration file server available.
NODGNREC (2)
No diagnostics record found in configuration file.
NOUSRREC (3)
No user record found in configuration file for this user.
BUF2SMAL (4)
Supplied buffer was too small.
NONOS (5)
Network operating system is not started.
NOTLOGON (6)
User is not logged on to the network operating system.
READERR (7)
Failed to read from configuration file.
NONAP (8)
The Network Access Program (NAP) is not started.
MAXAPP (9)
Windows only:
Maximum number of concurrent applications exceeded.
ERROR_SERVER (14)
Error on the server end of the remote procedure call (RPC).
ERROR_LOCAL_FAILURE (15)
Error on the local end of the RPC.

Remarks

The sbpuinit function should always be called before any other DL-BASE or Dynamic Access Module (DMOD) entry points except SNAGetVersion. For new emulators, **sepdcrec** should be called after **sbpuinit**. (Because of the order of calls used in older emulators, a call to **sepdcrec** before **sbpuinit** is still supported, but this order is not recommended.)

On successful return, the buffer contains pointers to the appropriate 3270 user record and the diagnostics record, followed by the records themselves. It is formatted as follows:

```
    TECWRKUS *pUserRecord,
    TEDIAGNS *pDiagRecord
   );
```

(UserRecord—variable length)

(DiagRecord)

The two records should be accessed using the supplied pointers.

See Configuration Information for details of the format of these records and of how the application uses the configuration file information.

If there is no 3270 user record for this user in the configuration file, or if no diagnostics record is found in the configuration file (an internal error), the application should terminate and not allow the user to use 3270 emulation. The Host Integration Server 2004 error log messages COM0438 and COM0437 can be used to report these failures.

If the supplied buffer is too small for the returned information, the contents of the buffer are undefined and should not be examined, but the *numbytes* parameter will contain the total number of bytes of information available (that is, the size of the two pointers plus the two configuration records). The application should retry with a buffer of at least this size.

sepdgetinfo

The **sepdgetinfo** function returns a structure containing the version number of Microsoft® Host Integration Server 2004, the path of the current configuration file, and the network operating system over which Host Integration Server 2004 is running.

```
USHORT sepdgetinfo(
    struct cs_info *pCSInfo
   );
```

Parameters

pCSInfo
Pointer to a buffer supplied by the application, containing a **cs_info** data structure in which system information is returned. The application must set the **length** member in this data structure (for more information, see Remarks later in this topic); the other members should be set to nulls or blanks.

The cs_info structure

The returned **cs_info** structure and its members are as follows:

```
struct cs_info {
    unsigned short length;
    unsigned char  major_ver;
    unsigned char  minor_ver;
    unsigned char  config_share[80];
    unsigned short nos;
 } cs_info;
```

Members

length
Length of the data structure supplied by the application.
major_ver
Major version number:

1 for Host Integration Server 1.1 (Connection Server 1.1)
2 for Host Integration Server 2.0 (Connection Server 2.0)

minor_ver
Minor version number (decimal):

10 for Connection Server 1.1 (indicates 1.10)
00 for Connection Server 2.0 (indicates 2.00)

config_share[80]
Path of the running configuration file：\\server\share\ (null terminated).
nos
Network operating system in use

1: LAN Manager / LAN Server
2: NetWare

Return Values

NO_ERROR (0)
OK.
NOCSSRVR (1)
No configuration file server available.
BADLNGTH (2)
Supplied buffer was too small.

Remarks

The application must set the **length** member to the length of the **cs_info** structure (86 bytes in the current version). Any other value will be rejected. This parameter is used to ensure compatibility with future versions; an application supplying this length will always obtain the information shown here, but in future versions it may be possible to specify larger values and obtain further information.

On successful return, the data structure **cs_info** contains the version number of Host Integration Server 2004, the path of the current configuration file, and the network operating system over which Host Integration Server 2004 is running.

Do not use the configuration file path returned by **sepdgetinfo** because NetWare clients will not be able to access this path.

If there is no configuration file server available, only the version number fields are valid; the other fields should not be checked.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

sepdrout

The **sepdrout** function for Win32® allows an application to perform its own routing of received messages by setting up a procedure that is called by the Dynamic Access Module (DMOD) when a message is received.

```
‹DWORD sepdrout(
DWORD ( *proc_addr,)
(BUFHDR *, USHORT, USHORT
);
 ›
DWORD sepdrout(
    DWORD *proc_addr,
    (BUFHDR *, USHORT, USHORT
   );
```

Parameters

proc_addr
The routing procedure.

Return Values

NO_ERROR (0)
Successful.
Anything else
Unsuccessful.

Remarks

This facility is only available to clients, as defined in the call to sbpuinit.

An application can have up to four routing procedures. Note that the Advanced Program-to-Program Communications (APPC) and Common Service Verb (CSV) libraries each use a routing procedure. When the DMOD receives a message, each routing procedure is called, until one accepts the message.

For an example of a routing procedure, see routproc.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

sepwrout

The **sepwrout** function is the Windows version of sepdrout. It has the same parameters and is used in exactly the same way.

FMI Message Formats

This section describes the message formats for the function management interface (FMI). The message formats are presented in a language-independent notation. Details of the message format notation and key assumptions about the contents of the message formats are as follows:

- Reserved indicates that the field is set to zero (for a numeric field) or all nulls (for names) by the sender of the message.
- Undefined indicates that the value of the field is indeterminate. The field is not set by the sender and should not be examined by the receiver of the message.
- Fields that occupy two bytes, such as **opresid** in the Open(PLU) Request, are represented with the most arithmetically significant byte in the lowest byte address, irrespective of the normal orientation used by the processor on which the software executes. That is, the 2-byte value 0x1234 has the byte 0x12 in the lowest byte address. However, the following fields are exceptions:
  - The **srci** and **desti** fields in buffer headers are stored in the local format of the application that assigns them, because only the assigning application needs to interpret these values.
  - The **startd** and **endd** fields in elements are always stored in low-byte, high-byte orientation (the normal orientation of an Intel processor).
- Messages are composed of buffers consisting of a buffer header and zero or more buffer elements. For more information about buffer formats, see Messages.
- Applications must assign unique index (I) values for every active LPI connection within the node. In particular, the Open(SSCP) Request must be different from the source index it sends in response to the Open(PLU). Additionally, zero should not be used as an I value. An I value of zero means that the sender of the message is inviting the recipient of the message to assign an I value.
- The **startd** field in each element gives the offset of the first byte of data in the element after the **trpad** field.

  For non-logical unit application (LUA) applications, **startd** will either be 1 (data starts in the byte after the **trpad** field), 10 (nine bytes of padding are included between the **trpad** field and the start of the data), or 13 (12 bytes of padding are included between the **trpad** field and the start of the data).

  For LUA applications, **startd** is 4 (three bytes of padding between the **trpad** field and the start of the data) in the first element of a message and 13 (12 bytes of padding) in subsequent elements.

  The local node uses extra bytes for additional header information. This avoids having to copy data into a new buffer when adding this information.

- Because **startd** indicates the index into **dataru** starting from 1, not 0, the first byte of valid data is always at **dataru[startd–1]**.
- If **startd** is greater than **endd**, there is no valid data in the message.
- All fields within **dataru** are of type **CHAR**, except where the remarks indicate otherwise.
- Note that where a buffer element has a **startd** of 1, 10, or 13, this only applies to the initial element in the chain of elements, and subsequent elements in the chain have a **startd** of 1. Messages with two distinct linked element chains in the message formats (for example Open(PLU) Request and Open(PLU) OK Response) have the **startd** field in the elements at the start of the chains as the value (1, 10, or 13) given in the message format, and the **startd** fields in all other elements as 1.

This section contains:

- Open(SSCP)
- Open(SSCP) Request
- Open(SSCP) Response
- Open(PLU)
- Open(PLU) Request
- Open(PLU) OK Response
- Open(PLU) Error Response
- Open(PLU) OK Confirm
- Open(PLU) Error Confirm
- Close(SSCP)
- Close(SSCP) Request
- Close(SSCP) Response

- Close(PLU)
- Close(PLU) Request
- Close(PLU) Response
- Data
- Status-Acknowledge
- Status-Acknowledge(Ack)
- Status-Acknowledge(Nack-1)
- Status-Acknowledge(Nack-2)
- Status-Acknowledge(ACKLUA)
- Status-Control
- Status-Control(...) Request
- Status-Control(...) Acknowledge
- Status-Control(...) Negative-Acknowledge-1
- Status-Control(...) Negative-Acknowledge-2
- Status-Control(...) ACKLUA
- Status-Error
- Status-Resource
- Status-RTM
- Status-Session

Open(SSCP)

The **Open(SSCP)** message is used by the application to open the system services control point (SSCP) connection. The Open request is sent by the application to the node, and the Open response comes from the node to the application.

See Also

Open(SSCP) Request

The **Open(SSCP) Request** message flows from the application to the node. It is used with a system services control point (SSCP) connection.

```
struct Open(SSCP) Request {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdrept;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      ophdr.openqual;
    CHAR      ophdr.opentype;
    CHAR      ophdr.appltype;
    CHAR      ophdr.opluno;
    INTEGER   ophdr.opresid;
    INTEGER   ophdr.icreditr;
    INTEGER   ophdr.icredits;
    CHAR      ophdr.opninfo1;
    CHAR      ophdr.opnpad1;
};
```

Element 1

```
struct Open(SSCP) Request {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Element 2

```
struct Open(SSCP) Request {
    PTRBFELT  hdreptr->elteptr->elteptr;
    INTEGER   hdreptr->elteptr->startd;
    INTEGER   hdreptr->elteptr->endd;
    CHAR      hdreptr->elteptr->trpad;
    CHAR[268] hdreptr->elteptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdrept
Pointer to first buffer element.

numelts
Number of buffer elements (0x02).

msgtype
Message type OPENMSG (0x01).

srcl
Source locality.

srcp
Source partner. (For more information, see Remarks.)

srci

Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
ophdr.openqual
Open qualifier REQU (0x01).
ophdr.opentype
Open type SSCPSEC (0x01).
ophdr.appltype
Application program interface type.

Function management interface (FMI) without chunking (0x02).

FMI with chunking (0x82). (For more information, see Remarks.)

ophdr.opluno
Logical Unit number. (For more information, see Remarks.)
ophdr.opresid
Resource identifier.
ophdr.icreditr
Reserved.
ophdr.icredits
Reserved.
ophdr.opninfo1
Reserved.
ophdr.opnpad1
Open force type. (For more information, see Remarks.)

OPEN_TEST (0x00)

OPEN_FORCE (0x01)

Element 1

hdreptr–>elteptr
Pointer to next buffer element.
hdreptr–>startd
Start of data in this buffer element (1).
hdreptr–>endd
End of data in this buffer element.
hdreptr–>trpad
Reserved (1 byte).
hdreptr–>dataru
Data request/response unit (RU), as follows:

dataru[0–9]

Source name. Should be filled with blanks.

dataru[10–19]

Destination name. Set to the logical unit (LU) with which you want to communicate.

dataru[20]

Sense 4003 flag.

dataru[21]

Sense 4004 flag.

dataru[22]

Sense 4006 flag.

dataru[23]

Sense 4007 flag.

dataru[24]

Sense 4009 flag.

dataru[25]

Sense 400A flag.

dataru[26]

Sense 400B flag.

dataru[27]

Sense 400C flag.

dataru[28]

Sense 400D flag.

dataru[29]

Sense 400F flag.

dataru[30]

Sense 4011 flag.

dataru[31]

Sense 4012 flag.

dataru[32]

Sense 4014 flag.

dataru[33]

High priority indicator.

HIGH (0x01)

LOW (0x02)

dataru[34]

Logical unit application (LUA) supported indicator.

Supported (0x01)

Not supported (0x00)

dataru[35–36]

Chunk size obtained from Dynamic Access Module (DMOD). (For more information, see Remarks.)

dataru[37]

Segment delivery option.

Do not deliver request/response unit (RU) segments (0x00)

Deliver RU segments (0x01)

dataru[38]

High-level language application programming interface (HLLAPI) session identifier. (For more information, see Remarks.)

Element 2

hdreptr–>elteptr–>elteptr
Pointer to next buffer element (NIL).
hdreptr–>elteptr–>startd
Start of data in this buffer element (1).
hdreptr–>elteptr–>endd

End of data in this buffer element.

hdreptr–>elteptr–>trpad

Reserved.

hdreptr–>elteptr–>dataru

Data RU, as follows:

dataru[0]

ASCII string identifying the 3270 emulator. (For more information, see Remarks.)

Remarks

- The **Open(SSCP) Request** message consists of a buffer header and two buffer elements.
- The source L value, the destination Locality Partner Index (LPI) values, and the source name are reserved.
- For a 3270 emulator, the source P value must be set to S3PROD (0x12), which identifies the application as a 3270 emulator. The destination name should be set to the LU name or pool name taken from the 3270 user record (right-filled with ASCII spaces if fewer than 10 characters).
- An LUA application uses the source P value LUAPROD (0x1D). This is independent of the value of the LUA supported indicator, which selects the LUA variant of the FMI.
- The SNS4003 to SNS4014 fields, together with the high priority indicator, are referred to in the text as the SSCP connection information control block (CICB). (For more information, see Opening the SSCP Connection.) A value of 0x00 indicates that the data flow control (DFC) receive check corresponding to the sense code is not supported for this LU. A value of 0x01 indicates that it is supported. Note that the corresponding send checks are always performed regardless of these values.
- The LU number is only used internally in the local node on the **Open(SSCP) Request**. It is generated from the destination name in the first element.
- The open force type field is used when locating resources across more than one server and for automatic activation of connections when the application wishes to use an LU for which the connection is inactive. The application does not need to set this flag. It is used by the DL-BASE. For details, see Opening the SSCP Connection.
- The application program interface type field defines whether RU chunking is used from the local node to the application. This may be necessary if large RUs are being used. For more information about FMI chunking, see Pacing and Chunking.
- The chunk size field (at **dataru[35]**) is an integer value.
- The segment delivery option specifies whether the local node should deliver segments of RUs to the application as soon as they are received or should assemble whole RUs before delivering them to the application. Segment delivery allows the application to update the user's screen as soon as data is received, known as window shading, which can result in a faster perceived response. For more information, see Segment Delivery. This option is required only when chunking is being used. It is included on this message so that the local node can calculate the initial chunk credit values on the corresponding primary logical unit (PLU) connection. The option must still be set on the **Open(PLU) Response**. The setting specified on that message will override the one specified here if there is a conflict. If this happens, the initial credit values may not be suitable.
- The LUA supported indicator specifies whether the application uses the LUA variant of the FMI.
- If the element is shorter than (s+34) bytes, Microsoft® Host Integration Server assumes no LUA and no chunking. This ensures backward compatibility with previous versions of the local node software in which these options were not available.
- The HLLAPI session identifier is a single ASCII character that identifies the 3270 display session to which the **Open(SSCP)** applies. HLLAPI uses this to identify a particular 3270 presentation space to which an HLLAPI function refers. It is also referred to by 3270 as the session's short name, or by HLLAPI as the presentation space identifier (PS identifier). If the 3270 emulator does not support session identifiers, this field should be set to zero.
- The second element contains an ASCII string that you can use to identify the type of 3270 emulator. This string will be logged in the audit log file by the client's DL-BASE and can also be seen in traces. The **startd** and **endd** fields must be set up to define the limits of this string.

Open(SSCP) Response

The **Open(SSCP) Response** message flows from the node to the application. It is used with an system services control point (SSCP) connection.

```
struct Open(SSCP) Response {
    PTRBFHDR  nxtqptr;
    PTRBFELT hdreptr;
    CHAR     numelts;
    CHAR     msgtype;
    CHAR     srcl;
    CHAR     srcp;
    INTEGER  srci;
    CHAR     destl;
    CHAR     destp;
    INTEGER  desti;
    CHAR     ophdr.openqual;
    CHAR     ophdr.opentype;
    CHAR     ophdr.appltype;
    CHAR     ophdr.opluno;
    INTEGER  ophdr.opresid;
    INTEGER  ophdr.operr1;
    INTEGER  ophdr.operr2;
};
```

Element 1

```
struct Open(SSCP) Response {
    PTRBFELT  hdreptr->elteptr;
    INTEGER   hdreptr->startd;
    INTEGER   hdreptr->endd;
    CHAR      hdreptr->trpad;
    CHAR[256] dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to first buffer element.
numelts
Number of buffer elements (0x01).
msgtype
Message type OPENMSG (0x01).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
ophdr.openqual
Open qualifier.

RSPOK (0x02)
RSPERR (0x03)

ophdr.opentype
Open type SSCPSEC (0x01).
ophdr.appltype
Application program interface type.

0x02 (function management interface (FMI) application)

ophdr.opluno
Logical unit number.
ophdr.opresid
Resource identifier.
ophdr.operr1
Error code 1.
ophdr.operr2
Error code 2.

Element 1

hdreptr–>elteptr
Pointer to buffer element (NIL).
hdreptr–>startd
Start of data in this buffer element (1).
hdreptr–>endd
End of data in this buffer element.
hdreptr–>trpad
Reserved (1 byte).
hdreptr–>dataru
Data RU, as follows:

dataru[0–9]

Source name.

dataru[10–19]

Destination name.

dataru[20–27]

Name of the local node that accepted the Open.

dataru[28–35]

Name of the connection used by the logical unit (LU).

dataru[36–37]

The internal identifier of the local node for the connection. (For more information, see Remarks.)

dataru[38]

The type of link service used by the connection, as shown in the following table.

Link service	Connection
CESLINK	(03) - SDLC
CESX25	(04) - X.25
CESTR	(11) - Token Ring
CESTCPIP	(30) - TCP/IP
CESRELAY	(31) - Frame Relay
CESCHANL	(32) - Channel
CESISDN	(33) – ISDN
CESETHER	(34) - Ethernet 802.2

Remarks

- The **Open(SSCP) Response** message consists of a buffer header and a single buffer element.
- If the open qualifier is RSPERR, the error code is valid and the Locality Partner Index (LPIs) and names are undefined. (For more information, see Error and Sense Codes.)

- The LU number indicates the LU selected by the local node from the configuration data. (For more information, see Opening the SSCP Connection.)
- When the **Open(SSCP)** is for an LU group, the source name contains the name of the selected LU.
- The connection identifier is an integer value. It uniquely identifies a particular connection on this local node. All sessions using the same connection will return the same identifier. This value is typically used when a link error is received on one session to determine which other sessions will be affected.

Open(PLU)

The **Open(PLU)** message is used by the local node to open the primary logical unit (PLU) connection with the application on receipt of a **BIND** command from the host.

Open(PLU) Request

The **Open(PLU) Request** message flows from the node to the application. It is used with a primary logical unit (PLU) connection.

```
struct Open(PLU) Request {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      ophdr.openqual;
    CHAR      ophdr.opentype;
    CHAR      ophdr.appltype;
    CHAR      ophdr.opluno;
    INTEGER   ophdr.opresid;
    INTEGER   ophdr.icreditr;
    INTEGER   ophdr.icredits;
    CHAR      ophdr.opninfo1;
};
```

Element 1

```
struct Open(PLU) Request {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Element 2

```
struct Open(PLU) Request {
    PTRBFELT  hdreptr->elteptr->elteptr;
    INTEGER   hdreptr->elteptr->startd;
    INTEGER   hdreptr->elteptr->endd;
    CHAR      hdreptr->elteptr->trpad;
    CHAR[ ]   hdreptr->elteptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to first buffer element.

numelts
Number of buffer elements (0x02).

msgtype
Message type OPENMSG (0x01).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl

Destination locality.

destp

Destination partner.

desti

Destination index.

ophdr.openqual

Open qualifier REQU (0x01).

ophdr.opentype

Open type LUSEC (0x02).

ophdr.appltype

Application program interface type.

0x02 (FMI application)

ophdr.opluno

Logical unit number.

ophdr.opresid

Resource identifier.

ophdr.icreditr

Initial credit for flow from application to local node: zero (no flow control).

ophdr.icredits

Recommended initial credit for flow from local node to application:
Pacing window + 1.

ophdr.opninfo1

Negotiable bind indicator.

Bind is not negotiable (0x00)

Bind is negotiable (0x01)

Element 1

hdreptr–>elteptr

Pointer to buffer element.

hdreptr–>startd

Start of data in this buffer element (1).

hdreptr–>endd

End of data in this buffer element.

hdreptr–>trpad

Reserved.

hdreptr–>dataru

Data RU, as follows:

dataru[0–9]

Source name.

dataru[10–19]

Destination name.

dataru[20]

Secondary pacing send window.

dataru[21]

Secondary pacing receive window.

dataru[22–23]

Secondary send maximum request/response unit (RU) size. (For more information, see Remarks.)

dataru[24–25]

Primary send maximum RU size. (For more information, see Remarks.)

dataru[26]

Secondary send chunk size (in units of elements).

dataru[27]

Primary send chunk size (in units of elements).

Element 2

hdreptr–>elteptr–>elteptr
Pointer to buffer element (NIL).
hdreptr–>elteptr–>startd
Start of data in this buffer element (13).
hdreptr–>elteptr–>endd
End of data in this buffer element.
hdreptr–>elteptr–>trpad
Reserved.
hdreptr–>elteptr–>dataru
Data RU, as follows:

dataru[13]

The **BIND** RU received from the host.

Remarks

- The **Open(PLU) Request** message consists of a buffer header, an initial element containing the source and destination names, RU sizes, and so on, followed by a second element containing the **BIND** RU received from the host.
- The source Locality Partner Index (LPI) and the L and P parts of the destination LPI are valid, but the I part of the destination LPI is reserved.
- The two send maximum RU size fields (in **dataru[22–25]**) are both integer values.
- The **BIND** RU can be up to 256 bytes in length.
- If the application is using the logical unit application (LUA) variant of the function management interface (FMI), the **BIND** RU is preceded by its transmission header (TH) and response header (RH). The **startd** field of the second element points to the TH. (For more information about FMI, see FMI Concepts.)
- The LU number matches that allocated to the named application on the Open(SSCP) Response.
- The resource identifier matches the value used by the application on the Open(SSCP) Request.
- If chunking was specified on the **Open(SSCP) Request**, the **icredits** (initial credit from local node to application) field specifies the number of chunks, rather than RUs, that can be transmitted. The two send chunk size parameters are specified in units of elements. (Each element contains up to 256 bytes of RU data.) A value of zero indicates that the chunk size is not the limiting factor in determining the size of messages. The limiting factor is the RU size or the segment size, so chunking is not required. In this case, credit will still be used, with the unit of credit being a message.
- The **icreditr** (initial credit from application to local node) field is not used and must be set to zero.

Open(PLU) OK Response

The **Open(PLU) OK Response** message flows from the application to the node. It is used with a primary logical unit (PLU) connection.

```
struct Open(PLU) OK Response {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      ophdr.openqual;
    CHAR      ophdr.opentype;
    CHAR      ophdr.appltype;
    CHAR      ophdr.opluno;
    INTEGER   ophdr.opresid;
    INTEGER   ophdr.icreditr;
    INTEGER   ophdr.icredits;
    CHAR      ophdr.opninfo1;
};
```

Element 1

```
struct Open(PLU) OK Response {
    PTRBFELT hdreptr->elteptr;
    INTEGER hdreptr->startd;
    INTEGER hdreptr->endd;
    CHAR hdreptr->trpad;
    CHAR[268] hdreptr->dataru;
};
```

Element 2

```
struct Open(PLU) OK Response {
    PTRBFELT   hdreptr->elteptr->elteptr;
    INTEGER    hdreptr->elteptr->startd;
    INTEGER    hdreptr->elteptr->endd;
    CHAR       hdreptr->elteptr->trpad;
    CHAR[268]  hdreptr->elteptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to first buffer element.
numelts
Number of buffer elements (0x02).
msgtype
Message type OPENMSG (0x01).
srcl
Source locality.
srcp
Source partner.
srci
Source index.

destl
Destination locality.
destp
Destination partner.
desti
Destination index.
ophdr.openqual
Open qualifier RSPOK (0x02).
ophdr.opentype
Open type LUSEC (0x02).
ophdr.appltype
Application program interface type.

0x02 (FMI application)

ophdr.opluno
Logical unit number.
ophdr.opresid
Resource identifier.
ophdr.icreditr
Initial credit for flow from application to local node: zero.
ophdr.icredits
Initial credit for flow from local node to application; only valid if APPLPAC = 0x01.
ophdr.opninfo1
Negotiable bind indicator.

Bind is not negotiable (0x00)

Bind is negotiable (0x01)

Element 1

hdreptr–>elteptr
Pointer to buffer element.
hdreptr–>startd
Start of data in this buffer element (1).
hdreptr–>endd
End of data in this buffer element.
hdreptr–>trpad
Reserved.
hdreptr–>dataru
Data RU, as follows:

dataru[0–9]

Source name.

dataru[10–19]

Destination name.

dataru[20]

Segment delivery option.

Do not deliver request/response unit (RU) segments (0x00)

Deliver RU segments (0x01)

dataru[21]

Application pacing option.

No application pacing (0x00)

Application pacing (0x01)

dataru[22]

Application cancel option: Cancel is generated by:

local node (0x00)

application (0x01)

dataru[23]

Application transaction numbers option: transaction numbers are:

not supported by application (0x00)

supported by application (0x01)

dataru[24]

BIND table index

BIND_TABLE_INDEX_PRT (1) (printer session)

BIND_TABLE_INDEX_CRT (2) (display session)

Element 2

hdreptr–>elteptr–>elteptr
Pointer to buffer element (NIL).
hdreptr–>elteptr–>startd
Start of data in this buffer element (13).
hdreptr–>elteptr–>endd
End of data in this buffer element.
hdreptr–>elteptr–>trpad
Reserved.
hdreptr–>elteptr–>dataru
Data RU, as follows:

dataru[13]

The **BIND** RU.

Remarks

- The **Open(PLU) OK Response** message consists of a buffer header, an initial element containing the source and destination names and connection information control block (CICB), followed by elements containing the **BIND** RU received from the host.
- The application should reflect the source and destination Locality Partner Index (LPIs) and the source and destination names from the Open(PLU) Request and must supply the I part of the source LPI.
- The fields from segment delivery option to bind table index (in the first element) are referred to in the text as the PLU CICB. For more information about the contents of the CICB, see Opening the PLU Connection.
- The **BIND** RU can be up to 256 bytes in length.
- For LUA, the **BIND** RU is not preceded by its transmission header (TH) and response header (RH). This is in contrast with the Open(PLU) Request, where the TH and RH are included.
- As in the **Open(PLU) Request**, the **icredits** value is in units of chunks if chunking is being used.

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Open(PLU) Error Response

The **Open(PLU) Error Response** message flows from the application to the node. It is used with a primary logical unit (PLU) connection.

```
struct Open(PLU) Error Response {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      ophdr.openqual;
    CHAR      ophdr.opentype;
    CHAR      ophdr.appltype;
    CHAR      ophdr.opluno;
    INTEGER  ophdr.opresid;
    INTEGER  ophdr.operr1;
    INTEGER  ophdr.operr2;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to first buffer element (NIL).
numelts
Number of buffer elements (0x00).
msgtype
Message type OPENMSG (0x01).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
ophdr.openqual
Open qualifier RSPERR (0x03).
ophdr.opentype
Open type LUSEC (0x02).
ophdr.appltype
Application program interface type.

0x02 (FMI application)

ophdr.opluno
Logical unit number.
ophdr.opresid
Resource identifier.
ophdr.operr1
Error code 1.
ophdr.operr2

Error code 2.

Remarks

- The **Open(PLU) Error Response** message consists of a buffer header only.
- The application should reflect the source and destination Locality Partner Index (LPIs).

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Open(PLU) OK Confirm

The **Open(PLU) OK Confirm** message flows from the node to the application. It is used with a primary logical unit (PLU) connection.

```
struct Open(PLU) OK Confirm {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   dsti;
    CHAR      ophdr.openqual;
    CHAR      ophdr.opentype;
    CHAR      ophdr.appltype;
    CHAR      ophdr.opluno;
    INTEGER   ophdr.opresid;
    INTEGER   ophdr.icreditr;
    INTEGER   ophdr.icredits;
    CHAR      ophdr.opninfo1;
};
```

Element

```
struct Open(PLU) OK Confirm {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to first buffer element.

numelts
Number of buffer elements (0x01).

msgtype
Message type OPENMSG (0x01).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

dsti
Destination index.

ophdr.openqual
Open qualifier CONFOK (0x04).

ophdr.opentype
Open type LUSEC (0x02).

ophdr.appltype
Application program interface type.

0x02 (FMI application)

ophdr.opluno
Logical unit number.
ophdr.opresid
Resource identifier.
ophdr.icreditr
Reserved.
ophdr.icredits
Reserved.
ophdr.opninfo1
PLU address.

Element

hdreptr–>elteptr
Pointer to buffer element (NIL).
hdreptr–>startd
Start of data in this buffer element (1).
hdreptr–>endd
End of data in this buffer element.
hdreptr–>trpad
Reserved.
hdreptr–>dataru
Data request/response unit (RU), as follows:

dataru[0]

Function management (FM) profile.

dataru[1]

Transmission Service profile (TS profile).

dataru[2]

Primary chaining use.

dataru[3]

Primary request control mode.

dataru[4]

Primary chain response protocol.

dataru[5]

Primary two-phase commit.

dataru[6]

Primary compression indicator.

dataru[7]

Primary send end bracket (EB) indicator.

dataru[8]

Secondary chaining use.

dataru[9]

Secondary request control mode.

dataru[10]

Secondary chain response protocol.

dataru[11]

Secondary two-phase commit.

dataru[12]

Secondary compression indicator.

dataru[13]

Secondary send EB indicator.

dataru[14]

Function Management Header (FMH) usage.

dataru[15]

Bracket usage.

Brackets not used (0x00)

Brackets used (0x01)

dataru[16]

Bracket reset state.

Bracket reset state between-brackets (BETB) (0x01)

Bracket reset state in-bracket (INB) (0x02)

dataru[17]

Bracket termination rule.

dataru[18]

Alternate code set indicator.

dataru[19]

Sequence number availability.

dataru[20]

Normal-flow send/receive mode.

dataru[21]

Half-duplex flip-flop reset.

dataru[22]

Secondary pacing send window.

dataru[23]

Secondary pacing receive window.

dataru[24–25]

Secondary send maximum RU size (INTEGER value).

dataru[26–27]

Primary send maximum RU size (INTEGER value).

dataru[28]

LU-LU session type.

dataru[29]

PLU name size.

dataru[30–37]

PLU name (Extended Binary Coded Decimal Interchange Code or EBCDIC).

dataru[38]

Session type 1: PS Function Management Header (FMH) type.

dataru[39]

PS data stream profile.

dataru[40]

Number of outstanding destinations.

dataru[41]

Compacted data indicator.

dataru[42]

Peripheral Data Interchange Record (PDIR) allowed indicator.

dataru[43]

Session type 2 or 3: query support.

dataru[44]

Dynamic screen size.

dataru[45]

Basic row size.

dataru[46]

Basic column size.

dataru[47]

Alternate row size.

dataru[48]

Alternate column size.

Remarks

- The **Open(PLU) OK Confirm** message consists of a buffer header and one element.
- The message does not carry source and destination names. Both LPIs are valid.
- The contents of **dataru** are referred to in the text as the PLU bind information control block (BICB). The BICB is only valid for an open-qualifier of CONFOK. For further information about the contents of the BICB, see Opening the PLU Connection.

Open(PLU) Error Confirm

The **Open(PLU) Error Confirm** message flows from the node to the application. It is used with a primary logical unit (PLU) connection.

```
struct Open(PLU) Error Confirm {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      ophdr.openqual;
    CHAR      ophdr.opentype;
    CHAR      ophdr.appltype;
    CHAR      ophdr.opluno;
    INTEGER   ophdr.opresid;
    INTEGER   ophdr.operr1;
    INTEGER   ophdr.operr2;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to first buffer element (NIL).
numelts
Number of buffer elements (0x00).
msgtype
Message type OPENMSG (0x01).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
ophdr.openqual
Open qualifier CONFERR (0x05).
ophdr.opentype
Open type LUSEC (0x02).
ophdr.appltype
Application program interface type.

0x02 (function management interface (FMI) application)

ophdr.opluno
Logical unit number.
ophdr.opresid
Resource identifier.
ophdr.operr1
Error code 1.
ophdr.operr2

Error code 2.

Remarks

- The **Open(PLU) Error Confirm** message consists of a buffer header only.
- The error codes are valid. (For more information, see Error and Sense Codes.) An **Open(PLU) Error Confirm** closes the connection.

Close(SSCP)

The **Close(SSCP)** message closes an open system services control point (SSCP) connection.

Close(SSCP) Request

The **Close(SSCP) Request** message flows from the application to the node. It is used with a system services control point (SSCP) connection.

```
struct Close(SSCP) Request {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      clhdr.closqual;
    CHAR      clhdr.clstype;
};
```

Members

nxtqptr
  Pointer to next buffer header.
hdreptr
  Pointer to buffer element (NIL).
numelts
  Number of buffer elements (0x00).
msgtype
  Message type CLOSEMSG (0x02).
srcl
  Source locality.
srcp
  Source partner.
srci
  Source index.
destl
  Destination locality.
destp
  Destination partner.
desti
  Destination index.
clhdr.closqual
  Close qualifier REQU (0x01).
clhdr.clstype
  Close subtype SSCPSEC (0x01).

Remarks

- The **Close(SSCP) Request** message consists of a buffer header only. There is no buffer element.

Close(SSCP) Response

The **Close(SSCP) Response** message flows from the node to the application. It is used with a system services control point (SSCP) connection.

```
struct Close(SSCP) Response {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      clhdr.closqual;
    CHAR      clhdr.clstype;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to buffer element (NIL).
numelts
Number of buffer elements (0x00).
msgtype
Message type CLOSEMSG (0x02).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
clhdr.closqual
Close qualifier RSPOK (0x02).
clhdr.clstype
Close subtype SSCPSEC (0x01).

Remarks

- The **Close(SSCP) Response** message consists of a buffer header only. There is no buffer element.
- The **Close(SSCP)** protocol is unconditional. It is not possible for the local node to keep the SSCP connection open after the application sends **Close(SSCP)**.

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Close(PLU)

The **Close(PLU)** message closes an open primary logical unit (PLU) connection.

Close(PLU) Request

The **Close(PLU) Request** message flows from the node to the application and from the application to the node. It is used with a primary logical unit (PLU) connection.

```
struct Close (PLU) Request {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      clhdr.closqual;
    CHAR      clhdr.clstype;
    CHAR      clhdr.clsctl;
    CHAR      clhdr.clspad1;
    INTEGER   clhdr.clspad2;
    INTEGER   clhdr.clserr1;
};
```

Logical unit application (LUA) only (see Remarks):
Element

```
struct Close (PLU) Request {
    PTRBFELT hdreptr->elteptr;
    INTEGER hdreptr->startd;
    INTEGER hdreptr->endd;
    CHAR hdreptr->trpad;
    CHAR[268] hdreptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element (NIL if not using LUA).

numelts
Number of buffer elements (0x00 if not using LUA).

msgtype
Message type CLOSEMSG (0x02).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

clhdr.closqual
Close qualifier REQU (0x01).

clhdr.clstype
Close subtype LUSEC (0x02).

clhdr.clsctl

Close control

CLNORMAL	(0x01)	normal
CLBIND	(0x02)	bind forthcoming
CLCFAERR	(0x03)	CFA error
CLPUINAC	(0x04)	PU inactive
CLLUINAC	(0x05)	LU inactive
CLLNKERR	(0x06)	link error
CLBFSHRT	(0x07)	node buffer shortage
CLRCVCHK	(0x08)	DFC receive check
CLSLUTRM	(0x09)	SLU termination

clhdr.clspad1

Reserved.

clhdr.clspad2

Reserved.

clhdr.clserr1

Error code (only valid for close control = link error).

LUA only (see Remarks):
Element

hdreptr–>elteptr

Pointer to buffer element (NIL).

hdreptr–>startd

Start of data in this buffer element (13).

hdreptr–>endd

End of data in this buffer element.

hdreptr–>trpad

Reserved.

hdreptr–>dataru

The **UNBIND** request/response unit (RU) received from the host, with its transmission header (TH) and response header (RH).

Remarks

- If the application is using the LUA variant of the function management interface (FMI), and the **Close(PLU) Request** was generated by receipt of an **UNBIND** from the host, the element is included, and **startd** points to the TH of the **UNBIND** message. (For more information about FMI, see FMI Concepts.)
- In all other cases (for example, if the **Close(PLU) Request** was generated by the local node as a result of a link outage), the message consists of a buffer header only. There is no buffer element.
- The close control field is only valid on messages from the local node to the application.
- If the close control field specifies link error, the error code field gives the link outage code.

Close(PLU) Response

The **Close(PLU) Response** message flows from the node to the application and from the application to the node. It is used with a primary logical unit (PLU) connection.

```
struct Close(PLU) Response {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      clhdr.closqual;
    CHAR      clhdr.clstype;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to buffer element (NIL).
numelts
Number of buffer elements (0x00).
msgtype
Message type CLOSEMSG (0x02).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
clhdr.closqual
Close qualifier RSPOK (0x02).
clhdr.clstype
Close subtype LUSEC (0x02).

Remarks

- The **Close(PLU) Response** message consists of a buffer header only. There is no buffer element.
- The **Close(PLU)** protocol is unconditional. It is not possible for the recipient of a Close(PLU) Request (either the local node or an application) to keep the PLU connection open. The only valid response is **Close(PLU) Response** with the close qualifier as RSPOK.

Data

Data messages carry both inbound and outbound data between the application and the local node on all connections. For a detailed description of outbound and inbound data flows, see Data Flow.

The **Data** message flows from the node to the application and from the application to the node. It is used with both the system services control point (SSCP) and the primary logical unit (PLU) connections.

```
struct Data {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      dfhdr.fhackrqd;
    CHAR      dfhdr.fhpad1;
    INTEGER   dfhdr.fhmsgkey;
    CHAR      dfhdr.fhflags1;
    CHAR      dfhdr.fhflags2;
    INTEGER   dfhdr.fhpad2;
    INTEGER   dfhdr.fhpad3;
    INTEGER   dfhdr.fhseqno;
};
```

Element

```
struct Data {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element.

numelts
Number of buffer elements.

msgtype
Message type DATAFMI (0x20).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

dfhdr.fhackrqd
Acknowledgment required indicator.

NOACKREQ (0x00)
ACKREQ (0x01)

dfhdr.fhpad1
Reserved.
dfhdr.fhmsgkey
Message key.
dfhdr.fhflags1
Application flag 1.
dfhdr.fhflags2
Application flag 2.
dfhdr.fhpad2
Reserved.
dfhdr.fhpad3
Reserved.
dfhdr.fhseqno
Sequence number.

Element

hdreptr–>elteptr
Pointer to buffer element.
hdreptr–>startd
Start of data in this buffer element:

Non-logical unit application (LUA): 13, or 10 for second and subsequent segments of outbound segmented request/response units (RUs).
LUA, inbound data: 4 in first element, 13 in subsequent elements.

hdreptr–>endd
End of data in this buffer element.
hdreptr–>trpad
Reserved.
hdreptr–>dataru
Data RU.

Remarks

- The use of the acknowledgment required indicator in both inbound and outbound data acknowledgment protocols is described in Data Flow.
- The use of the application flag fields is described in Application Flags (For more information, see the note that follows for LUA.)
- The sequence number is undefined for inbound data but contains the corresponding SNA sequence number for outbound data.
- If the application is using the LUA variant of the function management interface (FMI), the transmission header (TH) and (if appropriate) response header (RH) are included in the data, and the **startd** field points to the TH. The **fhmsgkey**, **fhflags1**, **fhflags2**, and **fhseqno** fields are undefined and should not be used. The corresponding data from the element should be used instead. (For more information about FMI, see FMI Concepts.)

Status-Acknowledge

Status-Acknowledge messages flow between the application and the local node as part of the outbound and inbound data acknowledgment protocols. For a detailed description of outbound and inbound acknowledgment protocols, see Data Flow.

> **Note** The format of this message is slightly different for messages from the application to the local node on the primary logical unit (PLU) connection, as is explained in the following topic Status-Acknowledge(Ack)

Status-Acknowledge(Ack)

The **Status-Acknowledge(Ack)** message flows from the node to the application and from the application to the node, and is used with both system services control point (SSCP) and primary logical unit (PLU) connections.

The following structure shows the message format for all SSCP messages and for PLU messages flowing from the node to the application.

```
struct Status-Acknowledge(Ack) {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stackhdr.akstat;
    CHAR      sfhdr.stackhdr.akqual;
    INTEGER   sfhdr.stackhdr.akmsgkey;
    CHAR      sfhdr.stackhdr.akflags1;
    CHAR      sfhdr.stackhdr.akflags2;
    INTEGER   sfhdr.stackhdr.aknumb1;
    INTEGER   sfhdr.stackhdr.aknumb2;
    INTEGER   sfhdr.stackhdr.akseqno;
};
```

Logical unit application (LUA) only (see Remarks):
Element

```
struct Status-Acknowledge(Ack) {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element (NIL if not using LUA).

numelts
Number of buffer elements (0x00 if not using LUA).

msgtype
Message type STATFMI (0x21).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

sfhdr.stackhdr.akstat

Status type ACK (0x01).

sfhdr.stackhdr.akqual
Acknowledgment type ACKPOS (0x02).

sfhdr.stackhdr.akmsgkey
Message key.

sfhdr.stackhdr.akflags1
Application flag 1.

sfhdr.stackhdr.akflags2
Application flag 2.

sfhdr.stackhdr.aknumb1
Undefined.

sfhdr.stackhdr.aknumb2
Reserved.

sfhdr.stackhdr.akseqno
SNA sequence number.

LUA only (see Remarks):
Element

hdreptr–>elteptr
Pointer to buffer element (NIL).

hdreptr–>startd
Start of data in this buffer element.

13 or
10 for second and subsequent segments of outbound segmented request/response units (RUs)

hdreptr–>endd
End of data in this buffer element.

hdreptr–>trpad
Reserved.

hdreptr–>dataru
Data RU.

The message format for PLU messages flowing from the application to the node is identical to the preceding format, except that the application flag 1 and application flag 2 fields are not used. They are replaced by the following INTEGER field:

sfhdr.stackhdr.akmsgtim
Last host response time

0xFFFF - no response time measured
0x*nnnn* - last response time measured, in units of 0.1 second

INTEGER	*sfhdr.stackhdr.akmsgtim*	Last host response time 0xFFFF - no response time measured 0x*nnnn* - last response time measured, in units of 0.1 second

Remarks

- The message key and application flags reflect the message key and application flags of the data message to which this is an acknowledgment. (For more information, see the note about LUA that follows.)
- For outbound **Status-Acknowledge(Ack)** messages from the local node to the application, the SNA sequence number gives the sequence number of the inbound data message to which this is an acknowledgment. (For more information, see the note about LUA that follows.) It is normally used only by Transmission Service profile (TS profile) 4 applications.
- For inbound **Status-Acknowledge(Ack)** messages from the application to the local node, the SNA sequence number reflects the sequence number of the outbound data message to which this is an acknowledgment.
- If the host specified that response time statistics are to be maintained, the application is responsible for measuring and reporting response times to the local node, using the **akmsgtim** field of this message. (For details, see RTM Parameters and Response Time Monitor Data.)
- If the application is using the LUA variant of the function management interface (FMI), the transmission header (TH) and (if appropriate) response header (RH) are included in the data, and the **startd** field points to the TH. The **akmsgkey**, **akflags1**, and **akflags2** fields are undefined and should not be used. The corresponding data from the element should be used

instead. The **akseqno** field is similarly undefined on messages from the local node to the application. It must be set on messages from the application to the local node. The **akseqno** field is used to hold the sequence number of the request being acknowledged. (For more information about FMI, see FMI Concepts.)

- If the application is not using the LUA variant of the FMI, the message consists of a buffer header only. There is no buffer element.

Status-Acknowledge(Nack-1)

The **Status-Acknowledge(Nack-1)** message flows from the node to the application and from the application to the node. It is used with both system services control point (SSCP) and primary logical unit (PLU) connections.

```
struct Status-Acknowledge(Nack-1) {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stackhdr.akstat;
    CHAR      sfhdr.stackhdr.akqual;
    INTEGER   sfhdr.stackhdr.akmsgkey;
    CHAR      sfhdr.stackhdr.akflags1;
    CHAR      sfhdr.stackhdr.akflags2;
    INTEGER   sfhdr.stackhdr.aknumb1;
    INTEGER   sfhdr.stackhdr.aknumb2;
    INTEGER   sfhdr.stackhdr.akseqno;
};
```

Logical unit application (LUA) only (see Remarks):
Element

```
struct Status-Acknowledge(Nack-1) {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to buffer element (NIL if not using LUA).
numelts
Number of buffer elements (0x00 if not using LUA).
msgtype
Message type STATFMI (0x21).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
sfhdr.stackhdr.akstat
Status type ACK (0x01).

sfhdr.stackhdr.akqual
Acknowledgment type ACKNEG1 (0x03).
sfhdr.stackhdr.akmsgkey
Message key.
sfhdr.stackhdr.akflags1
Application flag 1.
sfhdr.stackhdr.akflags2
Application flag 2.
sfhdr.stackhdr.aknumb1
Sense data 1.
sfhdr.stackhdr.aknumb2
Sense data 2.
sfhdr.stackhdr.akseqno
SNA sequence number.

LUA only (see Remarks):
Element

hdreptr–>elteptr
Pointer to buffer element (NIL).
hdreptr–>startd
Start of data in this buffer element.

13 or
10 for second and subsequent segments of outbound segmented request/response units (RUs)

hdreptr–>endd
End of data in this buffer element.
hdreptr–>trpad
Reserved.
hdreptr–>dataru
Data RU.

Remarks

- The message key and application flags reflect the message key and application flags of the data message to which this is a negative acknowledgment. (For more information, see the note about LUA that follows.)
- For **Status-Acknowledge(Nack-1)** messages from the local node to the application, the sense data reflects the sense data in the SNA negative response.
- For **Status-Acknowledge(Nack-1)** messages from the application to the local node, the sense data fields are those intended for the SNA negative response to the host.
- For outbound **Status-Acknowledge(Nack-1)** messages from the local node to the application, the SNA sequence number gives the sequence number of the inbound data message to which this is a negative acknowledgment. (For more information, see the note about LUA that follows.)
- For inbound **Status-Acknowledge(Nack-1)** messages from the application to the local node, the SNA sequence number reflects the sequence number of the outbound data message to which this is a negative acknowledgment.
- If the application is using the LUA variant of the function management interface (FMI), the transmission header (TH) and (if appropriate) response header (RH) are included in the data, and the **startd** field points to the TH. The **akmsgkey**, **akflags1**, and **akflags2** fields are undefined and should not be used. The corresponding data from the element should be used instead. The **akseqno** field is similarly undefined on messages from the local node to the application. It must be set on messages from the application to the local node. (For more information about FMI, see FMI Concepts.)
- If the application is not using the LUA variant of the FMI, the message consists of a buffer header only. There is no buffer element.

Status-Acknowledge(Nack-2)

The **Status-Acknowledge(Nack-2)** message flows from the node to the application. It is used with both system services control point (SSCP) and primary logical unit (PLU) connections.

```
struct Status-Acknowledge(Nack-2) {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stackhdr.akstat;
    CHAR      sfhdr.stackhdr.akqual;
    INTEGER   sfhdr.stackhdr.akmsgkey;
    CHAR      sfhdr.stackhdr.akflags1;
    CHAR sfhdr.stackhdr.akflags2;
    INTEGER sfhdr.stackhdr.aknumb1;
    INTEGER sfhdr.stackhdr.aknumb2;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to buffer element (NIL).
numelts
Number of buffer elements (0x00).
msgtype
Message type STATFMI (0x21).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
sfhdr.stackhdr.akstat
Status type ACK (0x01).
sfhdr.stackhdr.akqual
Acknowledgment type ACKNEG2 (0x04).
sfhdr.stackhdr.akmsgkey
Message key.
sfhdr.stackhdr.akflags1
Reserved.
sfhdr.stackhdr.akflags2
Critical failure indicator.

Noncritical failure (0x00)
Critical failure (0x01)

sfhdr.stackhdr.aknumb1
Error code 1.

sfhdr.stackhdr.aknumb2
Error code 2.

Remarks

- The **Status-Acknowledge(Nack-2)** message consists of a buffer header only. There is no buffer element.
- The message key refers to the message key in the inbound data message to which this is a negative acknowledgment.
- For more information about error codes, see Error and Sense Codes.

Status-Acknowledge(ACKLUA)

The **Status-Acknowledge(ACKLUA)** message is for logical unit application (LUA) applications only. It flows from the node to the application, and is used with both the system services control point (SSCP) and primary logical unit (PLU) connections.

```
struct Status-Acknowledge(ACKLUA) {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stackhdr.akstat;
    CHAR      sfhdr.stackhdr.akqual;
    INTEGER   sfhdr.stackhdr.akmsgkey;
    CHAR      sfhdr.stackhdr.akflags1;
    CHAR      sfhdr.stackhdr.akflags2;
    INTEGER   sfhdr.stackhdr.aknumb1;
    INTEGER   sfhdr.stackhdr.aknumb2;
    INTEGER   sfhdr.stackhdr.akseqno;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to buffer element (NIL).
numelts
Number of buffer elements (0x00).
msgtype
Message type STATFMI (0x21).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
sfhdr.stackhdr.akstat
Status type ACK (0x01).
sfhdr.stackhdr.akqual
Acknowledgment type.
sfhdr.stackhdr.akmsgkey
Message key.
sfhdr.stackhdr.akflags1
Application flag 1.
sfhdr.stackhdr.akflags2
Application flag 2.
sfhdr.stackhdr.aknumb1
Number of replies.
sfhdr.stackhdr.aknumb2
Reserved.

sfhdr.stackhdr.akseqno
SNA sequence number.

Remarks

- The message key and application flags are undefined and should not be checked.
- The SNA sequence number gives the sequence number of the inbound data message to which this is an acknowledgment.

Status-Control

For details about **Status-Control** message usage and for a summary of control type codes, see Status-Control Message.

Status-Control(...) Request

The **Status-Control(...) Request** message flows from the node to the application and from the application to the node. It is used with a primary logical unit (PLU) connection.

```
struct Status-Control(...) Request {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stctlhdr.ctlstat;
    CHAR      sfhdr.stctlhdr.ctlqual;
    CHAR      sfhdr.stctlhdr.ctltype;
    CHAR      sfhdr.stctlhdr.ctlack;
    CHAR      sfhdr.stctlhdr.ctlflag1;
    CHAR      sfhdr.stctlhdr.ctlflag2;
    INTEGER   sfhdr.stctlhdr.ctlnumb1;
    INTEGER   sfhdr.stctlhdr.ctlnumb2;
    INTEGER   sfhdr.stctlhdr.ctlmsgk;
};
```

Logical unit application (LUA) only (see Remarks):
Element

```
struct Status-Control(...) Request {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element (NIL if not using LUA).

numelts
Number of buffer elements (0x00 if not using LUA).

msgtype
Message type STATFMI (0x21).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

sfhdr.stctlhdr.ctlstat
Status type STCNTRL (0x02).

sfhdr.stctlhdr.ctlqual
  Control qualifier (0x01).
sfhdr.stctlhdr.ctltype
  Control type.
sfhdr.stctlhdr.ctlack
  Acknowledgment required indicator.

  No acknowledgment required (0x00)
  Acknowledgment required (0x01)

sfhdr.stctlhdr.ctlflag1
  Application flag 1.
sfhdr.stctlhdr.ctlflag2
  Application flag 2. (For more information, see STSN.)
sfhdr.stctlhdr.ctlnumb1
  Code 1.
sfhdr.stctlhdr.ctlnumb2
  Code 2.
sfhdr.stctlhdr.ctlmsgk
  Message key.

LUA only (see Remarks):
Element

hdreptr–>elteptr
  Pointer to buffer element (NIL).
hdreptr–>startd
  Start of data in this buffer element.

  13 or
  10 for second and subsequent segments of outbound segmented request/response units (RUs)

hdreptr–>endd
  End of data in this buffer element.
hdreptr–>trpad
  Reserved.
hdreptr–>dataru
  Data RU.

Remarks

- If the application is using the LUA variant of the function management interface (FMI), the transmission header (TH), response header (RH), and RU are included in the data element, and the **startd** field points to the TH. The **ctlflag1** and **ctlflag2** bytes are not defined and should not be used. The appropriate values from the data should be used instead. (For more information about FMI, see FMI Concepts.)
- If the application is not using the LUA variant of the function management interface (FMI), the message consists of a buffer header only. There is no buffer element.
- For a summary of **Status-Control** control type codes, see the table in Status-Control Message
- The code 1 and code 2 fields apply only for **Status-Control** LUSTAT, SIGNAL, and STSN messages.
- The application flag byte 2 is used for the **Status-Control** STSN control byte. (For more information, see Recovery.)

Status-Control(...) Acknowledge

The **Status-Control(...) Acknowledge** message flows from the node to the application and from the application to the node. It is used with a primary logical unit (PLU) connection.

```
struct Status-Control(...) Acknowledge {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stctlhdr.ctlstat;
    CHAR      sfhdr.stctlhdr.ctlqual;
    CHAR      sfhdr.stctlhdr.ctltype;
    CHAR      sfhdr.stctlhdr.ctlack;
    CHAR      sfhdr.stctlhdr.ctlflag1;
    CHAR      sfhdr.stctlhdr.ctlflag2;
    INTEGER   sfhdr.stctlhdr.ctlnumb1;
    INTEGER   sfhdr.stctlhdr.ctlnumb2;
    INTEGER   sfhdr.stctlhdr.ctlmsgk;
};
```

Logical unit application (LUA) only (see Remarks):
Element

```
struct Status-Control(...) Acknowledge {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element (NIL if not using LUA).

numelts
Number of buffer elements (0x00 if not using LUA).

msgtype
Message type STATFMI (0x21).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

sfhdr.stctlhdr.ctlstat
Status type STCNTRL (0x02).

sfhdr.stctlhdr.ctlqual
Control qualifier ACKPOS (0x02).
sfhdr.stctlhdr.ctltype
Control type.
sfhdr.stctlhdr.ctlack
Reserved.
sfhdr.stctlhdr.ctlflag1
Application flag 1.
sfhdr.stctlhdr.ctlflag2
Application flag 2. (For more information, see STSN.)
sfhdr.stctlhdr.ctlnumb1
Code 1.
sfhdr.stctlhdr.ctlnumb2
Code 2.
sfhdr.stctlhdr.ctlmsgk
Message key.

LUA only (see Remarks):
Element

hdreptr–>elteptr
Pointer to buffer element (NIL).
hdreptr–>startd
Start of data in this buffer element.

13 or
10 for second and subsequent segments of outbound segmented request/response units (RUs)

hdreptr–>endd
End of data in this buffer element.
hdreptr–>trpad
Reserved.
hdreptr–>dataru
Data RU.

Remarks

- If the application is using the LUA variant of the function management interface (FMI), the transmission header (TH), response header (RH), and RU are included in the data element, and the **startd** field points to the TH. The **ctlflag1** and **ctlflag2** bytes are not defined and should not be used. The appropriate values from the data should be used instead. (For more information about FMI, see FMI Concepts.)
- If the application is not using the LUA variant of the FMI, the message consists of a buffer header only. There is no buffer element.
- For a summary of **Status-Control** control type codes, see the table in Status-Control Message.
- The code 1 and code 2 fields apply only for **Status-Control(STSN) Acknowledge** messages, where they are the application's secondary-to-primary and primary-to-secondary sequence numbers respectively.
- For messages from the application to the local node, the message key field must match the message key in the corresponding **Status-Control Request**.

Status-Control(...) Negative-Acknowledge-1

The **Status-Control(...) Negative-Acknowledge-1** message flows from the node to the application and from the application to the node. It is used with a primary logical unit (PLU) connection.

```
struct Status-Control(...) Negative-Acknowledge-1 {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stctlhdr.ctlstat;
    CHAR      sfhdr.stctlhdr.ctlqual;
    CHAR      sfhdr.stctlhdr.ctltype
    CHAR      sfhdr.stctlhdr.ctlack;
    CHAR      sfhdr.stctlhdr.ctlflag1;
    CHAR      sfhdr.stctlhdr.ctlflag2;
    INTEGER   sfhdr.stctlhdr.ctlnumb1;
    INTEGER   sfhdr.stctlhdr.ctlnumb2;
    INTEGER   sfhdr.stctlhdr.ctlmsgk;
};
```

Logical unit application (LUA) only (see Remarks):
Element

```
struct Status-Control(...) Negative-Acknowledge-1 {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element (NIL if not using LUA).

numelts
Number of buffer elements (0x00 if not using LUA).

msgtype
Message type STATFMI (0x21).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

sfhdr.stctlhdr.ctlstat
Status type STCNTRL (0x02).

sfhdr.stctlhdr.ctlqual
Control qualifier ACKNEG1 (0x03).
sfhdr.stctlhdr.ctltype
Control type.
sfhdr.stctlhdr.ctlack
Reserved.
sfhdr.stctlhdr.ctlflag1
Application flag 1.
sfhdr.stctlhdr.ctlflag2
Application flag 2.
sfhdr.stctlhdr.ctlnumb1
Sense code 1.
sfhdr.stctlhdr.ctlnumb2
Sense code 2.
sfhdr.stctlhdr.ctlmsgk
Message key.

LUA only (see Remarks):
Element

hdreptr–>elteptr
Pointer to buffer element (NIL).
hdreptr–>startd
Start of data in this buffer element.

13 or
10 for second and subsequent segments of outbound segmented request/response units (RUs)

hdreptr–>endd
End of data in this buffer element.
hdreptr–>trpad
Reserved.
hdreptr–>dataru
Data RU.

Remarks

- If the application is using the LUA variant of the function management interface (FMI), the transmission header (TH), response header (RH), and RU are included in the data element, and the **startd** field points to the TH. The **ctlflag1** and **ctlflag2** bytes are not defined and should not be used. The appropriate values from the data should be used instead. (For more information about FMI, see FMI Concepts.)
- If the application is not using the LUA variant of the FMI, the message consists of a buffer header only. There is no buffer element.
- For messages from the application to the local node, the message key field must match the message key in the corresponding **Status-Control** request.
- For a summary of **Status-Control** control type codes, see the table in Status-Control Message.

Status-Control(...) Negative-Acknowledge-2

The **Status-Control(...) Negative-Acknowledge-2** message flows from the node to the application. It is used with a primary logical unit (PLU) connection.

```
struct Status-Control(...) Negative-Acknowledge-2 {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stctlhdr.ctlstat;
    CHAR      sfhdr.stctlhdr.ctlqual;
    CHAR      sfhdr.stctlhdr.ctltype
    CHAR      sfhdr.stctlhdr.ctlack;
    CHAR      sfhdr.stctlhdr.ctlflag1;
    CHAR      sfhdr.stctlhdr.ctlflag2;
    INTEGER   sfhdr.stctlhdr.ctlnumb1;
    INTEGER    sfhdr.stctlhdr.ctlnumb2;
    INTEGER   sfhdr.stctlhdr.ctlmsgk;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element (NIL).

numelts
Number of buffer elements (0x00).

msgtype
Message type STATFMI (0x21).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

sfhdr.stctlhdr.ctlstat
Status type STCNTRL (0x02).

sfhdr.stctlhdr.ctlqual
Control qualifier ACKNEG2 (0x04).

sfhdr.stctlhdr.ctltype
Control type.

sfhdr.stctlhdr.ctlack
Reserved.

sfhdr.stctlhdr.ctlflag1
Reserved.

sfhdr.stctlhdr.ctlflag2
Reserved.

sfhdr.stctlhdr.ctlnumb1

Error code 1.

sfhdr.stctlhdr.ctlnumb2

Error code 2.

sfhdr.stctlhdr.ctlmsgk

Message key.

Remarks

- The **Status-Control(...) Negative-Acknowledge-2** message consists of a buffer header only. There is no buffer element.
- The message key field matches the message key in the corresponding **Status-Control** request.
- For a summary of **Status-Control** control type codes, see the table in Status-Control Message.
- For a list of error codes, see Error and Sense Codes.

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Status-Control(...) ACKLUA

The **Status-Control(...) ACKLUA** message is for logical unit application (LUA) applications only. It flows from the node to the application, and is used with a primary logical unit (PLU) connection.

```
struct Status-Control(...) ACKLUA {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stctlhdr.ctlstat;
    CHAR      sfhdr.stctlhdr.ctlqual;
    CHAR      sfhdr.stctlhdr.ctltype
    CHAR      sfhdr.stctlhdr.ctlack;
    CHAR      sfhdr.stctlhdr.ctlflag1;
    CHAR      sfhdr.stctlhdr.ctlflag2;
    INTEGER   sfhdr.stctlhdr.ctlnumb1;
    INTEGER   sfhdr.stctlhdr.ctlnumb2;
    INTEGER   sfhdr.stctlhdr.ctlmsgk;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element (NIL).

numelts
Number of buffer elements (0x00).

msgtype
Message type STATFMI (0x21).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

sfhdr.stctlhdr.ctlstat
Status type STCNTRL (0x02).

sfhdr.stctlhdr.ctlqual
Control qualifier ACKLUA (0x05).

sfhdr.stctlhdr.ctltype
Control type.

sfhdr.stctlhdr.ctlack
Reserved.

sfhdr.stctlhdr.ctlflag1
Application flag 1.

sfhdr.stctlhdr.ctlflag2
Application flag 2.

sfhdr.stctlhdr.ctlnumb1

Code 1.

sfhdr.stctlhdr.ctlnumb2

Code 2.

sfhdr.stctlhdr.ctlmsgk

Message key used for the SNA sequence number. (For more information, see Remarks.)

Remarks

- The **Status-Control(...) ACKLUA** message consists of a buffer header only. There is no buffer element.
- The application flags and the code 1 and code 2 fields are undefined and should not be used.
- The message key field gives the sequence number from the transmission header of the inbound data message to which this is an acknowledgment.
- For a summary of **Status-Control** control type codes, see the table in Status-Control Message.

Status-Error

The **Status-Error** message is used to report request reject and response header (RH) usage error conditions in outbound SNA request/response units (RUs) to the application. It flows from the node to the application and is used with both system services control point (SSCP) and primary logical unit (PLU) connections.

For more information, see Status-Error Message.

```
struct Status-Error {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.sterrhdr.errstat;
    CHAR      sfhdr.sterrhdr.errpad1;
    CHAR      sfhdr.sterrhdr.errpad2;
    CHAR      sfhdr.sterrhdr.errpad3;
    CHAR      sfhdr.sterrhdr.errcode1;
    CHAR      sfhdr.sterrhdr.errcode2;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element (NIL).

numelts
Number of buffer elements (0x00).

msgtype
Message type STATFMI (0x21).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

sfhdr.sterrhdr.errstat
Status type STERROR (0x03).

sfhdr.sterrhdr.errpad1
Reserved.

sfhdr.sterrhdr.errpad2
Reserved.

sfhdr.sterrhdr.errpad3
Reserved.

sfhdr.sterrhdr.errcode1
Error code 1.

sfhdr.sterrhdr.errcode2
Error code 2.

Remarks

- The **Status-Error** message consists of a buffer header only. There is no buffer element.
- The error codes are listed in Error and Sense Codes.

Status-Resource

The **Status-Resource** message is used to provide a simple flow control mechanism between the local node and the application to prevent the application from exhausting its resources. It flows from the application to the node, and is used with a primary logical unit (PLU) connection.

It is only used on the PLU connection where the application specifies in the PLU connection information control block (CICB) that pacing requires application participation. For further details, see Pacing and Chunking.

```
struct Status-Resource {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.streshdr.resstat;
    CHAR      sfhdr.streshdr.respad;
    CHAR      sfhdr.streshdr.rescred;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to buffer element (NIL).
numelts
Number of buffer elements (0x00).
msgtype
Message type STATFMI (0x21).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
sfhdr.streshdr.resstat
Status type STRESRCE (0x04).
sfhdr.streshdr.respad
Reserved.
sfhdr.streshdr.rescred
Application credit.

Remarks

- The **Status-Resource** message consists of a buffer header only. There is no buffer element.
- The **rescred** (application credit) field indicates that the application can receive further credit request/response units (RUs) of the maximum RU size, or further credit chunks if chunking is being used.

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Status-RTM

The **Status-RTM** message provides the application with information about the Response Time Monitor (RTM) measurement parameters used by the host. This allows the application to match its local display of RTM statistics, if it provides such a display, with the statistics used by the host. It flows from the node to the application and is used with an system services control point (SSCP) connection.

For further details, see Response Time Monitor Data.

```
struct Status-RTM {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.strtmhdr.rtmstat;
    CHAR      sfhdr.strtmhdr.strbndry;
    CHAR      sfhdr.strtmhdr.strcount;
    CHAR      sfhdr.strtmhdr.strtmdef;
    CHAR      sfhdr.strtmhdr.strtmact;
    CHAR      sfhdr.strtmhdr.strtmdsp;
};
```

Element

```
struct Status-RTM {
    PTRBFELT   hdreptr->elteptr;
    INTEGER    hdreptr->startd;
    INTEGER    hdreptr->endd;
    CHAR       hdreptr->trpad;
    CHAR[268]  hdreptr->dataru;
};
```

Members

nxtqptr
Pointer to next buffer header.

hdreptr
Pointer to buffer element.

numelts
Number of buffer elements.

msgtype
Message type STATFMI (0x21).

srcl
Source locality.

srcp
Source partner.

srci
Source index.

destl
Destination locality.

destp
Destination partner.

desti
Destination index.

sfhdr.strtmhdr.rtmstat
Status type STRTM (0x06).

sfhdr.strtmhdr.strbndry

RTM boundaries.

0x00 - No RTM boundaries follow in element.
0x01 - RTM boundaries follow in element.

sfhdr.strtmhdr.strcount
RTM counters.

0x00 - No RTM counters follow in element.
0x01 - RTM counters follow in element.

sfhdr.strtmhdr.strtmdef
RTM definition.

0x00 - No change: use last received definition.
0x01 - Timers run until first data is written to screen.
0x02 - Timers run until keyboard is unlocked.
0x03 - Timers run until application can send (change direction (CD) or end bracket (EB) received).

sfhdr.strtmhdr.strtmact
RTM measurement.

0x00 - not active
0x01 - active

sfhdr.strtmhdr.strtmdsp
Local RTM display.

0x00 - disabled
0x01 - enabled

Element

hdreptr–>elteptr
Pointer to buffer element (NIL).
hdreptr–>startd
Start of data in this element.
hdreptr–>endd
End of data in this element.
hdreptr–>trpad
Reserved.
hdreptr–>dataru
Data RU, as follows:

dataru[0–1]

Number of boundaries in element

0x0000 - no boundaries included

m - number of boundaries included

dataru[2–3]

Number of counters in element

0x0000 - no counters included

n - number of counters included

dataru[4–(2m+3)]

m boundary values.

dataru[(2m+4)–(2m+2n+3)]

n counter values.

dataru[(2m+2n+4)

RTM total time.

Remarks

- A **Status-RTM** message is sent after the **Open(SSCP) OK Response** to give the initial RTM parameters. It is sent again when the RTM counters are reset (either on request from the host or when the local node sends unsolicited RTM data to the host), or when the host changes any of the RTM parameters.
- The message is sent only for applications that use LUs with type video display unit (VDU) or logical units (LUs) in a VDU pool, because the RTM feature applies only to 3270 display sessions.
- All the values in the data RU are integer values.
- The RTM counter values in this message can be nonzero at startup, because RTM statistics are maintained for a specific LU and not for a specific application's use of that LU. If zero counter values are included, this indicates that the counters are to be reset.
- The RTM total time field is present only if the number of counters in the element is nonzero.

Status-Session

The **Status-Session** message provides the application with information about changes in the state of a session between the local node and the host. It flows from the node to the application and is used with both system services control point (SSCP) and primary logical unit (PLU) connections.

For further details, see Status-Session Message.

```
struct Status-Session {
    PTRBFHDR  nxtqptr;
    PTRBFELT  hdreptr;
    CHAR      numelts;
    CHAR      msgtype;
    CHAR      srcl;
    CHAR      srcp;
    INTEGER   srci;
    CHAR      destl;
    CHAR      destp;
    INTEGER   desti;
    CHAR      sfhdr.stseshdr.sesstat;
    CHAR      sfhdr.stseshdr.sesspad;
    CHAR      sfhdr.steeshdr.sesscode;
    CHAR      sfhdr.stseshdr.sessqual;
};
```

Members

nxtqptr
Pointer to next buffer header.
hdreptr
Pointer to buffer element (NIL).
numelts
Number of buffer elements (0x00).
msgtype
Message type STATFMI (0x21).
srcl
Source locality.
srcp
Source partner.
srci
Source index.
destl
Destination locality.
destp
Destination partner.
desti
Destination index.
sfhdr.stseshdr.sesstat
Status type STSESSN (0x05).
sfhdr.stseshdr.sesspad
Reserved.
sfhdr.steeshdr.sesscode
Session code.
sfhdr.stseshdr.sessqual
Session code qualifier.

Remarks

- The **Status-Session** message consists of a buffer header only. There is no buffer element.
- The session codes are listed in Status-Session Codes.

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FMI Extension for the Windows Environment

This section describes the application programming interface (API) extension to the Microsoft® Windows® 3270 Emulator Interface that converts link status and error codes to a printable string.

Following is a definition of the function, syntax, returns, and remarks for using the extension. For more information, see FMI Status, Error, and Sense Codes.

This section contains:

- GetFmiReturnCode

GetFmiReturnCode

The **GetFmiReturnCode** function converts link status and error codes to a printable string. This function provides a standard set of error strings for use by Function Management Interface (FMI) applications.

```
int WINAPI GetFmiReturnCode (
    UINT errcode1,
    UINT errcode2,
    UINT buffer_length,
    unsigned char FAR *buffer_addr
);
```

Parameters

errcode1
Supplied parameter; see Remarks.

errcode2
Supplied parameter; see Remarks.

buffer_length
Supplied parameter; specifies the length of the buffer pointed to by *buffer_addr*. The recommended length is 256 characters.

buffer_addr
Supplied/returned parameter; specifies the address of the buffer that will hold the formatted, null-terminated string.

Return Values

0x20000001
The parameters are invalid; the function could not read the specified error codes or could not write to the specified buffer.

0x20000002
The specified buffer is too small.

Remarks

The *errcode1* and *errcode2* parameters are set according to the way that **GetFmiReturnCode** is used, as shown in the following table.

Codes to be translated	**Value for *errcode1***	**Value for *errcode2***
The *errcode1* and *errcode2* values specified in Error and Sense Codes includes messages for **Open(SSCP) Response**, **Open(PLU) Confirm**, **Status-Acknowledge(Nack-2)**, **Status-Control(...) Nack2**, **Status-Error**, and **Appl-Data** messages with the system detected error indicator (SDI) set	Unchanged from message	Unchanged from message
The status and qualifier codes returned from a Status-Session message	*status**256 + *qualifier*	0xFFFF
The return code from **WinLUAGetLastInitStatus**	The return code	0xFFFF

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SNA Internationalization Programmer's Reference

This section describes the features available in Microsoft® Host Integration Server 2004 for programming support for international languages and different national language character sets.

The SNANLS API uses the language support features provided with Microsoft Windows Server™ 2003, Windows® XP, and Windows 2000. SNANLS supports European languages that use single-byte encoding, as well as East Asian languages that use double-byte or Unicode encoding.

For general information about programming for SNA internationalization, see SNA Internationalization Programmer's Guide.

This section contains:

- SNANLS Code Page Support
- SNANLS API Functions
- The TrnsDT API
- Host Integration Server 2004 Components and NLS Support

SNANLS Code Page Support

The SNA National Language Support (SNANLS) API provides functions for converting single-byte character stream (SBCS) EBCDIC-to-Unicode-to-ANSI and SBCS ANSI-to-Unicode-to-EBCDIC by leveraging the Win32® National Language Support (NLS) API. The Win32 NLS API uses resource files containing NLS conversion tables that are installed on the target computer when Windows is installed or installed by the Setup program for Microsoft® Host Integration Server 2004 (the Setup program also adds the required registry entries). The SNANLS DLL is supplied with Host Integration Server 2004.

SNANLS supports conversions for the following groups of code pages:

- ANSI code pages
- ANSI/OEM code pages
- EBCDIC code pages
- OEM PC code pages
- Open Systems code pages
- ISO code pages

This section contains:

- ANSI Code Page Support Using SNANLS
- ANSI/OEM Code Page Support Using SNANLS
- EBCDIC Code Page Support Using SNANLS
- ISO Code Page Support Using SNANLS
- OEM PC Code Page Support Using SNANLS
- SNANLS Dependencies

ANSI Code Page Support Using SNANLS

The following table shows the ANSI code pages and character code set identifiers (CCSIDs) supported by SNA National Language Support (SNANLS) in Microsoft® Host Integration Server 2004.

SNANLS display name	NLS code page	HOST CCSID	Type	NLS file name
ANSI - Arabic	1256	1256	SBCS	c_1256.nls
ANSI - Baltic	1257	1257	SBCS	c_1257.nls
ANSI - Cyrillic	1251	1251	SBCS	c_1251.nls
ANSI - Central Europe	1250	1250	SBCS	c_1250.nls
ANSI - Greek	1253	1253	SBCS	c_1253.nls
ANSI - Hebrew	1255	1255	SBCS	c_1258.nls
ANSI - Latin I	1252	1252	SBCS	c_1252.nls
ANSI - Turkish	1254	1254	SBCS	c_1254.nls

> **Note** All of these ANSI code pages support the euro.

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ANSI/OEM Code Page Support Using SNANLS

The following table shows the ANSI/OEM code pages and character code set identifiers (CCSIDs) supported by SNA National Language Support (SNANLS) in Microsoft® Host Integration Server 2004.

SNANLS display name	NLS code page	Host CCSID	Type	NLS file name	Comments
ANSI/OEM - Japanese Shift-JIS	932	932	SBCS	c_932.nls	Japanese JIS-8 Bit + Shift-JIS
ANSI/OEM - Korean	949	949	DBCS	c_949.nls	Korean Hangul (Extended Wansung)
ANSI/OEM - Simplified Chinese GBK	936	936	DBCS	c_936.nls	Simplified Chinese GBK
ANSI/OEM - Thai	874	874	SBCS	c_874.nls	Thai
ANSI/OEM - Traditional Chinese Big5	950	950	DBCS	c_950.nls	Traditional Chinese Big5
ANSI/OEM - Viet Nam	1258	1258	SBCS	c_1258.nls	Viet Nam

Note None of these code pages support the euro.

EBCDIC Code Page Support Using SNANLS

The following table shows the EBCDIC code pages and character code set identifiers (CCSIDs) supported by SNA National Language Support (SNANLS) in Microsoft® Host Integration Server 2004.

SNANLS Display Name	NLS Code Page	Host CCSID	euro	Supported by SNANLS
EBCDIC - Arabic	20420	420		partial (See Note)
EBCDIC - Cyrillic (Russian)	20880	880		yes
EBCDIC - Cyrillic (Serbian, Bulgarian)	21025	1025		yes
EBCDIC - Denmark/ Norway (Euro)	1142	277	yes	yes
EBCDIC - Denmark/ Norway	20277	277		yes
EBCDIC - Finland/ Sweden (Euro)	1143	278	yes	yes
EBCDIC - Finland/ Sweden	20278	278		yes
EBCDIC - France (Euro)	1147	297	yes	yes
EBCDIC - France	20297	297		yes
EBCDIC - Germany (Euro)	1141	273	yes	yes
EBCDIC - Germany	20273	273		yes
EBCDIC - Greek (Modern)	875	875		yes
EBCDIC - Greek	20423	423		yes
EBCDIC - Hebrew	20424	424		partial (See Note)
EBCDIC - Icelandic (Euro)	1149	871	yes	yes
EBCDIC - Icelandic	20871	871		yes
EBCDIC - International (Euro)	1148	500	yes	yes
EBCDIC - International	500	500		yes
EBCDIC - Italy (Euro)	1144	280	yes	yes
EBCDIC - Italy	20280	280		yes
EBCDIC - Japan English (Extended)	1027			
EBCDIC - Japan English/Kanji (Extended)	939	939		yes
EBCDIC - Japan English/Kanji (Extended)	5035			
EBCDIC - Japan Katakana (Extended)	290	290		yes
EBCDIC - Japan Katakana/Kanji (Extend Katakana)	930	930		yes
EBCDIC - Japan Katakana/Kanji (Extend Katakana)	5026			
EBCDIC - Japanese	931	931		yes
EBCDIC - Korea (Extended)	933	933		yes
EBCDIC - Latin America/ Spain (Euro)	1145	284	yes	yes
EBCDIC - Latin America/ Spain	20284	284		yes
EBCDIC - Multilingual/ ROECE (Latin-2)	870	870		yes
EBCDIC - Simplified Chinese (Extended)	935	935		yes
EBCDIC - Thai	20838	838		yes
EBCDIC - Traditional Chinese (Extended)	937	937		yes
EBCDIC - Turkish (Latin-3)	20905	905		yes
EBCDIC - Turkish (Latin-5)	1026	1026		yes
EBCDIC - U.S./ Canada (Euro)	1140	37	yes	yes
EBCDIC - U.S./ Canada	37	37		yes

EBCDIC - United Kingdom (Euro)	1146	285	yes	yes
EBCDIC - United Kingdom	20285	285		yes

> **Note** Support for Arabic and Hebrew code page conversions are limited to left-to-right output. Bidirectional output including the default Arabic and Hebrew right-to-left output is not supported in this release of Host Integration Server 2004.

ISO Code Page Support Using SNANLS

The following table shows the ISO NLS code pages and host character code set identifiers (CCSIDs) supported by SNA National Language Support (SNANLS) in Microsoft® Host Integration Server 2004.

SNANLS display name	NLS code page	Host CCSID	euro	Supported by SNANLS
ISO 6937 Non-Spacing Accent	20269	6937		
ISO 8859-1 Latin-1	28591	819		
ISO 8859-15 Latin 9 (Euro)	20865	923	yes	
ISO 8859-2 Central Europe	28592	912		
ISO 8859-3 Latin 3	28593	913		
ISO 8859-4 Baltic	28594	914		
ISO 8859-5 Cyrillic	28595	915		
ISO 8859-6 Arabic	28596	1089		
ISO 8859-7 Greek	28597	813		
ISO 8859-8 Hebrew (Visually Ordered)	28598	916		
ISO 8859-9 Hebrew (Logically Ordered)	28599	920		

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OEM PC Code Page Support Using SNANLS

The following table shows the OEM PC code pages and character code set identifiers (CCSIDs) supported by SNA National Language Support (SNANLS) in Microsoft® Host Integration Server 2004.

SNANLS display name	NLS code page	Host CCSID	Type	NLS file name	Comments
OEM - Arabic	864	864	SBCS	c_864.nls	
OEM - Baltic	775	775	SBCS	c_775.nls	
OEM - Canadian French	863	863	SBCS	c_863.nls	OEM - Canada (850 subset)
OEM - Cyrillic	855	855	SBCS	c_855.nls	
OEM - Cyrillic II	866	866	SBCS	c_866.nls	OEM - Russian
OEM - Greek 437G	737	737	SBCS	c_737.nls	
OEM - Hebrew	862	862	SBCS	c_862.nls	
OEM - Icelandic	861	861	SBCS	c_861.nls	OEM - Iceland
OEM - Modern Greek	869	869	SBCS	c_869.nls	
OEM - Multilingual Latin I	850	850	SBCS	c_850.nls	
OEM - Multilingual Latin II	852	852	SBCS	c_852.nls	
OEM - Nordic	865	865	SBCS	c_865.nls	OEM - Denmark, Norway, Finland, Sweden
OEM - Portuguese	860	860	SBCS	c_860.nls	OEM - Portugal (850 subset)
OEM - Turkish	857	857	SBCS	c_857.nls	
OEM - United States	437	437	SBCS	c_437.nls	

Note None of these code pages support the euro.

Open Systems Code Page Support Using SNANLS

The following table shows the Open Systems NLS code pages and host character code set identifiers (CCSIDs) supported by SNA National Language Support (SNANLS) in Microsoft® Host Integration Server 2004.

SNANLS display name	NLS code page	Host CCSID	euro	Supported by SNANLS
Latin-1/Open System (Euro)	20924	924	yes	
Latin-1/Open System	1047	1047		

SNANLS Dependencies

The only file required to support the SNA National Language Support (SNANLS) API on Microsoft® Windows Server™ 2003, Windows® XP, and Windows 2000 is SNANLS.DLL. To link to this .dll, use the SNANLS.H header (located under the \SDK\INCLUDE subdirectory) and the SNANLS.LIB library file (located under the \SDK\LIB subdirectory) supplied with the Host Integration Server 2004 SDK. Note that individual Win32® NLS resource files must be installed in order to support the various languages and code pages on Windows Server 2003, Windows XP, and Windows 2000.

The Win32 NLS files needed to support various languages are normally installed when the operating system is installed during Setup for Windows Server 2003, Windows XP, and Windows 2000. If these files are not present on Windows Server 2003, Windows XP, and Windows 2000, they may be installed using Regional and Language Options. Click **Start**, then click **Control Panel**. Click **Regional and Language Options**, then click the **Advanced** tab. Select the appropriate settings from this dialog box.

The registry settings required to use specific NLS files are enabled on Windows Server 2003, Windows XP, and Windows 2000 when the operating system is installed. When you install the end-user client or Administrator clients from Host Integration Server 2004, the registry settings required to use specific NLS files are automatically created.

The registry settings required for common EBCDIC code pages are listed in the following table.

File name	SNANLS display name	NLS code page	Host CCSID	Registry setting
c_037.nls	EBCDIC - U.S./ Canada	37	37	Value Name=37 Type=REG_SZ Data=c_037.nls
c_500.nls	EBCDIC - International	500	500	Value Name=500 Type=REG_SZ Data=c_500.nls
c_870.nls	EBCDIC - Multilingual/ ROECE (Latin-2)	870	870	Value Name=870 Type=REG_SZ Data=c_870.nls
c_875.nls	EBCDIC - Greek (Modern)	875	875	Value Name=875 Type=REG_SZ Data=c_875.nls
c_1026.nls	EBCDIC - Turkish (Latin-5)	1026	1026	Value Name=1026 Type=REG_SZ Data=c_1026.nls
c_20273.nls	EBCDIC - Germany	20273	273	Value Name=20273 Type=REG_SZ Data=c_20273.nls
c_20277.nls	EBCDIC - Denmark/ Norway	20277	277	Value Name=20277 Type=REG_SZ Data=c_20277.nls
c_20278.nls	EBCDIC - Finland/ Sweden	20278	278	Value Name=20278 Type=REG_SZ Data=c_20278.nls
c_20280.nls	EBCDIC - Italy	20280	280	Value Name=20280 Type=REG_SZ Data=c_20280.nls
c_20284.nls	EBCDIC - Latin America/ Spain	20285	284	Value Name=20284 Type=REG_SZ Data=c_20284.nls
c_20285.nls	EBCDIC - United Kingdom	20285	285	Value Name=20285 Type=REG_SZ Data=c_20285.nls
c_20297.nls	EBCDIC - France	20297	297	Value Name=20297 Type=REG_SZ Data=c_20297.nls
c_20420.nls	EBCDIC - Arabic	20420	420	Value Name=28596 Type=REG_SZ Data=c_20420.nls

c_20423.nls	EBCDIC - Greek	20423	423	Value Name=20423 Type=REG_SZ Data=c_20423.nls
c_20424.nls	EBCDIC - Hebrew	20424	424	Value Name=20424 Type=REG_SZ Data=c_20424.nls
c_20838.nls	EBCDIC - Thai	20838	838	Value Name=20838 Type=REG_SZ Data=c_20838.nls
c_20871.nls	EBCDIC - Icelandic	20871	871	Value Name=20871 Type=REG_SZ Data=c_20871.nls
c_20880.nls	EBCDIC - Cyrillic (Russian)	20880	880	Value Name=20880 Type=REG_SZ Data=c_20880.nls
c_20905.nls	EBCDIC - Turkish (Latin-3)	20905	905	Value Name=20905 Type=REG_SZ Data=c_20905.nls
c_21025.nls	EBCDIC - Cyrillic (Serbian, Bulgarian)	21025	1025	Value Name=21025 Type=REG_SZ Data=c_21025.nls

> **Note** On Windows Server 2003, Windows XP, and Windows 2000, the registry settings are located under the **HKEY_LOCAL_MACHINE** under the following sub key:
> SYSTEM\CurrentControlSet\Control\Nls\CodePage.

SNANLS API Functions

The SNA National Language Support (SNANLS) API is documented in the SNANLS.H file in the software development kit (SDK) provided with Microsoft® Host Integration Server 2004.

SNANLS on Microsoft Host Integration Server 2004 supports the following functions :

- CloseNlsRegistry
- FindCloseCodePage
- FindFirstCodePage
- FindNextCodePage
- GetCodePage
- GetCodePageDisplayStr
- IsInstalledCodePage
- OpenNlsRegistry
- SnaNlsInit
- SnaNlsMapString

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CloseNlsRegistry

The SNA National Language Support (SNANLS) **CloseNlsRegistry** function closes an open registry key on a local or remote computer.

```
BOOL WINAPI CloseNlsRegistry(
    HKEY KeyHandle
);
```

Parameters

KeyHandle
Supplied parameter. The handle to a key in the registry opened using **OpenNlsRegistry**.

Return Values

The **CloseNlsRegistry** function returns zero on success, otherwise a non-zero value is returned on failure.

Remarks

The *KeyHandle* parameter passed to this function is the handle returned from a previous call to the **OpenNlsRegistry** function. This function is primarily used by the Print service in Host Integration Server 2004 to determine what code pages are supported on a remote computer providing the print services function.

SNANLS supports this function on Microsoft® Host Integration Server 2004.

FindCloseCodePage

The SNA National Language Support (SNANLS) **FindCloseCodePage** function closes the handle allocated by a call to the **FindFirstCodePage** function.

```
BOOL WINAPI FindCloseCodePage(
    const HANDLE hInfo
);
```

Parameters

hInfo
Supplied parameter. The handle allocated and returned using **FindFirstCodePage**.

Return Values

The **FindCloseCodePage** function returns **TRUE** on success, otherwise the returned value on failure is **FALSE**.

Remarks

The *hInfo* parameter passed to this function is the handle returned from a previous call to the **FindFirstCodePage** function.

SNANLS supports this function on Microsoft® Host Integration Server 2004.

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FindFirstCodePage

The SNA National Language Support (SNANLS) **FindFirstCodePage** function finds the first instance of a code page satisfying the condition specified, copies the code page information to a structure passed as a parameter, and opens and returns a handle used in subsequent calls to the **FindNextCodePage** function.

```
const HANDLE WINAPI FindFirstCodePage(
    DWORD dwEnumOption,
    struct CodePage *pPage
);
```

Parameters

dwEnumOption

Supplied parameter. The set of conditions that a code page should satisfy. These conditions can be any combination of the following values defined in the SNANLS.h include file:

ENUM_CP_AVAILABLE (0x01)

The code page is installed and available for use.

ENUM_CP_HOST (0x02)

The code page is a host code page (EBCDIC, for example).

ENUM_CP_EURO (0x04)

The code page contains support for the euro character.

ENUM_CP_DBCS (0x08)

The code page is for a double-byte character set.

ENUM_CP_MBCS (0x10)

The code page is for a mixed-byte character set.

ENUM_CP_SBCS (0x20)

The code page is for a single-byte character set.

Note that some of these combinations represent cases that will not match any installed code pages used by SNANLS.

pPage

Supplied and returned parameter. A pointer to a struct CodePage where the code page information should be copied.

On a successful return, the memory location pointed to by this parameter will be filled with the information for the first code page satisfying the conditions in *dwEnumOption*. On failure, no changes will be made to the memory pointed to by this parameter.

The CodePage struct is defined in the SNANLS.H include file as follows:

```
struct CodePage {
    BYTE    CodePageKey;
    DWORD   CodePageID;
    WCHAR   szFriendlyName[CP_SIZE];
    short   eGroup;
    BOOL    bAvailable;
    BYTE    bccsid;
    BOOL    bEuro;
};
```

The members of this CodePage structure are as follows:

CodePageKey

A numeric value that represents the index into the array of CodePage structures. This value should be used as an opaque value, since this value can be changed arbitrarily by Service Packs when additional code pages are supported.

CodePageID

The NLS code page number.

szFriendlyName

The SNANLS display name for this code page.

eGroup

The group that this code page is represented by. .This value can be one of the following enumerations defined in the SNANLS.h include file for code groups:

ENUM_CP_EBCDIC

This code page is a member of the EBCDIC code page group.

ENUM_CP_ANSI

This code page is a member of the ANSI code page group.

ENUM_CP_ISO

This code page is a member of the ISO code page group.

ENUM_CP_OEMPC

This code page is a member of the OEM PC code page group.

ENUM_CP_ISO

This code page is a member of the ISO code page group.

ENUM_CP_ISO

This code page is a member of the ISO code page group.

ENUM_CP_OEM PC

This code page is a member of the OEM PC code page group.

ENUM_CP_OPEN

This code page is a member of the Open Systems code page group.

ENUM_CP_UCS

This code page is a member of the UCS code page group.

bAvailable

A Boolean used to indicate that this code page is installed on the computer. A value of **FALSE** for this member indicates that the computer will not be queried to determine if this code page is installed. A value of **TRUE** indicated the code page is installed.

bccsid

A flag used to indicate the type of code page. This flag can be one of the following:

ENUM_CP_DBCS (0x08)

The code page is for a double-byte character set.

ENUM_CP_MBCS (0x10)

The code page is for a mixed-byte character set.

ENUM_CP_SBCS (0x20)

The code page is for a single-byte character set.

bEuro

A Boolean value used to indicate if this code page supports the euro symbol. If this value is **TRUE**, then the euro symbol is supported.

Return Values

The **FindFirstCodePage** function returns a handle used in calls to the **FindNextCodePage** or **FindCloseCodePage** on success.

On failure, INVALID_HANDLE_VALUE is returned for the value of this handle.

Remarks

The handle returned by this function should not be tampered with by the user.

This function is supported by SNANLS on Microsoft® Host Integration Server 2004.

FindNextCodePage

The SNA National Language Support (SNANLS) **FindNextCodePage** function finds the next instance of code page satisfying the condition specified in the initial call to the **FindFirstCodePage** function, and copies the code page information to a structure passed as a parameter.

```
BOOL WINAPI FindNextCodePage(
    const HANDLE hInfo
    struct CodePage *pPage
);
```

Parameters

hInfo
Supplied parameter. The handle allocated and returned using **FindFirstCodePage**.

pPage
Supplied and returned parameter. A pointer to struct CodePage where the code page information should be copied.

On a successful return, the memory location pointed to by this parameter will be filled with the information for the next code page satisfying the conditions in *dwEnumOption* parameter passed to the **FindFirstCodePage** function.

On failure, no changes will be made to the memory pointed to by this parameter.

The CodePage struct is defined in the SNANLS.H include file as follows:

```
struct CodePage {
    BYTE    CodePageKey;
    DWORD   CodePageID;
    WCHAR   szFriendlyName[CP_SIZE];
    short   eGroup;
    BOOL    bAvailable;
    BYTE    bccsid;
    BOOL    bEuro;
};
```

The members of this CodePage structure are as follows:

CodePageKey

A numeric value that represents the index into the array of CodePage structures. This value should be used as an opaque value, since this value can be changed arbitrarily by Service Packs when additional code pages are supported.

CodePageID

The NLS code page number.

szFriendlyName

The SNANLS display name for this code page. The character string is null terminated.

eGroup

The group that this code page is represented by. .This value can be one of the following enumerations defined in the SNANLS.h include file for code groups:

ENUM_CP_EBCDIC

This code page is a member of the EBCDIC code page group.

ENUM_CP_ANSI

This code page is a member of the ANSI code page group.

ENUM_CP_ISO

This code page is a member of the ISO code page group.

ENUM_CP_OEMPC

This code page is a member of the OEM PC code page group.

ENUM_CP_ISO

This code page is a member of the ISO code page group.

ENUM_CP_ISO

This code page is a member of the ISO code page group.

ENUM_CP_OEM PC

This code page is a member of the OEM PC code page group.

ENUM_CP_OPEN

This code page is a member of the Open Systems code page group.

ENUM_CP_UCS

This code page is a member of the UCS code page group.

bAvailable

A Boolean used to indicate that this code page is installed on the computer. A value of **FALSE** for this member indicates that the computer will not be queried to determine if this code page is installed. A value of **TRUE** indicated the code page is installed.

bccsid

A flag used to indicate the type of code page. This flag can be one of the following:

ENUM_CP_DBCS (0x08)

The code page is for a double-byte character set.

ENUM_CP_MBCS (0x10)

The code page is for a mixed-byte character set.

ENUM_CP_SBCS (0x20)

The code page is for a single-byte character set.

bEuro

A Boolean value used to indicate if this code page supports the euro symbol. If this value is **TRUE**, then the euro symbol is supported.

Return Values

The **FindNextCodePage** function returns a value of **TRUE** on success. On failure, the returned value is **FALSE**.

Remarks

This function is supported by SNANLS on Microsoft® Host Integration Server 2004.

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GetCodePage

The SNA National Language Support (SNANLS) **GetCodePage** function copies the code page information identified by a key to a structure passed as a parameter.

```
BOOL WINAPI GetCodePage(
    int nKey
    struct CodePage *pPage
);
```

Parameters

nKey
Supplied parameter. The numeric key to a code page. This value is an opaque index into an array containing the code pages supported by SNANLS. This value is normally the *CodePageKey* member of a CodePage structure returned from a previous call to **FindFirstCodePage** or **FindNextCodePage**.
pPage
Supplied and returned parameter. A pointer to struct CodePage where the code page information should be copied.

On a successful return, the memory location pointed to by this parameter will be filled with the information for the specific code page.

On failure, no changes will be made to the memory pointed to by this parameter.

The CodePage struct is defined in the SNANLS.H include file as follows:

```
struct CodePage {
    BYTE    CodePageKey;
    DWORD   CodePageID;
    WCHAR   szFriendlyName[CP_SIZE];
    short   eGroup;
    BOOL    bAvailable;
    BYTE    bccsid;
    BOOL    bEuro;
};
```

The members of this CodePage structure are as follows:

CodePageKey

A numeric value that represents the index into the array of CodePage structures. This value should be used as an opaque value, since this value can be changed arbitrarily by Service Packs when additional code pages are supported.

CodePageID

The NLS code page number.

szFriendlyName

The SNANLS display name for this code page. The character string is null terminated.

eGroup

The group that this code page is represented by. .This value can be one of the following enumerations defined in the SNANLS.h include file for code groups:

ENUM_CP_EBCDIC

This code page is a member of the EBCDIC code page group.

ENUM_CP_ANSI

This code page is a member of the ANSI code page group.

ENUM_CP_ISO

This code page is a member of the ISO code page group.

ENUM_CP_OEMPC

This code page is a member of the OEM PC code page group.

ENUM_CP_ISO

This code page is a member of the ISO code page group.

ENUM_CP_ISO

This code page is a member of the ISO code page group.

ENUM_CP_OEM PC

This code page is a member of the OEM PC code page group.

ENUM_CP_OPEN

This code page is a member of the Open Systems code page group.

ENUM_CP_UCS

This code page is a member of the UCS code page group.

bAvailable

A Boolean used to indicate that this code page is installed on the computer. A value of **FALSE** for this member indicates that the computer will not be queried to determine if this code page is installed. A value of **TRUE** indicated the code page is installed.

bccsid

A flag used to indicate the type of code page. This flag can be one of the following:

ENUM_CP_DBCS (0x08)

The code page is for a double-byte character set.

ENUM_CP_MBCS (0x10)

The code page is for a mixed-byte character set.

ENUM_CP_SBCS (0x20)

The code page is for a single-byte character set.

bEuro

A Boolean value used to indicate if this code page supports the Euro symbol. If this value is **TRUE**, then the euro symbol is supported.

Return Values

The **GetCodePage** function returns a value of **TRUE** on success. On failure, the returned value is **FALSE**.

Remarks

This function is supported by SNANLS on Microsoft® Host Integration Server 2004.

GetCodePageDisplayStr

The SNA National Language Support (SNANLS) **GetCodePageDisplayStr** function copies the SNANLS code page display name identified by a key to a character string passed as a parameter.

```
BOOL WINAPI GetCodePageDisplayStr(
    int nKey
    WCHAR *szDisplayStr
);
```

Parameters

nKey
Supplied parameter. The numeric key to a code page. This value is an opaque index into an array containing the code pages supported by SNANLS. This value is normally the *CodePageKey* member of a CodePage structure returned from a previous call to **FindFirstCodePage** or **FindNextCodePage**.

szDisplayStr
Supplied and returned parameter. A pointer to a wide-character array where the SNANLS display name for the specific code page should be copied.

On a successful return, the memory location pointed to by this parameter will be filled with the SNANLS display name for the specific code page. The character string is null terminated.

On failure, no changes will be made to the memory pointed to by this parameter.

Return Values

The **GetCodePageDisplayStr** function returns a value of **TRUE** on success. On failure, the returned value is **FALSE**.

Remarks

This function is supported by SNANLS on Microsoft® Host Integration Server 2004.

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IsInstalledCodePage

The SNA National Language Support (SNANLS) **IsInstalledCodePage** function determines if a code page is installed on a local or remote computer.

```
BOOL WINAPI IsInstalledCodePage(
    UINT CodePage,
    HKEY KeyHandle
);
```

Parameters

CodePage
Supplied parameter. The NLS code page.
KeyHandle
Supplied parameter. The registry key returned from a call to the **OpenNlsRegistry** function.

Return Values

The **IsInstalledCodePage** function returns non-zero if a code page is installed, otherwise a zero value is returned on failure.

Remarks

This function is primarily used by the Print Service in Host Integration Server 2004 to determine if what code pages are supported on a remote computer providing the print services function.

This function is supported by SNANLS on Microsoft® Host Integration Server 2004.

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OpenNlsRegistry

The SNA National Language Support (SNANLS) **OpenNlsRegistry** function opens a registry key on a local or remote computer pointing to the NLS Codepage registry entries.

```
HKEY WINAPI OpenNlsRegistry(
    char *MachineName,
    HKEY hkey,
    LPSTR Path
);
```

Parameters

MachineName
Supplied parameter. The name of the remote computer on which to open the registry. If this parameter is NULL, the registry on the local computer is opened.
hKey
Supplied parameter. The key to the registry to open. If this parameter is NULL, the **HKEY_LOCAL_MACHINE** key is used.
Path
Supplied parameter. The path to the key value in the registry hive to open. If this parameter is NULL, the following key is opened:

SYSTEM\CurrentControlSet\NLS\CodePage.

Return Values

The **OpenNlsRegistry** function returns a handle to the opened registry key on success, otherwise a NULL value is returned on failure.

Remarks

This function is primarily used by the Print Service in Host Integration Server 2004 to determine if what code pages are supported on a remote computer providing the print services function.

This function is supported by SNANLS on Microsoft® Host Integration Server 2004.

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SnaNlsInit

The **SnaNlsInit** function is called to determine if the code page needed is supported by code page translations using SNA National Language Support (SNANLS). This enables an application to determine if the necessary NLS language files containing code page translation tables are installed on the local system.

```
int WINAPI SnaNlsInit(
    UINT CodePage
);
```

Parameters

CodePage
Supplied parameter. The number of the NLS code page for which support is requested. The *CodePage* parameter corresponds with the registry settings on Microsoft® Windows® 2000 located under the **HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Nls\CodePage** subkey.

Return Values

The **SnaNlsInit** function returns non-zero if code page translations are supported; otherwise 0 is returned.

Remarks

If CP_ACP (the current ANSI code page) is passed as the *CodePage* parameter, this functions returns non-zero.

This function is supported by SNANLS on Microsoft® Host Integration Server 2004.

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SnaNlsMapString

The **SnaNlsMapString** function is called to translate a string from one code page to another.

```
int WINAPI SnaNlsMapString(
    LPCTSTR lpSrcStr,
    LPTSTR lpDestStr,
    UINT inCodePage,
    UINT outCodePage,
    int in_length,
    int out_length,
    UINT in_type,
    UINT out_type,
    WORD *Options
);
```

Parameters

lpSrcStr
Supplied parameter. The input source string to be translated.

lpDestStr
Returned parameter. The translated string which may be NULL if *out_length* was zero.

inCodePage
Supplied parameter. Specifies the code page of the incoming source string; ignored if the input is Unicode.

outCodePage
Supplied parameter. Specifies the code page of the output translated string; ignored if the output is Unicode.

in_length
Supplied parameter. Specifies the length of the input source string in characters if the input is multibyte or in wide characters if the input is Unicode.

out_length
Supplied parameter. Specifies the maximum length available for the output translated string in characters if the output is multibyte or in wide characters if the output is Unicode.

in_type
Supplied parameter. Specifies the type of the input source string. Possible values for *in_type* are SNA_MULTIBYTE for multibyte and SNA_UNICODE for Unicode.

out_type
Supplied parameter. Specifies the type of the output translated string. Possible values for *out_type* are SNA_MULTIBYTE for multibyte and SNA_UNICODE for Unicode.

Options
Supplied and returned parameter. As a supplied parameter, this specifies a set of options that may be applied to the translation process, including TrnsDT options and the default character for the translation. On return, this parameter indicates the required buffer length for the output translated string if the function call failed.

Return Values

The **SnaNlsMapString** function returns the number of characters or wide characters written to *lpDestStr* on success; otherwise 0 is returned on failure.

On failure, the Win32® **GetLastError** function should be used to return an error code indicating the cause of the failure. Possible values returned by GetLastError are as follows:

ERROR_NOT_SUPPORTED

This error is returned for two possible reasons—either the NLS language resource file is not available or the *in_type* and *out_type* of the source and destination strings are not of the same type.

ERROR_BUFFER_OVERFLOW

This error is returned if the output buffer is too small. In such cases, the *Options* parameter returns with the value needed for *out_length*.

ERROR_INVALID_PARAMETER

This error is returned if a bad value was passed in a parameter; for example, if the *in_type* or *out_type* parameters contained undefined values.

ERROR_INVALID_DATA

This error is returned if a bad value was passed in the *lpSrcStr* parameter; for example, if the input string has a lead byte at the end.

ERROR_OUTOFMEMORY

This error is returned if memory could not be allocated for use by the SNANLS DLL.

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The TrnsDT API

The SNA National Language Support (SNANLS) API also enables applications to convert double-byte character stream (DBCS) EBCDIC-to-ANSI and DBCS ANSI-to-EBCDIC by leveraging another Microsoft® Host Integration Server 2004 API called TrnsDT. The TrnsDT API has its own mechanism to translate East Asia code pages using conversion table resource files (*.tbl files) that the setup program for Host Integration Server 2004 installs on the target computer.

This section contains:

- TrnsDT Code Page Support
- TrnsDT Resource Files
- TrnsDT API Functions

TrnsDT Code Page Support

The TrnsDT API is used to perform all DBCS EBCDIC-to- ASCII conversions throughout Microsoft® Host Integration Server 2004. To a degree, TrnsDT has been and continues to be a uniform translation method and cross-component resource. TrnsDT also handles mixed DBCS and SBCS, plus SBCS for Japan.

This section contains:

- Host EBCDIC SBCS Using TrnsDT
- Host EBCDIC DBCS Using TrnsDT
- Host EBCDIC Mixed SBCS and DBCS Using TrnsDT
- TrnsDT Conversions Possible

Host EBCDIC SBCS Using TrnsDT

The following table shows the character code set identifiers (CCSIDs) for EBCDIC single byte character sets (SBCS) supported by TrnsDT in Microsoft® Host Integration Server 2004.

Code page display name	Type	CCSID	Character set	Comments
IBM EBCDIC - U.S./Canada	SBCS	037	697	IBM English lowercase
IBM EBCDIC - Japan Katakana (Extended)	SBCS	290	1172	IBM Extended English Katakana
IBM EBCDIC - Korean (Extended)	SBCS	833	934	Korean (Extended)
IBM EBCDIC - Simplified Chinese (Extended)	SBCS	836	935	Simplified Chinese single-byte
IBM EBCDIC - Japan English (Extended)	SBCS	1027	1172	IBM Extended lowercase English
IBM EBCDIC - Traditional Chinese (Extended)	SBCS	28709	937	Traditional Chinese (Extended)

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Host EBCDIC DBCS Using TrnsDT

The following table shows the character code set identifiers (CCSIDs) for EBCDIC double byte character sets (DBCS) supported by TrnsDT in Microsoft® Host Integration Server 2004.

Code page display name	Type	CCSID	Character set	Comments
IBM EBCDIC - Japan	DBCS	300	1001	IBM Japanese (including 4370 user-defined characters).
IBM EBCDIC - Korea	DBCS	834	933	IBM Korean (including 1880 user-defined characters).
IBM EBCDIC - Traditional Chinese	DBCS	835	937	Traditional Chinese Host double-byte (including 6204 user-defined characters)
IBM EBCDIC - Simplified Chinese	DBCS	837	837	Simplified Chinese Host double-byte
IBM EBCDIC - Japan	DBCS	4396	930, 931, 939	IBM Japanese (including 1880 user-defined characters).

Host EBCDIC Mixed SBCS and DBCS Using TrnsDT

The following table shows the character code set identifiers (CCSIDs) for EBCDIC mixed single byte character sets (SBCS) and double byte character sets (DBCS) supported by TrnsDT in Microsoft® Host Integration Server 2004.

Code page display name	**Type**	**CCSID**	**Comments**
IBM EBCDIC - Japan Katakana/Kanji (Extended)	Mixed	930	Japanese Katakana-Kanji mixed with 4370 user-defined characters.
IBM EBCDIC - Japanese	Mixed	931	Japan (English Lower-Case & Japanese)
IBM EBCDIC - Korea (Extended)	Mixed	933	Korean Mixed with 1880 user-defined characters.
IBM EBCDIC - Simplified Chinese (Extended)	Mixed	935	Simplified Chinese Host mixed with 1880 user-defined characters.
IBM EBCDIC - Traditional Chinese (Extended)	Mixed	937	Traditional Chinese Host mixed with 4370/6204 user-defined characters.
IBM EBCDIC - Japan English/Kanji (Extended)	Mixed	939	Japanese Latin Kanji mixed with 4370 user-defined characters.
IBM EBCDIC - Japan Katakana/Kanji (Extended)	Mixed	5026	A subset of CCSID 930 Japanese Katakana-Kanji mixed.
IBM EBCDIC - Japan English/Kanji (Extended)	Mixed	5035	A subset of CCSID 939 Japanese Latin Kanji mixed.

TrnsDT Conversions Possible

The following table describes conversions possible for the TrnsDT API.

Country/ Region	Conversion	From CCSID	To CCSID
Japan	Host-PC	930	932
Japan	Host-PC	931	932
Japan	Host-PC	939	932
Japan	Host-PC	290	932
Japan	Host-PC	1027	932
Japan	Host-PC	5026	932
Japan	Host-PC	5035	932
Japan	PC-Host	932	930
Japan	PC-Host	932	931
Japan	PC-Host	932	939
Japan	PC-Host	932	290
Japan	PC-Host	932	1027
Japan	PC-Host	932	5026
Japan	PC-Host	932	5035
Taiwan	PC-Host	950	937
Taiwan	Host-PC	937	950
Korea	PC-Host	949	933
Korea	Host-PC	933	949
China	PC-Host	936	935
China	Host-PC	935	936

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TrnsDT Resource Files

The **TrnsDt** API uses a series of resource files that contain the necessary translation tables, which are listed in the following table.

File name	**Description**
TRNSDT.DLL	Core global resource used by all TrnsDT conversions
TRNSDTJ.DLL	Core Japanese resource
TRNSDTS.DLL	Core Simplified Chinese (PRC) resource
TRNSDTK.DLL	Core Korean resource
TRNSDTT.DLL	Core Traditional Chinese (Taiwanese) resource
SNADBC.TBL	Japanese double-byte translation tables
SNADBCS.TBL	Simplified Chinese (PRC) double-byte translation tables
SNADBCT.TBL	Simplified Chinese (Taiwanese) double-byte translation tables
SNADBCK.TBL	Korean double-byte translation tables
SNASBC.TBL	Japanese single-byte translation tables
SNASBCS.TBL	Simplified Chinese (PRC) single-byte translation tables
SNASBCK.TBL	Korean single-byte translation tables
SNASBCT.TBL	Traditional Chinese (Taiwanese) single-byte translation tables

TrnsDT API Functions

The TrnsDT API consists of a single function.

This section contains:

- TrnsDT

TrnsDT

The **TrnsDT** function is called to translate a string from one code page to another.

```
WORD WINAPI TrnsDt(
    PASSSTRUCT far* PassParm
);
```

Parameters

PassParm
Supplied parameter. A pointer to a **PASSSTRUCT** structure containing members that must be supplied as well as members that are returned by the function.

The PASSSTRUCT structure

The PASSSTRUCT structure is defined as follows:

```
typedef struct tagPassParm {
    WORD    parm_length;
    WORD    exit_code;
    WORD    in_length;
    LPBYTE  in_addr;
    WORD    out_length;
    LPBYTE  out_addr;
    WORD    trns_id;
    WORD    in_page;
    WORD    out_page;
    WORD    option;
} PASSSTRUCT;
```

Members

parm_length
Supplied parameter. The length of the structure passed, normally set to 24. If the **option** member is not needed or used, then this parameter can be set to 22.

exit_code
Supplied and returned parameter. On entry this member must be set to zero. On return, this member indicates the exit status. Legal values for returned **exit_code** values are as follows:

0

Normal exit code indicating function completed successfully.

1

The requested conversion is not supported.

12

The **exit_code** field was not properly initialized to zero.

128

The last character in the source input string was a DBCS lead byte.

256

The conversion could not be successfully completed since the length of the resulting converted destination string exceeds 65535 bytes.

257

An error occurred when trying to load one and initialize one of the TrnsDTx.dll files.

in_length
Supplied parameter. Specifies the length of the input source string in bytes.

in_addr
Supplied parameter. A pointer to the buffer containing the source string to be converted.

out_length
Supplied and returned parameter. Specifies the maximum length available for the output translated string in bytes. On return, this member is set to the length of the converted output string on success or the output buffer length needed if the buffer was too small.

out_addr
Supplied parameter. A pointer to the buffer that will contain the output destination string after conversion.

trns_id
Supplied parameter. The conversion identifier, which is always zero.

in_page
Supplied parameter. Specifies the code page of the incoming source string.

out_page
Supplied parameter. Specifies the code page of the output translated string.

option
Supplied and returned parameter if **parm_length** was set to 24. As a supplied parameter, this specifies a set of options that may be applied to the translation process. Possible values for these options are as follows:

Bits 15-9

Reserved.

Bit 8

Add shift out (SO)/shift in (SI) bytes to the converted output strings.

Bits 3-7

Reserved.

Bit 2

If this bit is set, then convert the input string using the IBM-specified 1-byte code table. This option is only valid when converting from code page 932 to one of the following code pages: 037, 290, 930, or 931.

If this bit is zero, then convert the input source string using the conversion table that is created using the SYSCTBL utility.

In case of double-byte characters, always use the conversion table created by the SYSCTBL utility.

The SYSCTBL.EXE file is a utility program included with Host Integration Server 2004 that provides a tool that can be used to create custom conversion tables for use with the **TrnsDT** function.

Bit 1

If this bit is set, then it indicates that the input source string starts with a 2-byte character. Generally, the host data always includes SO/SI control characters in pairs, but when converting part of mixed data strings, it is necessary to start the conversion from a double-byte character without the SO control character. In this case, the data itself does not have adequate information to determine if it is double-byte or not, so bit 1 must be set.

Bit 0

If this bit is set, then it indicates that the input source string contains SO/SI control characters. Bit 8 and bit 0 should be set as follows:

Conversion from PC to host Bit 8=1, bit 0 =0
Conversion from host to PC Bit 8=0, bit 0=1

On return, **option** is set to 4 if the last character was a double-byte character.

Return Values

The **TrnsDT** function returns zero on success. On failure, possible values returned by this function are as follows:

ERR_FILE_NOT_FOUND

This error is returned if the TrnsDT table files (*.tbl) could not be found. Normally **TrnsDT** uses the conversion tables located in the Host Integration Server\System directory on Microsoft® Windows Server™ 2003, Windows® XP, and Windows 2000. If **TrnsDT** cannot find these tables, it searches for them in the current directory.

ERR_INVALID_PARAMETER

This error is returned if a bad value was passed for one or more of the members of the *PassParm* structure. Invalid parameters can include not zeroing the **exit_code** member, passing an **in_length** for the input source string of zero or less or greater than 65535 bytes, passing an **out_length** for the output string buffer of zero or less, passing **in_page** or **out_page** members containing undefined codepage values.

ERR_BUFFER_OVERFLOW

This error is returned if the output buffer is too small for the converted output string. In such cases, the **out_length** member returns with the necessary value in bytes for the output buffer. This error is also returned if the length of the output buffer needed to convert the source string would exceed 65535 bytes.

ERR_MEMORY_ALLOCATE

This error is returned if memory could not be allocated for use by the TrnsDT DLL.

Host Integration Server 2004 Components and NLS Support

The following table lists the conversion methods and types used by the various components in Microsoft® Host Integration Server 2004.

Component	**SNANLS**	**TrnsDT (DBCS)**	**Bidirectional layout (Arabic)**	**Notes**
3270 Applet	Yes	Yes	No	
5250 Applet	Yes	Yes	No	
Security Integration Service	Yes	Yes	No	
Host Security	No	No	No	User identifiers and passwords are converted from computer to host. Only Latin I code pages are supported.
NetView Alert Service	No	No	No	
NetView RunCmd Service	No	No	No	
CSV Convert Verb	No	No	No	
ODBC Driver for DB2	Yes	Yes	Yes	
OLE DB Provider for DB2	Yes	Yes	Yes	
OLE DB Provider for AS/400 and VSAM	Yes	Yes	Yes	
Managed Provider for DB2	Yes	Yes	Yes	
Data Queues ActiveX Control	Yes	Yes	No	
Host File Transfer ActiveX Control	Yes	Yes	No	
Transaction Integrator	Yes	Yes	Yes	

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SNA Print Server Data Filter Programmer's Reference

The Host Print Service feature of Microsoft® Host Integration Server 2004 provides server-based 3270 and 5250 printer emulation, enabling host applications to print to a Local Area Network (LAN) printer supported by Microsoft Windows Server™ 2003, Windows® XP, Windows 2000 Server, and Novell NetWare. This section introduces the SNA Print Server Data Filter API (sometimes referred to as the Print Exit API) that can be used to extend the capabilities of the Host Print Service in Host Integration Server 2004. This print data filter DLL can do the following:

- Send data to the printer when a job starts (print a banner page, for example).
- Perform special processing on the data to be printed.
- Send data to the printer upon print job completion (print a trailer page, for example).

This section contains:

- SNA Print Server Data Filter API
- PrtFilterAlloc
- PrtFilterFree
- PrtFilterJobData
- PrtFilterJobEnd
- PrtFilterJobStart

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SNA Print Server Data Filter API

You configure the path to the print data filter DLL. This DLL is used by all sessions actively using the Host Print service. However, the print data filter DLL can specify whether or not it wants a given session's print data passed to it.

The entry points to this DLL are listed as follows:

PrtFilterAlloc
  Obtains a data buffer in which to pass print data.
PrtFilterFree
  Indicates that a data buffer obtained previously from the DLL is no longer needed and the DLL can free the memory allocated for this resource.
PrtFilterJobData
  Allows the DLL to manipulate print data.
PrtFilterJobEnd
  Informs the DLL that a print job has ended.
PrtFilterJobStart
  Informs the DLL that a new print job has started and enables the DLL to send special data to the Print Server at the start of a job.

A description of the example sequence of calls during an ordinary print job is listed below to illustrate how these functions are normally used:

- **PrtFilterStartJob** is called when a new print job is started. The DLL can return a data buffer with special data that will be sent to the printer (a special banner page or special printer initialization strings, for example) before printing data.
- **PrtFilterFree** is called if special data was sent in the **PrtFilterStartJob** function and indicates that the data buffer used to pass special data can be freed.

The next sequence of function calls is repeated until all of the print data has been sent:

- **PrtFilterAlloc** is called to allocate a data buffer used to pass print data in the subsequent call to **PrtFilterJobData**.
- **PrtFilterJobData** is called to pass print data to the DLL for possible modification. This allows the user DLL the opportunity to manipulate the printer data before it is sent to the printer. If the modified print data to be returned requires a larger data buffer or the DLL needs to use a different data buffer for returning data, the DLL may need to allocate a new data buffer to return this data. The DLL may also choose to free the data buffer used to pass the incoming print data if a different data buffer is used to return modified print data. The **PrtFilterFree** function will not be called with the pointer to the original data buffer if a different data buffer is returned by **PrtFilterJobData**.
- **PrtFilterFree** is called to indicate that the data buffer allocated by **PrtFilterAlloc** for passing incoming data to the **PrtFilterJobData** function can be freed. If a different data buffer was returned by **PrtFilterJobData**, then **PrtFilterFree** would be called to indicate that a data buffer allocated by the DLL used to return modified print data in the **PrtFilterJobData** function can be freed.

The final sequence occurs when all of the print data has been processed:

- **PrtFilterEndJob** is called to indicate the end of the print job and allows the DLL the option to return special data (a trailer page, for example) that should be sent to the printer.
- **PrtFilterFree** is called if special data was sent in the **PrtFilterEndJob** function and indicates that the data buffer used to pass special data can be freed.

PrtFilterAlloc

The **PrtFilterAlloc** function is called to obtain a data buffer from the user filter DLL in which to pass it the print data.

```
void * WINAPI PrtFilterAlloc(
  DWORD BufLen
);
```

Parameters

BufLen
Supplied parameter. Indicates the length of buffer required.

Return Values

The **PrtFilterAlloc** function allocates a memory block of *BufLen* size and returns a pointer to the buffer. This function should return a NULL pointer on failure.

See Also

PrtFilterFree

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PrtFilterFree

The **PrtFilterFree** function is called to indicate that a data buffer obtained previously from the DLL is no longer needed and the DLL can free the memory allocated for this resource. This function is called for data buffers returned from calls to **PrtFilterAlloc** as well as buffers that were allocated by the DLL to pass data in the **PrtFilterStartJob**, **PrtFilterJobData**, and **PrtFilterEndJob** functions.

```
void WINAPI PrtFilterFree(
  void *pBuf
);
```

Parameters

pBuf
Supplied parameter. Points to the data buffer that can be freed.

See Also

PrtFilterAlloc

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PrtFilterJobData

The **PrtFilterJobData** function is called to give the user DLL the opportunity to manipulate the printer data before it is printed. This allows the DLL to provide custom processing for print data sent to the print server.

```
void WINAPI PrtFilterJobData(
  void *UniqueID,
  char **pBufPtr,
  DWORD *pBufLen
);
```

Parameters

UniqueID
Supplied parameter. The *UniqueID* value returned by the **PrtFilterJobStart** function to identify a print job.

pBufPtr
The print server passes the print data received from the host to the user DLL for processing in this incoming buffer. The user DLL returns to the print server a pointer to an outgoing buffer of data to be printed. This outgoing buffer pointer can be different from the received buffer pointer because the print data filter DLL can modify the data. Note that in this case **PrtFilterFree** will only be called by the Host Print Service for the outgoing buffer pointer. If necessary, the print data filter DLL must call its own free function on the incoming buffer pointer that was supplied to the **PrtFilterJobData** function. This incoming buffer was allocated by a Host Print Service by a previous call to **PrtFilterAlloc.**

pBufLen
Indicates the length of the data passed in the buffer to the print server and the length of the buffer returned to the print server by the user-provided DLL.

Remarks

The data in the buffer is printable ASCII and/or printer control sequences if these are being sent in the print jobs. The buffer returned by the user DLL does not have to be the same as the buffer passed in. The returned buffer will always be freed by calling **PrtFilterFree** after the data has been spooled. The unique identifier parameter *UniqueID* is the identifier returned from a previous call to the **PrtFilterJobStart** function.

See Also

PrtFilterFree

PrtFilterJobStart

PrtFilterJobEnd

The **PrtFilterJobEnd** function is called to inform the print data filter DLL that a print job is about to end. This allows the DLL to provide custom processing and send special data to the print server at the end of a print job.

```
void * WINAPI PrtFilterJobEnd(
  void *UniqueID,
  char **pBufPtr,
  DWORD *pBufLen
);
```

Parameters

UniqueID
Supplied parameter. The *UniqueID* value returned by the **PrtFilterJobStart** function to identify a print job.
pBufPtr
Returned parameter. Specifies a pointer to a buffer pointer holding additional data to be printed by the print server.
pBufLen
Returned parameter. Pointer to the length of the data provided by the print data filter DLL in the buffer.

Remarks

No data is passed in the buffer, but the user DLL can return print data which will be sent to the printer before the print job is ended.

See Also

PrtFilterJobStart

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PrtFilterJobStart

The **PrtFilterJobStart** function is called to inform the print data filter DLL that a new job has just been started. This allows the DLL to provide custom processing and send special data to the print server at the beginning of a job.

```
void * WINAPI PrtFilterJobStart(
  char *SessionName,
  DWORD LUType,
  char **pBufPtr,
  DWORD *pBufLen
);
```

Parameters

SessionName
Supplied parameter. The name of the print session which has just started a print job. The *SessionName* is the same as that configured in using the SNA Print Service Admin tool.

LUType
Supplied parameter. Specifies the printer type. Valid values are LU 1, LU 3, or LU 6.2 printers, represented by an *LUType* value of 1, 3, or 6.

pBufPtr
Returned parameter. Specifies a pointer to a buffer pointer holding additional data to be printed by the print server.

pBufLen
Returned parameter. Pointer to the length of the data provided by the print data filter DLL in the buffer.

Return Values

The **PrtFilterJobStart** function returns a unique identifier (cast to a pointer to a void) if it wants the opportunity to filter the data for this print job.

If the user DLL returns a NULL pointer, it is indicating that it is not interested in filtering this job. No further calls to the user DLL will be made for this print job.

Remarks

No data is passed in the data buffer to the print data filter DLL in this call, but the DLL can return data in *pBufPtr* (for example, a banner page). The data returned from this call should be printable ASCII and/or printer control sequences.

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SNADIS Drivers Programmer's Reference

This section provides reference material for developers writing their own SNALink software.

This section contains:

- Base/DMOD and SNALink Entry Points
- SNADIS Message Formats
- Configuration Entry Points
- Setup Functions
- IOCTL Commands
- SNA Modem API
- SNA Perfmon API

Base/DMOD and SNALink Entry Points

This section gives definitions for Base/DMOD and SNALink entry points that must be supplied in an SNALink.

This section contains:

- SNAGetBuffer
- SNAGetElement
- SNAGetLinkName
- SNAGetVersion
- SNALinkDispatchProc
- SNALinkInitialize
- SNALinkTerminate
- SNALinkWorkProc
- SNAReleaseBuffer
- SNAReleaseElement
- SNASendAlert
- SNASendMessage

SNAGetBuffer

The **SNAGetBuffer** function is called by an application to get a buffer with a requested number of elements.

```
PTRBFHDR SNAGetBuffer(
INTEGER numelts
);
```

Parameters

numelts
Number of elements required.

Return Values

A pointer to the buffer obtained. NULL if a buffer could not be obtained.

Remarks

Each element has a size of 268, the constant SNANBEDA in the header file SNA_DLC.H.

The returned buffer consists of a header and the required number of elements. The header points to the first element, which points to the next element and so on to make an element chain.

It is possible to add an element to an existing buffer by calling SNAGetElement to get the extra element. The new element should be added to the element chain of the buffer, and the number of elements count should be updated.

The application must release any buffers that are not transmitted.

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SNAGetElement

The **SNAGetElement** function is called by an application to get a buffer element to append to an existing buffer.

```
VOID SNAGetElement(
PTRBFELT *eltptr
);
```

Parameters

eltptr

Pointer to a pointer to an element. On return, this points to a pointer to the element obtained, or to NULL if an element was not obtained (an internal error).

Remarks

This function should only be used to get extra elements for an existing buffer. SNAGetBuffer should be used to get a new buffer.

The new element should be added to the chain of elements from the existing buffer header and the count of the number of elements updated.

This function is typically used when a received buffer is being reused to transmit a message that is longer than the incoming message.

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SNAGetLinkName

The SNALink can call the **SNAGetLinkName** function to obtain its configured SNALink name.

```
VOID SNAGetLinkName(
UCHAR *linkname
);
```

Parameters

linkname
A pointer to a buffer where the NULL-terminated SNALink name is stored.

Remarks

The buffer should be at least nine bytes in length.

SNAGetVersion

The **SNAGetVersion** function returns the major version number in the low byte and minor version number in the high byte.

```
USHORT FAR SNAGetVersion(void);
```

SNALinkDispatchProc

The **SNALinkDispatchProc** function is the link dispatcher function. The Base calls this function whenever one of the following events occurs:

- A message arrives for the link.
- The Base timer expires.
- Contact is lost with the local node.

```
VOID SNALinkDispatchProc(
PTRBFHDR msgptr,
INTEGER function,
INTEGER locality
);
```

Parameters

msgptr
The message to be processed, or NULL if some other event is being notified.
function
The reason for **SNALinkDispatchProc** being called.
locality
L value (only valid for function SBLOST).

Remarks

The *function* parameter can have one of three values:

- 0—Message received.
- SBLOST—Contact lost with local node; L-value of locality.
- SBTICK—Base timer has expired; occurs every five seconds.

For suggested usage of this function, see Sample Code for SNALinkDispatchProc.

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SNALinkInitialize

The **SNALinkInitialize** function initializes the SNALink. The Base calls this function when the SNALink is loaded into memory.

```
VOID SNALinkInitialize(
HANDLE event
);
```

Parameters

event
A handle to the global Base event.

Remarks

This function should:

- Read in required configuration information.
- Perform any required initialization of the hardware or device driver.
- Set up control blocks and data structures required internally by the SNALink.

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SNALinkTerminate

The **SNALinkTerminate** function terminates the SNALink. The Base calls this function, when present, during service shutdown. This allows the DLL to free memory, release system resources (such as events), and close drivers.

```
VOID SNALinkTerminate(void);
```

Remarks

This function must not send messages to other SNA components.

SNALinkWorkProc

The **SNALinkWorkProc** function is the work manager function. The Base calls this function whenever the global Base event is triggered by the SNALink, or at least once every five seconds.

```
VOID SNALinkWorkProc(void);
```

Remarks

This function can be used to perform any general processing required by the SNALink, in particular to process messages received from the link.

SNAReleaseBuffer

The **SNAReleaseBuffer** function is called by an application to release a buffer.

```
VOID SNAReleaseBuffer(
PTRBFHDR msgptr
);
```

Parameters

msgptr
Pointer to the buffer to be released.

Remarks

It is important that buffers are released after use. This is done automatically when a message is transmitted. For messages received, it is the responsibility of the application either to release or to reuse the buffer.

This function releases both the buffer header and any associated buffer elements. It is possible to release single elements from a buffer by using the function SNAReleaseElement.

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SNAReleaseElement

The **SNAReleaseElement** function is called by an application to release a buffer element from an existing buffer.

```
VOID SNAReleaseElement(
PTRBFELT *eltptr
);
```

Parameters

eltptr
Pointer to a pointer to the element to be released.

Remarks

This function should only be used to release surplus elements from a buffer. SNAReleaseBuffer should be called to release the entire buffer.

The released element should first be removed from the element chain and the count of the number of elements updated.

This function is typically used when a received buffer is being reused to transmit a message that is shorter than the incoming message.

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SNASendAlert

The SNALink calls the **SNASendAlert** function to send a complete preformatted Network Management Vector Transport (NMVT) alert to NetView.

```
VOID SNASendAlert(
PTRBFHDR msgptr,
INTEGER severity
);
```

Parameters

msgptr
Pointer to the NMVT alert to be sent.
severity
The severity of the problem that caused the alert (ranges from 0 through 16).

Remarks

The complete NMVT to be sent must be generated by the SNALink and inserted into a buffer. Only the elements are used—the buffer header need not be set up before sending. The fields **startd** and **endd** should be set to reflect the location of the NMVT within the element. Multiple elements can be used to store the NMVT, up to a maximum length of 512 bytes. The buffer will be freed by the Base after the NMVT has been sent.

Any NMVT sent refers to a particular Microsoft® Host Integration Server 2004 connection. It is recommended that the NMVT include at least a hierarchy resource list, giving the name of the remote physical unit (PU) that the connection is associated with. This name is supplied to the SNALink on the Open(STATION) message.

For complete details of the format of an NMVT, see the IBM manual *SNA Formats* (GA27-3136).

SNASendMessage

The **SNASendMessage** function is called by an application to send messages to other localities (in the case of an SNALink, the local 2.1 node).

```
VOID SNASendMessage(
PTRBFHDR *msgptr
);
```

Parameters

msgptr
Pointer to message to be sent.

Remarks

The locality, partner, index (LPI) values on the message should be set up to reference the correct connection for the data to be passed.

SNADIS Message Formats

This section describes the SNA Device Interface Specification interface in terms of message formats. These are presented in a language-independent notation that is described below.

The messages used between the node and the SNALinks are shown in the following table.

Message type	Direction	LPI connection
Open(LINK)Request	NODE ------> DLC	LINK
Close(LINK)Request	NODE ------> DLC	LINK
Send-XID	NODE ------> DLC	LINK
Open(STATION) Request	NODE ------> DLC	STATION
Close(STATION) Request	NODE ------> DLC	STATION
Open(LINK) Response	NODE <------ DLC	LINK
Close(LINK) Response	NODE <------ DLC	LINK
Request-Open-Station	NODE <------ DLC	LINK
Open(STATION) Response	NODE <------ DLC	STATION
Close(STATION) Response	NODE <------ DLC	STATION
Station-Contacted	NODE <------ DLC	STATION
Outage	NODE <------ DLC	LINK/STATION
DLC-Data	NODE <-----> DLC	STATION
Status-Resource	NODE <-----> DLC	STATION

Details of the message format notation and key assumptions about the contents of the message formats are as follows:

- "Reserved" indicates that the field must be set to zero (for a numeric field) or all nulls (for names) by the sender of the message.
- "Undefined" indicates that the value of the field is indeterminate. The field is not set by the sender and should not be examined by the receiver of the message.
- Fields that occupy two bytes — the **srci** field in all messages, and fields such as **opresid** in Open(LINK) Request — are represented with the arithmetically most significant byte in the lowest byte address, irrespective of the normal byte order used by the processor on which the software executes. That is, the 2-byte value 0x1234 has the byte 0x12 in the lowest byte address. The exception to this is the **startd** and **endd** fields in all elements, which are always stored in the processor's normal byte order.
- Messages are composed of buffers, consisting of a buffer header and zero or more buffer elements. For more information on buffer formats, see Messages.
- The **startd** field in each element gives the offset of the first byte of data in the element after the **trpad** field. Its value will either be 1 (data starts in the byte after the **trpad** field), 10 (nine bytes of padding are included between the **trpad** field and the start of the data), or 13 (12 bytes of padding are included between the **trpad** field and the start of the data). Any extra bytes are used by the local node for additional header information. This avoids having to copy data into a new buffer when adding this information.
- Because **startd** indicates the index into **dataru** starting from 1, not 0, the first byte of valid data will always be at **dataru[startd–1]**.
- All fields within **dataru** are of type unsigned character (UCHAR), except where the notes indicate otherwise.

This section contains:

- Open(LINK)
- Open(LINK) Request
- Open(LINK) Response
- Close(LINK)
- Close(LINK) Request
- Close(LINK) Response
- Open(STATION)
- Open(STATION) Request
- Open(STATION) OK Response
- Open(STATION) Error Response

- Close(STATION)
- Close(STATION) Request
- Close(STATION) Response
- Request-Open-Station
- Station-Contacted
- Outage
- Status-Resource
- Send-XID
- DLC-Data

Open(LINK)

Open(LINK) is used by the node to open the LINK LPI connection.

Open(LINK) Request

Flow : NODE ------> DLC

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue.
hdreptr	PTRBFELT	Pointer to first buffer element.
numelts	CHAR	Number of buffer elements: 1 (Number of elements can be 2 if the connection is for an X.25 SVC).
msgtype	CHAR	Message type: OPENMSG (0x01).
srcl	CHAR	Source locality.
srcp	CHAR	Source partner.
srci	INTEGER	Source index.
destl	CHAR	Destination locality.
destp	CHAR	Destination partner.
desti	INTEGER	Destination index.
ophdr.openqual	CHAR	Open qualifier: REQU (0x01).
ophdr.opentype	CHAR	Open type: LINK (0x10).
ophdr.opresid	INTEGER	Resource identifier.

Element 1

Field	Type	Description
hdreptr–>elteptr	PTRBFELT	Pointer to optional second buffer element (NULL if only one element).
hdreptr–>startd	INTEGER	Index to start of data in this buffer element's data array.
hdreptr–>endd	INTEGER	Index to last byte of data in this buffer element's data array.
hdreptr–>dataru	CHAR[SNANBEDA]	Defined as follows, where s = startd–1
dataru[s..s+9]	Not applicable	Source name — name of local node.
dataru[s+10..s+19]	Not applicable	Destination name—name of remote PU (blank for incoming calls).
dataru[s+20..s+21]	Not applicable	Link index.

Link Data (depends on DLC type)

Unless otherwise stated, these fields are valid for outgoing calls only.

SDLC link data field	Description
dataru[s+22]	XID supplied 0x00 Do not send initial XID 0x01 Send initial XID from this message (may be a NULL XID)
dataru[s+23]	Link operational role 0x00 Primary 0x01 Secondary 0x02 Negotiable
dataru[s+24]	Use Reject_Command indicator 0x00 Do use it 0x01 Do not use it
dataru[s+25]	Address match byte 0x00 Primary/Negotiable SDLC 0x01 to 0xFE Secondary SDLC
dataru[s+26]	Second SDLC address match byte 0x00 Primary SDLC 0xFF Secondary/Negotiable SDLC
dataru[s+27]	Reserved

Channel adapter link data	Description
dataru[s+22]	XID supplied. 0x00 Do not send initial XID. 0x01 Send initial XID from this message (may be a NULL XID).

dataru[s+23]	PU emulation type. 0x00 Unknown. 0x20 PU 2.0 (format 0 XID). 0x21 PU 2.1 (format 3 XID).
dataru[s+24]	Control Unit Image number (0 to 15) on the Channel address configured in SNA Manager.
dataru[s+25]	Channel subaddress.
dataru[s+26..s+67]	Reserved (may not be zero).

Station timers	Description
dataru[s+28..s+29]	Contact time-out.
dataru[s+30..s+31]	Contact retry limit.
dataru[s+32..s+33]	Discontact time-out.
dataru[s+34..s+35]	Discontact retry limit.
dataru[s+36..s+37]	Negative poll time-out.
dataru[s+38..s+39]	Negative poll retry limit.
dataru[s+40..s+41]	T1 (no acknowledgment) time-out.
dataru[s+42..s+43]	T2 (acknowledgment) time-out.
dataru[s+44..s+45]	Remote station busy time-out.
dataru[s+46..s+47]	Remote station busy retry limit.

Link timers	Description
dataru[s+48..s+49]	Idle time-out.
dataru[s+50..s+51]	Idle retry limit.
dataru[s+52..s+53]	Nonproductive receive time-out.
dataru[s+54..s+55]	Nonproductive receive retry limit.
dataru[s+56..s+57]	Write time-out.
dataru[s+58..s+59]	Write retry limit.
dataru[s+60..s+61]	Link connection time-out.
dataru[s+62..s+63]	Link connection retry limit. 0xFFFF for infinite retry.
dataru[s+64..s+65]	Reserved.
dataru[s+66]	Configuration options: Bit 0 : 1 = Constant carrier selected Bit 1 : 1 = NRZI 0 = NRZ Bit 2 : = Reserved Bit 3 : 1 = Full-duplex 0 = Half-duplex Bit 4 : 0 = External clocking Bit 5 : 1 = Data signal rate select high 0 = Data signal rate select low Bit 6 : 1 = Select standby on 0 = Select standby off Bit 7 : = Reserved
dataru[s+67]	Configuration options: line type 0x00 leased 0x01 switched manual dial 0x02 switched auto-dial

Note that for configuration options, bit 0 is the most significant option and bit 7 is the least significant. Reserved bits are not always zero, so always use a bitwise **AND** operation when testing these bits.

The configuration options byte is also valid for incoming calls.

This section contains:

- Expanded Information About Message Formats for Open(LINK) Request with SDLC
- Optional Second Element (Only Used by X.25 SVC)

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Expanded Information About Message Formats for Open(LINK) Request with SDLC

The following list supplements the information found in the table in Open(LINK) Request. The timers described in the lists are used by a Synchronous Data Link Control (SDLC) link service to determine when to retry communication and when to generate outages. Generally, after the time interval specified by the time-out (usually 1000 milliseconds), the communication is retried. The cycle of time-out and retry is repeated until the retry limit is reached. Then an Outage message is sent by the SDLC link service.

With some timers, there are no communication retries. Such timers simply cycle through the time-out as many times as allowed in the retry limit (without actually retrying), then generate an **Outage** message.

Each description indicates whether you can configure the field through a Microsoft® Host Integration Server 2004 interface (such as the SNA Manager program). If the field is not configurable, the built-in setting for the field is shown.

SDLC Link Data

dataru[s+22] XID supplied

This field controls whether an initial exchange identification (XID) is sent on this connection. The value used is determined by the leased or switched setting for the line:

Leased line: 0x00 Do not send an initial XID.
Switched line: 0x01 Send an initial XID (may be a NULL XID).

A line is configured as leased or switched in Host Integration Server 2004 Setup.

dataru[s+24] Use Reject_Command indicator

This field determines that the link service will not send a Reject command (an SDLC command, not often used, value 0x19) if a frame is received with an invalid next-to-send (NS) value. Instead, the link service waits until the next poll before requesting retransmission of the frame.

This field is not configurable and must remain at the setting of "Do not use."

Station Timers (described for SDLC only)

dataru[s+28..s+29] Contact time-out
dataru[s+30..s+31] Contact retry limit

This timer is started when an XID or set normal response mode (SNRM) is transmitted. If the time-out expires without acknowledgment, the frame is retransmitted. When the number of retransmitted frames reaches the retry limit, an outage is generated. Note that for XIDs, the time-out value is randomized to prevent possible clashes between two servers sending XIDs simultaneously.

This timer is configurable in SNA Manager, in the advanced settings for an SDLC connection.

dataru[s+32..s+33] Discontact time-out
dataru[s+34..s+35] Discontact retry limit

This timer is started when a discontact (DISC) is sent. It is stopped when an unnumbered acknowledgment (UA) or disconnect mode (DM) is received. If the number of sent DISCs reaches the retry limit, an outage is generated.

This timer is not configurable. The discontact time-out is 1000 milliseconds; the discontact retry limit is 3.

dataru[s+36..s+37] Negative poll time-out
dataru[s+38..s+39] Negative poll retry limit

This timer is used for primary SDLC only. At intervals specified by the negative poll time-out, a receive ready (RR) is transmitted. The negative poll retry limit is set at no limit; therefore, no outage is generated, no matter how many RRs are transmitted without acknowledgment being received.

The negative poll time-out is configurable in SNA Manager, in the advanced settings for an SDLC connection, where the time-out is called poll rate. Poll rate is set in polls per second (and translated internally into the negative poll time-out, timed in milliseconds).

The negative poll retry limit is not configurable. It is set at –1, meaning no limit.

dataru[s+40..s+41] T1 (no acknowledgment) time-out
dataru[s+42..s+43] N2 (no acknowledgment) retry limit

This timer is used for primary SDLC and is started when a poll/final bit is expected. If the time-out expires before a frame containing a poll/final bit is received, an RR is sent. When the number of sent RRs reaches the retry limit, an outage is generated.

This timer is configurable in SNA Manager, in the advanced settings for an SDLC connection, where it is called the poll time-out and poll retry limit.

dataru[s+44..s+45] Remote station busy time-out
dataru[s+46..s+47] Remote station busy retry limit
This timer is used for primary SDLC and is started when a receive not ready (RNR) is received. It is stopped when an RR is received. If the time-out expires the number of times specified by the retry limit, an outage is generated.

This timer is not configurable. The remote station busy time-out is 1000 milliseconds. The remote station busy retry limit is 30. Therefore, the time allowed before an outage is 30 seconds.

Link Timers (described for SDLC only)

dataru[s+48..s+49] Idle time-out
dataru[s+50..s+51] Idle retry limit
This timer is configurable in SNA Manager, in the advanced settings for an SDLC connection.
dataru[s+52..s+53] Nonproductive receive time-out
dataru[s+54..s+55] Nonproductive receive retry limit
This timer is used for secondary SDLC only and is started when any frame is received for this station. It is stopped when additional frames are received for this station. If the time-out expires the number of times specified by the retry limit, the link service causes a pop-up message, but does not generate an outage (because multidrop lines can be very slow).

This timer is not configurable. The nonproductive receive time-out is 1000 milliseconds (1 second); the nonproductive receive retry limit is 60. Therefore, the time allowed before a pop-up message is 60 seconds.

dataru[s+56..s+57] Write time-out
dataru[s+58..s+59] Write retry limit
This timer is started after an information frame has been transmitted to the hardware and stopped when the hardware acknowledges the frame. If the time-out expires the number of times specified by the retry limit, an outage is generated.

This timer is not configurable. The write time-out is 1000 milliseconds (one second). The write retry limit is 15. Therefore, the time allowed before an outage is 15 seconds.

dataru[s+60..s+61] Link connection time-out
dataru[s+62..s+63] Link connection retry limit
This timer is started when an open link for a leased line is received, and stopped when Data Set Ready (DSR) is raised. If the time-out expires the number of times specified by the retry limit, an outage is generated.

This timer is not configurable. The link connection time-out is 1000 milliseconds (one second). The link connection retry limit is 300. Therefore, the time allowed before an outage is 300 seconds.

X.25 link data	Description
dataru[s+22]	Circuit type 0x00 PVC 0x01 SVC
dataru[s+23]	PVC alias, starting at 1 for lowest PVC channel number (reserved for SVC).
dataru[s+24..s+25]	PVC packet size (reserved for SVC).
dataru[s+26]	Default level 3 window size for PVC (reserved for SVC).
dataru[s+27]	Link role: 0x00 Primary 0x01 Secondary 0x02 Negotiable

802.2 link data	Description
dataru[s+22]	Maximum receives without a transmit acknowledgment.
dataru[s+23]	Maximum transmits without a receive acknowledgment.
dataru[s+24]	Dynamic window increment value.
dataru[s+25]	Remote local service access point (SAP) address.
dataru[s+26]	Local SAP address (for incoming calls).
dataru[s+27]	Value for t1 timer multiplier.
dataru[s+31]	Value for t2 timer multiplier.
dataru[s+35]	Value for t3 timer multiplier.
dataru[s+42]	Maximum retry count (N2 value). Note that this 802.2 link data is required for the 802.2 command DLC.OPEN.STATION.

Note that if the fields in the preceding table for timer multipliers are set to zero, the SNALink should use appropriate defaults.

End of link data section	Description
dataru[s+68..s+69]	Length of link connection data (= a) (0x0000) None present
dataru[s+70..s+70+a]	Link connection data
dataru[s+70+b..s+71+b]	Where b is maximum of a and 20. Size of XID I-frame (= n) (0x0000) NULL XID
dataru[s+72+b]	XID

Note that if there are 20 or fewer bytes of link connection data, the XID length is at s+90 and the actual XID starts at s+92.

The link connection data can contain one of the following:

- Media access control (MAC) address of remote station
- X.25 address of remote station
- Dial-digits for manual or auto-dial modems

Optional Second Element (Only Used by X.25 SVC)

Element 2

Field	Type	Description
hdreptr–>elteptr–>elteptr	PTRBFELT	Pointer to next buffer element: NULL
hdreptr–>elteptr–>startd	INTEGER	Index to start of data in this buffer element's data array: 1
hdreptr–>elteptr–>endd	INTEGER	Index to last byte of data in this buffer element's data array
hdreptr–>elteptr–>dataru	CHAR[SNANBEDA]	Defined as follows, where s = startd–1
dataru[s]	Not applicable	Length of facilities data field (= c) inclusive of this length byte 0x01 no facilities data
dataru[s+1..s+c–1]	Not applicable	CHAR[c–1]Facilities data
dataru[s+c]	Not applicable	CHARLength of user data field (= d) inclusive of this length byte 0x01 no user data
dataru[s+c+1..s+c+d]	Not applicable	User data

Open(LINK) Response

Flow : DLC ------> NODE

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element
numelts	CHAR	Number of buffer elements: 1
msgtype	CHAR	Message type: OPENMSG (0x01)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
ophdr.openqual	CHAR	Open qualifier - RSPOK (0x02) - RSPERR (0x03)
ophdr.opentype	CHAR	Open type - LINK (0x10)
ophdr.opresid	INTEGER	Resource identifier
ophdr.operr1	INTEGER	Error code (see immediately following the table)
ophdr.operr2	INTEGER	Reserved
hdreptr–>elteptr	PTRBFELT	Pointer to next buffer element: NULL
hdreptr–>startd	INTEGER	Index to start of data in this buffer element's data array: 1
hdreptr–>endd	INTEGER	Index to last byte of data in this buffer element's data array
hdreptr–>dataru	CHAR[SNANBEDA]	Defined as follows, where s = startd–1
dataru[s..s+9]	Not applicable	Source name—same as destination name from **Open(LINK) Request**
dataru[s+10..s+19]	Not applicable	Destination name—name of local node; same as source name from **Open(LINK) Request**
dataru[s+22..s+23]	Not applicable	The maximum BTU size supported by SNALink. This size is 65,536 (largest number in an unsigned short) for channel connections and 32,768 for non-channel connections. Note that this limit does not guarantee that the SNA connection will actually use this value. The individual link service or the host can negotiate it downward.

The error codes (for an ERROR-RESPONSE) are defined as follows in SNA_CNST.H:

Symbolic constant	Value	Description
ERINIFAIL	0x01	Hardware initialization failed
ERINVXID	0x08	Invalid XID length
ERLINKOPN	0x09	Link already open
ERLLCERR	0x0A	LCC error; fatal hardware failure
ERBADINDX	0x0B	Invalid link index
ERBADOPN	0x0C	**Open(LINK)** has insufficient data
ERCONNTO	0x0D	Link connection time-out

ERNORES	0x0E	Maximum connection count reached –or– No more internal control blocks
EROPNPND	0x11	**Close(LINK)** arrived while **Open(LINK)** pending
ERDUPREQ	0x12	Duplicate request

Close(LINK)

Close(LINK) is used by the node to close the LINK LPI connection.

Close(LINK) Request

Flow : NODE ------> DLC

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element: NULL
numelts	CHAR	Number of buffer elements: 0
msgtype	CHAR	Message type: CLOSEMSG (0x02)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
clhdr.closqual	CHAR	Close qualifier: REQU (0x01)
clhdr.clstype	CHAR	Close type: LINK (0x10)

Note that the message consists of a buffer header only.

Close(LINK) Response

Flow : DLC ------> NODE

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element: NULL
numelts	CHAR	Number of buffer elements: 0
msgtype	CHAR	Message type: CLOSEMSG (0x02)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
clhdr.closqual	CHAR	Close qualifier - RSPOK (0x02) - RSPERR (0x03)
clhdr.clstype	CHAR	Close type: LINK (0x10)
clhdr.clserr1	INTEGER	Error code (see immediately following the table)

The error codes (for an ERROR-RESPONSE) are defined as:

- 0x03 — Link not open
- 0x04 — Invalid link index

Note The message consists of a buffer header only.

Note The **Close(LINK)** message unconditionally shuts down the link.

Open(STATION)

Open(STATION) is used by the node to open the STATION LPI connection.

Open(STATION) Request

Flow : NODE ------> DLC

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element
numelts	CHAR	Number of buffer elements: 1
msgtype	CHAR	Message type: OPENMSG (0x01)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
ophdr.openqual	CHAR	Open qualifier: REQU (0x01)
ophdr.opentype	CHAR	Open type: STAT (0x11)
ophdr.opresid	INTEGER	Resource identifier
ophdr.icreditr	INTEGER	Initial credit for flow DLC –> NODE

Element

Field	Type	Description
hdreptr–>elteptr	PTRBFELT	Pointer to optional second buffer element (NULL if only one element)
hdreptr–>startd	INTEGER	Index to start of data in this buffer element's data array: 1
hdreptr–>endd	INTEGER	Index to last byte of data in this buffer element's data array
hdreptr–>dataru	CHAR[SNANBEDA]	Defined as follows, where s = startd–1
dataru[s..s+9]	Not applicable	Source name—name of local node
dataru[s+10..s+19]	Not applicable	Destination name
dataru[s+20..s+21]	Not applicable	Link index as specified in **Open(LINK) Request**
dataru[s+22]	Not applicable	If NODE is primary, address of secondary station to initiate contact procedure with. 0x00 if NODE is secondary
dataru[s+23]	Not applicable	FID2 indicator 0x00 FID2 used
dataru[s+24]	Not applicable	Station type 0x00 Subarea 0x01 Peer
dataru[s+25..s+26]	Not applicable	Length of network name from received XID 0000 = No name
dataru[s+27..s+27+n]	Not applicable	Network name from received XID, in local character set, or if this is null, the name of the remote PU record in the COM.CFG file. This name can be fully qualified and has a maximum length of 17 characters.
dataru[s+44..s+89]	Not applicable	Link data—a copy of that supplied on the **Open(LINK) Request**

dataru[s+90..s+91]	Not applicable	The maximum BTU size to be used with this station. This size is 65,536 (largest number in an unsigned short) for channel connections and 32,768 for non-channel connections. Note that this limit does not guarantee that the SNA connection will actually use this value. The individual link service or the host can negotiate it downward.
dataru[s+m+1]	Not applicable	Local service access point (SAP) used by remote station. The remote SAP information is only allowed for 802.2 connections, and may only be present if Signaling information is present. It is used along with the Signaling Information to identify the remote station.

Open(STATION) OK Response

Flow : DLC ------> NODE

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element
numelts	CHAR	Number of buffer elements: 1
msgtype	CHAR	Message type: OPENMSG (0x01)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
ophdr.openqual	CHAR	Open qualifier: RSPOK (0x02)
ophdr.opentype	CHAR	Open type: STAT (0x11)
ophdr.opresid	INTEGER	Resource identifier
ophdr.icreditr	INTEGER	Initial Credit for flow DLC –> NODE
ophdr.icredits	INTEGER	Initial Credit for flow NODE –> DLC

Element

Field	Type	Description
hdreptr–>elteptr	PTRBFELT	Pointer to next buffer element (NULL is only one element)
hdreptr–>startd	INTEGER	Index to start of data in this buffer element's data array: 1
hdreptr–>endd	INTEGER	Index to last byte of data in this buffer element's data array
hdreptr–>dataru	CHAR[SNANBEDA]	Defined as follows, where s = startd–1
dataru[s..s+9]	Not applicable	Source name—same as destination name from **Open(STATION) Request**
dataru[s+10..s+19]	Not applicable	Destination name—name of local node; same as source name from **Open(STATION) Request**

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Open(STATION) Error Response

Flow : DLC ------> NODE

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element
numelts	CHAR	Number of buffer elements: 1
msgtype	CHAR	Message type: OPENMSG (0x01)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
ophdr.openqual	CHAR	Open qualifier: RSPERR (0x03)
ophdr.opentype	CHAR	Open type: STAT (0x11)
ophdr.opresid	INTEGER	Resource identifier
ophdr.operr1	INTEGER	Error code
ophdr.operr2	INTEGER	Reserved

Element

Field	Type	Description
hdreptr–>eltептr	PTRBFELT	Pointer to next buffer element (NULL is only one element)
hdreptr–>startd	INTEGER	Index to start of data in this buffer element's data array - 1
hdreptr–>endd	INTEGER	Index to last byte of data in this buffer element's data array
hdreptr–>dataru	CHAR[SNANBEDA]	Defined as follows, where s = startd - 1
dataru[s..s+9]	Not applicable	Source name
dataru[s+10..s+19]	Not applicable	Destination name

The error codes are defined as follows:

Symbolic constant	Value	Description
ERLKNOTOPEN	0x03	Link not open
ERSTATOPEN	0x05	Station already open
ERNOCB	0x06	Station control blocks depleted
ERINVINDX	0x07	Invalid link index
ERMAXSTAT	0x08	Limit for number of stations per link reached
ERDIFADDR	0x09	Address different from that on **Request-Open-Station**
ERBADADDR	0x0A	Invalid DLC address

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Close(STATION)

Close(STATION) is used by the node to close the STATION LPI connection.

Close(STATION) Request

Flow : NODE ------> DLC

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element: NULL
numelts	CHAR	Number of buffer elements: 0
msgtype	CHAR	Message type: CLOSEMSG (0x02)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
clhdr.closqual	CHAR	Close qualifier: REQU (0x01)
clhdr.clstype	CHAR	Close type: STAT (0x11)

Note that the message consists of a buffer header only.

Close(STATION) Response

Flow : DLC ------> NODE

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element: NULL
numelts	CHAR	Number of buffer elements: 0
msgtype	CHAR	Message type: CLOSEMSG (0x02)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
clhdr.clsequal	CHAR	Close qualifier - RSPOK (0x02) - RSPERR (0x03)
clhdr.clstype	CHAR	Close type: STAT (0x11)
clhdr.clserr1	INTEGER	Error code

The error codes (for an ERROR-RESPONSE) are defined as:

- 0x03 — Station not open
- 0x04 — Link not connected
- 0x05 — Invalid station index
- 0x06 — Duplicate request

> **Note** The message consists of a buffer header only.

> **Note** The Close(STATION) message unconditionally closes the station connection.

Request-Open-Station

Flow : DLC ------> NODE (link connection)

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element if present
numelts	CHAR	Number of buffer elements
msgtype	CHAR	Message type: DLCSTAT (0x11)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
dshdr.dstype	CHAR	Status type: QOPNSTN (0x16)
dshdr.dsqual	CHAR	Station address on XID or mode-set command. Set to 0x01 for 802.2
dshdr.dsmdset	CHAR	Rcv-Set-Mode flag 0x00 XID received 0x01 Mode set command received for example, SNRM for SDLC SABME for 802.2 QSM for X.25

Element field	Type	Description
hdreptr–>elteptr	PTRBFELT	Pointer to next buffer element (NULL is only one element)
hdreptr–>startd	INTEGER	Index to start of data in this buffer element's data array: 1
hdreptr–>endd	INTEGER	Index to last byte of data in this buffer element's data array
hdreptr–>dataru	CHAR[SNANBEDA]	Defined as follows, where s = startd–1
dataru[s..s+n–1]	Not applicable	XID-starting at first byte of received XID information field. 0x00 NULL XID received (n = 1) and signaling information present.

Optional Signaling Information

Field	Description
dataru[s+n]	Length of data, including this byte
dataru[s+n+1]	Type of data (not used at present)
dataru[s+n+2..s+m]	Address or other identifier data. For example, media access control (MAC) address of remote station X.25 address of remote station

- **Note** The signaling information is used by the node to identify the remote station on 802.2 and X.25 links.

  Note If a NULL XID is received and no signaling information is required, the element can be omitted.

  Note If a NULL XID is received and signaling information is required, an 0x00 byte should be put in the element followed by the signaling information.

  Note If the Rcv-Set-Mode flag is set to 0x01, the element can be omitted.

Station-Contacted

Flow : DLC ------> NODE (station connection)

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element: NULL
numelts	CHAR	Number of buffer elements: 0
msgtype	CHAR	Message type: DLCSTAT (0x11)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
dshdr.dstype	CHAR	Status type: STNCTCTD (0x17)

Note that this message contains a buffer header only.

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Outage

Flow : DLC ------> NODE (link or station connection)

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element: NULL
numelts	CHAR	Number of buffer elements: 0
msgtype	CHAR	Message type: DLCSTAT (0x11)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
dshdr.dstype	CHAR	Status type: OUTAGE (0x18)
dshdr.dsqual	CHAR	Outage qualifier
dshdr.dsoutsq	CHAR	Outage subqualifier (optional)

Note the following:

- This message contains a buffer header only.
- Outage qualifier codes are given in Outages.

Status-Resource

Flow : DLC <------> NODE (station connection)

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element: NULL
numelts	CHAR	Number of buffer elements: 0
msgtype	CHAR	Message type: DLCSTAT (0x11)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
dshdr.dstype	CHAR	Status type: RESOURCE (0x04)
dshdr.dlccred	INTEGER	DLC credit

Note This message contains a buffer header only.

Note The **dlccred** field indicates that the message sender can receive a further **dlccred DLC-Data** message.

Send-XID

Flow : NODE ------> DLC (link connection)

Header

Field	Type	Description
nxtqptr	PTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PTRBFELT	Pointer to first buffer element
numelts	CHAR	Number of buffer elements
msgtype	CHAR	Message type: DLCSTAT (0x11)
srcl	CHAR	Source locality
srcp	CHAR	Source partner
srci	INTEGER	Source index
destl	CHAR	Destination locality
destp	CHAR	Destination partner
desti	INTEGER	Destination index
dshdr.dstype	CHAR	Status type: SENDXID (0x1A)
dshdr.dsqual	CHAR	Station address on XID

Element

Field	Type	Description
hdreptr–>elteptr	PTRBFELT	Pointer to next buffer element: (NULL is only one element)
hdreptr–>startd	INTEGER	Index to start of data in this buffer element's data array: 1
hdreptr–>endd	INTEGER	Index to last byte of data in this buffer element's data array
hdreptr–>dataru	CHAR[SNANBEDA]	Defined as follows, where s = startd–1
dataru[s..s+n–1]	Not applicable	XID information frame

Note that the **dshdr.dsqual** field is valid only for primary multipoint connections where station is specified on a multidrop line that the XID should be sent to. In all other cases, it is set to 0xFF.

In situations where the link protocol requires the address field on the XID to be set to a value other than 0xFF (for example, to specify that the XID is a response), it is the responsibility of the link service to set this byte appropriately.

The **Send-XID** message can contain zero elements (**numelts** = 0) or a single, empty element (**hdreptr–>startd** < **hdreptr–>endd**). In these cases, the link service is expected to transmit a NULL XID.

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DLC-Data

Flow : DLC <------> NODE

Header

Field	Type	Description
nxtqptr	PPTRBFHDR	Pointer to next buffer header in a queue
hdreptr	PPTRBFELT	Pointer to first buffer element
numelts	CCHAR	Number of buffer elements
msgtype	CCHAR	Message type: DLCDATA (0x10)
srcl	CCHAR	Source locality
srcp	CCHAR	Source partner
srci	INTEGER	Source index
destl	CCHAR	Destination locality
destp	CCHAR	Destination partner
desti	INTEGER	Destination index
ddhdr.ddth01	CCHAR[6]	Transmission header

Element

Field	Type	Description
hdreptr–>elteptr	PPTRBFELT	Pointer to next buffer element: (NULL is only one element)
hdreptr–>startd	INTEGER	Index to start of data in this buffer element's data array: 1
hdreptr–>endd	INTEGER	Index to last byte of data in this buffer element's data array
hdreptr–>dataru	CHAR[SNANBEDA]	Defined as follows, where s = startd–1
dataru[s..s+n–1]	Not applicable	SNA request/response header (RH) if present, and request/response unit (RU) if not present

Configuration Entry Points

The following topics describe the entry points used by SNALink to obtain configuration information.

This section contains:

- SNAGetConfigValue
- SNAGetSystemInfo

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SNAGetConfigValue

SNALink calls the **SNAGetConfigValue** function to obtain the value of a specific configuration parameter.

```
USHORT SNAGetConfigValue(
UCHAR *entryName,
VOID *pBuffer,
ULONG bufferLen,
UCHAR parmType,
ULONG *pRetLength
);
```

Parameters

entryName
The name of the configuration parameter required.
pBuffer
A pointer to a buffer (if the parameter is a string), or a pointer to a LONGINT (if the parameter is an integer).
bufferLen
The length of the buffer. Only required if the parameter is TYPESTRING.
parmType
TYPESTRING if the parameter is a string.

TYPELONG if the parameter is an integer.

pRetLength
Number of bytes returned if the parameter is TYPESTRING, or number of bytes available if the buffer was too short.

Return Values

NO_ERROR
OK.
ERBADCFG
Error reading configuration file.
ERNOTFND
Entry not found in configuration record.
ERTOOLONG
Data available exceeded the size of the buffer.
ERBADTYPE
A bad type was specified for the *parmType* parameter.

Remarks

It is strongly recommended that SNALink read all required configuration parameters at initialization time (when SNALinkInitialize is called by the Base).

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SNAGetSystemInfo

SNALink calls the **SNAGetSystemInfo** function to obtain information about the SNA server and the network operating system.

```
INTEGER SNAGetSystemInfo(
struct cs_info *pCSInfo
);
```

Parameters

pCSInfo
Pointer to a buffer supplied by the application that contains a data structure in which system information is returned. The application must set the **length** field in this data structure. (For details, see Remarks.) The other fields should be set to nulls or blanks.

```
struct cs_info {
    unsigned short  length;
    unsigned char   major_ver;
    unsigned char   minor_ver;
    unsigned char   config_share[80];
    unsigned short  nos;
};
```

Members

length
Length of the data structure supplied by the application.
major_ver
Major version number:

1 for Comm Server 1.1

2 for SNA Server 2.0 or 2.1

3 for SNA Server 3.0

4 for SNA Server 4.0

minor_ver
Minor version number (decimal):

10 for Comm Server 1.1

00 for SNA Server 2.0

20 for SNA Server 2.1

00 for SNA Server 3.0

00 for SNA Server 4.0

config_share[80]
The name of the share point of the current configuration file (\\server\share\, for example). This path name must be a null-terminated string.
nos
Transport protocol in use:

bit 0: LAN Manager/LAN Server (named pipes)

bit 1: NetWare (IPX/SPX)

bit 2: AppleTalk (Not supported in Host Integration Server 2004)

bit 3: Banyan VINES (VINES IP)

bit 4: TCP/IP

Return Values

NO_ERROR
  OK.
ERNOCFGSVR
  No configuration file server available.
ERMOREDATA
  Supplied buffer was too small.

Remarks

The application must set the **length** parameter to the length of the **cs_info** structure (86 bytes in the current version). Any other value is rejected. This parameter is used to ensure compatibility with future versions. An application supplying this length will always obtain the information shown, but in future versions it may be possible to specify larger values and obtain further information.

On successful return, the **cs_info** data structure contains the version number of the SNA server, the path to the current configuration file, and the network operating system over which the SNA server is running.

If there is no configuration file server available, only the version number fields are valid. The other fields should not be checked.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Setup Functions

This section provides a reference for the functions used with the integrated link service dynamic-link library (DLL) architecture as well as INF-based Setup.

This section contains:

- Integrated Link Service Configuration Functions
- Inf-Based Setup Functions

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Integrated Link Service Configuration Functions

This section provides a reference for exported dynamic-link library (DLL) entry points and utility functions used when building an integrated link service configuration dynamic-link library (DLL).

This section contains:

- Functions Exported from a Link Service Configuration DLL
- Utility Functions Used by a Link Service Configuration DLL

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Functions Exported from a Link Service Configuration DLL

This section provides a reference for functions that must be exported from an integrated link service configuration dynamic-link library (DLL).

This section contains:

- CommandLineAdd
- ConfigureLinkService
- ConfigureLinkServiceEx
- DisplayHelpInfo
- RemoveAllLinkServices
- RemoveLinkService

CommandLineAdd

The **CommandLineAdd** function is used to add a new link service using a command-line interface. This function must be exported from a link service configuration dynamic-link library (DLL) supplied with each link service.

```
__declspec(dllexport) BOOL WINAPI CommandLineAdd(
  LPSTR szCommandLine,
  LPSTR *szConfigInfo,
  LPDWORD dConfigInfoSize
);
```

Parameters

szCommandLine
This supplied parameter specifies the command line containing information on the computer and link service to be configured.

szConfigInfo
This supplied and returned parameter points to a configuration buffer that is used to configure the link service.

dConfigInfoSize
This supplied parameter specifies the size of the sz*ConfigInfo* configuration buffer .

Return Values

TRUE
The function executed successfully.

FALSE
One or more of the parameters passed to this function are invalid or the function failed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ConfigureLinkService

The **ConfigureLinkService** function is used to add or modify a link service. This function must be exported from a link service configuration dynamic-link library (DLL) supplied with each link service.

```
__declspec(dllexport) BOOL WINAPI ConfigureLinkService(
  LPSTR szComputerName,
  LPSTR szLinkServiceTitle
);
```

Parameters

szComputerName
  This supplied parameter specifies the name of the computer that is to be configured.
szLinkServiceTitle
  This supplied parameter specifies the title of the link service that is to be configured.

Return Values

TRUE
  The function executed successfully and network bindings need to be recalculated.
FALSE
  One or more of the parameters passed to this function are invalid or network bindings do not need to be recalculated.

ConfigureLinkServiceEx

The **ConfigureLinkServiceEx** function is used to add or modify a link service. This function must be exported from a link service configuration dynamic-link library (DLL) supplied with each link service.

```
__declspec(dllexport) BOOL WINAPI ConfigureLinkServiceEx(
  LPSTR szComputerName,
  LPSTR szLinkServiceTitle,
  LPSTR* pvConfigInfo,
  LPDWORD dConfigInfoSize
);
```

Parameters

szComputerName
This supplied parameter specifies the name of the computer that is to be configured.
szLinkServiceTitle
This supplied parameter specifies the title of the link service that is to be configured.
pvConfigInfo
This supplied and returned parameter points to a configuration buffer that is used to configure the link service.
dConfigInfoSize
This supplied parameter specifies the size of the *pvConfigInfo* configuration buffer.

Return Values

TRUE
The function executed successfully and network bindings need to be recalculated.
FALSE
One or more of the parameters passed to this function are invalid or network bindings do not need to be recalculated.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DisplayHelpInfo

The **DisplayHelpInfo** function is used to generate help information used by the command-line interface to a link service dynamic-link library (DLL). This function must be exported from a link service configuration DLL supplied with each link service.

```
__declspec(dllexport) BOOL WINAPI DisplayHelpInfo(
  LPSTR * szHelpInfoBuffer
);
```

Parameters

szHelpInfoBuffer
This supplied and returned parameter points to a buffer that on successful return contains help information that can be used to configure the link service.

Return Values

TRUE
The function executed successfully.
FALSE
The parameter passed to this function is invalid or the function failed.

RemoveAllLinkServices

The **RemoveAllLinkServices** function is used to remove all link services from a machine. This function must be exported from a link service configuration dynamic-link library (DLL) supplied with each link service.

```
__declspec(dllexport) BOOL WINAPI RemoveAllLinkServices(
  LPSTR szComputerName
);
```

Parameters

szComputerName
This supplied parameter specifies the name of the computer that is to have all link services removed.

Return Values

TRUE
The function executed successfully and network bindings need to be recalculated.
FALSE
The parameter passed to this function is invalid or network bindings do not need to be recalculated.

RemoveLinkService

The **RemoveLinkService** function is used to remove a link service. This function must be exported from a link service configuration dynamic-link library (DLL) supplied with each link service.

```
__declspec(dllexport) BOOL WINAPI RemoveLinkService(
  LPSTR szComputerName,
  LPSTR szLinkServiceTitle
);
```

Parameters

szComputerName
This supplied parameter specifies the name of the computer that is to have the link service removed.

szLinkServiceTitle
This supplied parameter specifies the title of the link service that is to be removed.

Return Values

TRUE
The function executed successfully and network bindings need to be recalculated.

FALSE
One or more of the parameters passed to this function are invalid or network bindings do not need to be recalculated.

This section contains:

- Utility Functions Used by a Link Service Configuration DLL

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Utility Functions Used by a Link Service Configuration DLL

This section provides a reference for utility functions used by an integrated link service configuration dynamic-link library (DLL).

This section contains:

- AddPerfmonCounters
- bCreateService
- bDeleteService
- bStopService
- CheckForExistingLinkService
- ConvertHexStringToDWORD
- ExtractNextParameter
- fAddRegistryEntry
- fCanWeAdministerRemoteBox
- fConnectRegistry
- fDisconnectRegistry
- fFindAndReplaceString
- fFindString
- fFindStringInMultiSZ
- fQueryRegistryValue
- fRegistryKeyExists
- fRemoveRegistryEntry
- fRemoveRegistryValue
- fStringCompare
- LoadStringResource
- ParseNextField
- RemovePerfmonCounters

AddPerfmonCounters

The **AddPerfmonCounters** function is used to add Perfmon counters to a link service. This utility function is used to construct an integrated link service configuration dynamic-link library (DLL).

```
void AddPerfmonCounters(
  LPSTR pszComputerName,
  LPSTR pszService
);
```

Parameters

pszComputerName
This supplied parameter specifies the name of the computer that is to have Perfmon counters added.

pszService
This supplied parameter specifies the name of the link service that is to have Perfmon counters added.

Return Values

None.

Remarks

SNA RPC Service must be running or an error message will indicate a failure.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

bCreateService

The **bCreateService** function is used to create a service on a computer for a link service. This utility function is used to construct an integrated link service configuration dynamic-link library (DLL).

```
BOOL bCreateService(
  LPSTR szComputerName,
  LPSTR szServiceName,
  LPSTR szServicePath,
  LPSTR szServiceDependencies,
  DWORD dServiceType,
  DWORD dServiceLoadType,
  LPSTR szDomainName,
  LPSTR szUserid,
  LPSTR szPassword
);
```

Parameters

szComputerName
This supplied parameter specifies the name of the computer to create the service on.

szServiceName
This supplied parameter specifies the name of the link service that is to be created. This parameter is passed unchanged to the Microsoft® Windows® 2000 **CreateService** function.

szServicePath
This supplied parameter specifies the binary path to the link service that is to be created. This parameter is passed unchanged to the Windows 2000 **CreateService** function.

szServiceDependencies
This supplied parameter specifies the service dependencies of the link service that is to be created. This parameter is passed unchanged to the Windows 2000 **CreateService** function.

dServiceType
This supplied parameter specifies the type of service that is to be created. This parameter is passed unchanged to the Windows 2000 **CreateService** function.

dServiceLoadType
This supplied parameter specifies the load type of service that is to be created. This parameter is passed unchanged to the Windows 2000 **CreateService** function.

szDomainName
This supplied parameter specifies the domain name for the service to run in.

szUserid
This supplied parameter specifies the user identifier for the service to run in.

szPassword
This supplied parameter specifies the password for the domain account.

Return Values

TRUE
The function executed successfully and the service was created.

FALSE
One or more of the parameters passed to this function are invalid or the function failed.

Remarks

If the *szUserid* parameter is not supplied, then the *szDomainName* parameter is used to construct the Account parameter passed to the Windows 2000 **CreateService** function.

bDeleteService

The **bDeleteService** function is used to delete a service on a computer for a link service. This utility function is used to construct an integrated link service configuration dynamic-link library (DLL).

```
BOOL bDeleteService(
  LPSTR szComputerName,
  LPSTR szServiceName
);
```

Parameters

szComputerName
This supplied parameter specifies the name of the computer to delete the service on.
szServiceName
This supplied parameter specifies the name of the service that is to be deleted. This parameter is passed unchanged to the Microsoft® Windows® 2000 **OpenService** function.

Return Values

TRUE
The function executed successfully and the service was deleted.
FALSE
One or more of the parameters passed to this function are invalid or the function failed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

bStopService

The **bStopService** function is used to stop a service running on a computer for a link service. This utility function is used to construct an integrated link service configuration dynamic-link library (DLL).

```
BOOL bStopService(
  LPSTR szServiceName,
  LPSTR szComputerName
);
```

Parameters

szServiceName
This supplied parameter specifies the name of the service that is to be stopped. This parameter is passed unchanged to the Microsoft® Windows® 2000 **OpenService** function.

szComputerName
This supplied parameter specifies the name of the computer to stop the service on.

Return Values

TRUE
The function executed successfully and the service was stopped.

FALSE
One or more of the parameters passed to this function are invalid or the function failed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CheckForExistingLinkService

The **CheckForExistingLinkService** function is used to check to see if a link service of this type exists with this title. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL bCreateService(
  HKEY *hGlobalKey,
  LPSTR szLinkRegistryRoot,
  LPSTR szTitle
);
```

Parameters

hGlobalKey
This supplied parameter specifies the handle of the registry to search.
szLinkRegistryRoot
This supplied parameter specifies the registry root for this type of link service to search for.
szTitle
This supplied parameter specifies the title of the link service to search for.

Return Values

TRUE
The link service was located.
FALSE
One or more of the parameters passed to this function are invalid or the link service was not located.

ConvertHexStringToDWORD

The **ConvertHexStringToDWORD** function is used to convert a hexadecimal string to a DWORD value. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL ConvertHexStringToDWORD(
  LPSTR szHexString,
  LPDWORD dHexValue
);
```

Parameters

szHexString
  This supplied parameter specifies the hexadecimal string to be converted.
dHexValue
  This supplied and returned parameter contains the DWORD value of the hexadecimal string if the function was successful.

Return Values

TRUE
  The function executed successfully and the hexadecimal string was converted.
FALSE
  One or more of the parameters passed to this function are invalid or the function failed.

Remarks

This function scans until a nonhexadecimal character is encountered. The hexadecimal formats recognized are xnnnn, 0xnnnn, or nnnn.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ExtractNextParameter

The **ExtractNextParameter** function is used to get the next parameter from a buffer. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL ExtractNextParameter(
  LPSTR szSourceBuffer,
  LPSTR szParameter,
  LPDWORD dStartIndex
);
```

Parameters

szSourceBuffer
This supplied parameter specifies the source buffer.
szParameter
This supplied and returned parameter specifies the return buffer for parameters.
dStartIndex
This supplied parameter contains the DWORD index to begin parameter scan.

Return Values

TRUE
The function executed successfully and the next parameter was located and returned in the *szParameter* argument.
FALSE
The function failed.

Remarks

Parameters are delimited by a space character. Quotes can be used to include spaces in a parameter.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

fAddRegistryEntry

The **fAddRegistryEntry** function is used to add a new registry value to the registry. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fAddRegistryEntry(
  HKEY *hGlobalKey,
  char *szRegistryValue,
  char *szRegistryData,
  DWORD dType,
  DWORD dSize
);
```

Parameters

hGlobalKey
This supplied parameter specifies the handle of the registry to modify.
szRegistryValue
This supplied parameter specifies the registry value name to add.
szRegistryData
This supplied parameter specifies the registry value data to add.
dType
This supplied parameter specifies the registry value type. This parameter is supplied unchanged to the Win32® **RegSetValueEx** function.
dSize
This supplied parameter specifies the size of the registry value data. This parameter is supplied unchanged to the Win32 **RegSetValueEx** function.

Return Values

TRUE
The function executed successfully and the registry entry was added.
FALSE
The function failed and the registry entry was not added.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

fCanWeAdministerRemoteBox

The **fCanWeAdministerRemoteBox** function is used to determine if the caller has administrative privileges on the remote computer. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fCanWeAdministerRemoteBox(
  HKEY *hGlobalKey
);
```

Parameters

hGlobalKey
  This supplied parameter specifies the handle to the remote computer's registry.

Return Values

TRUE
  The caller has administrative privileges on the remote computer.
FALSE
  The caller lacks administrative privileges.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

fConnectRegistry

The **fConnectRegistry** function is used to connect to a remote computer's registry and return a handle to the remote registry. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fConnectRegistry(
  HKEY *hGlobalKey,
  LPSTR *szComputerName
);
```

Parameters

hGlobalKey
This supplied parameter specifies the handle of the registry to connect to.

szComputerName
This supplied parameter specifies the computer name to connect to.

Return Values

TRUE
The function executed successfully and the function was able to connect to the registry.

FALSE
The function failed.

fDisconnectRegistry

The **fDisconnectRegistry** function is used to disconnect from a remote computer's registry. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fDisconnectRegistry(
  HKEY *  hGlobalKey
);
```

Parameters

hGlobalKey
This supplied parameter specifies the handle of the registry from which to disconnect.

Return Values

TRUE
The function executed successfully and the function was able to disconnect from the registry.
FALSE
The function failed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

fFindAndReplaceString

The **fFindAndReplaceString** function is used to find and replace a substring within a string. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fFindAndReplaceString(
  LPSTR szStringBuffer,
  LPSTR szSearchString,
  LPSTR szReplaceString
);
```

Parameters

szStringBuffer
This supplied parameter specifies the string buffer to search.
szSearchString
This supplied parameter specifies the string to search for.
szReplaceString
This supplied parameter specifies the replacement string.

Return Values

TRUE
The string was found.
FALSE
The string was not found.

fFindString

The **fFindString** function is used to determine if a string exists within a string buffer. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fFindString(
  LPSTR szStringBuffer,
  LPSTR szSearchString
);
```

Parameters

szStringBuffer
  This supplied parameter specifies the string buffer to search.
szSearchString
  This supplied parameter specifies the string to search for.

Return Values

TRUE
  The string was found.
FALSE
  The string was not found.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

fFindStringInMultiSZ

The **fFindStringInMultiSZ** function is used to determine if string exists in a REG_MULTI_SZ string list and return entire string. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fFindString(
  LPSTR szStringBuffer,
  LPSTR szSearchString,
  LPSTR szFoundString
);
```

Parameters

szStringBuffer
This supplied parameter specifies the string buffer to search.
szSearchString
This supplied parameter specifies the string to search for.
szFoundString
This supplied and returned parameter specifies the full string containing string if successful.

Return Values

TRUE
The string was found and returned.
FALSE
The string was not found.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

fQueryRegistryValue

The **fQueryRegistryValue** function is used to query a value from the registry. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fQueryRegistryValue(
  HKEY *  hGlobalKey,
  LPSTR szRegistryKey,
  LPSTR szRegistryValue,
  LPSTR szRegistryData,
  LPDWORD dSize
);
```

Parameters

hGlobalKey
This supplied parameter specifies the handle of the registry.

szRegistryKey
This supplied parameter specifies the registry key.

szRegistryValue
This supplied parameter specifies the registry value name.

szRegistryData
This supplied parameter specifies the registry value data.

dSize
This supplied parameter specifies the size of the registry data.

Return Values

TRUE
The function executed successfully and the function was able to connect to the registry.

FALSE
The function failed.

fRegistryKeyExists

The **fRegistryKeyExists** function is used to determine if a registry key already exists in the registry. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fRegistryKeyExists (
  HKEY *  hGlobalKey,
  LPSTR szRegistryKey
);
```

Parameters

hGlobalKey
This supplied parameter specifies the handle of the registry.
szRegistryKey
This supplied parameter specifies the registry key.

Return Values

TRUE
The registry key exists.
FALSE
The function failed or the registry key does not exist.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

fRemoveRegistryEntry

The **fRemoveRegistryEntry** function is used to remove a registry key from the registry. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fRemoveRegistryEntry (
  HKEY *  hGlobalKey,
  char * szRegistryKey
);
```

Parameters

hGlobalKey
  This supplied parameter specifies the handle of the registry.
szRegistryKey
  This supplied parameter specifies the registry key.

Return Values

TRUE
  The function was successful and the registry key was removed.
FALSE
  The function failed or the registry key could not be removed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

fRemoveRegistryValue

The **fRemoveRegistryValue** function is used to remove a registry value from the registry. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fRemoveRegistryValue (
  HKEY *  hGlobalKey,
  char * szRegistryKey,
  char * szRegistryValue
);
```

Parameters

hGlobalKey
This supplied parameter specifies the handle of the registry.
szRegistryKey
This supplied parameter specifies the registry key.
szRegistryValue
This supplied parameter specifies the registry value to remove.

Return Values

TRUE
The function was successful and the registry value was removed.
FALSE
The function failed or the registry value could not be removed.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

fStringCompare

The **fStringCompare** function is used to determine if string exists in another string. This utility function is used to construct an integrated link service configuration DLL.

```
BOOL fStringCompare (
  LPSTR lpszString1,
  LPSTR lpszString2
);
```

Parameters

lpszString1
This supplied parameter specifies the string to search for.
lpszString2
This supplied parameter specifies the string to compare.

Return Values

TRUE
The string was found.
FALSE
The string was not found.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

LoadStringResource

The **LoadStringResource** function is used to load a string from a string resource. This utility function is used to construct an integrated link service configuration DLL.

```
void LoadStringResource (
  DWORD dStringResource,
  LPSTR pszString
);
```

Parameters

dStringResource
This supplied parameter specifies the resource ID of the string resource.
pszString
This supplied and returned parameter specifies the buffer to place the string in.

Return Values

None

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ParseNextField

The **ParseNextField** function is used to parse and return the next field from string. This utility function is used to construct an integrated link service configuration DLL.

```
void ParseNextField(
  LPSTR szParseString,
  LPSTR szField,
  char scDelimiter,
  LPDWORD dStartIndex
);
```

Parameters

szParseString
This supplied parameter specifies the string to parse.
szField
This supplied and returned specifies the return buffer for the next field.
scDelimiter
This supplied parameter specifies the delimiter character for the end of a field.
dStartIndex
This supplied parameter specifies a pointer to the index in bytes from beginning of the *szParseString* to start the search from.

Return Values

TRUE
The next field was found.
FALSE
The next field was not found.

> **Note** The `'^'` character can be used as an escape character to allow the delimiter to be used.

RemovePerfmonCounters

The **RemovePerfmonCounters** function is used to remove counters from a link service. This utility function is used to construct an integrated link service configuration DLL.

```
void RemovePerfmonCounters(
  LPSTR pszComputerName,
  LPSTR pszService
);
```

Parameters

pszComputerName
This supplied parameter specifies the name of the computer that is to have Perfmon counters removed.
pszService
This supplied parameter specifies the name of the link service that is to have Perfmon counters removed.

Return Values

None.

Remarks

SNA RPC Service must be running or an error message will indicate a failure.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Inf-Based Setup Functions

This section provides a reference for some of the useful entry points in the .inf file that contains utility functions. The file name is in the variable *UtilityInf*; usually set to SNAUTILS.INF.

This section contains:

- CreateSNARegEntry
- CreateSNAService
- DeleteSNAService
- EnterServiceName
- FindNextAvailableIndex
- FindSNAProductServices
- FindSNARegEntry
- FindSNAService
- GrepUniqueServiceInfo
- SetupMessage

CreateSNARegEntry

The **CreateSNARegEntry** function creates the necessary entries for an instance in the **SOFTWARE\Microsoft** registry tree. If the product is not already in the registry, it creates an entry for the product. It then creates an entry for the particular instance of the product and for the **NetRules** key under that entry. This function leaves open handles to all the important subkeys for further use.

Parameters

Argument 0
Name of the top-level registry node to use. This should be a full registry path. For most scenarios, this is the value held in the *ProductRegBase* variable (**SOFTWARE\Microsoft**).

Argument 1
Name of the product. This is the name of the key that will be created for this product.

Argument 2
Instance index. This is the index of this particular instance of this product.

Return Values

Return 0
Status of the operation:

- STATUS_SUCCESSFUL: Operation succeeded.
- STATUS_FAILED: Operation failed.

Return 1
Handle to the top-level registry node.

Return 2
Handle to the product's registry key under the top-level node.

Return 3
Handle to the instance entry under the product key.

Return 4
Handle to the NetRules entry under the instance key.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

CreateSNAService

The **CreateSNAService** function creates the necessary entries for an instance in the **Services** registry tree. This function adds particular values that are necessary for the service as well as all the subkeys under the service key, including **Parameters** and **ExtraParameters**.

Parameters

Argument 0
Name of the service to be created.
Argument 1
Type of SNA Service (*SNAServiceType* variable).
Argument 2
Image path of this component (*ImagePath* variable).
Argument 3
Dependency list (*ProductDepends* variable).
Argument 4
Parameter list (*ProductParams* variable).
Argument 5
Extra parameter list (*ProductExtraParams* variable).
Argument 6
Event Log message file.
Argument 7
Event types supported (usually 0x07).

Return Values

Return 0
Status of the operation:

- STATUS_SUCCESSFUL: Operation succeeded.
- STATUS_FAILED: Operation failed.

Return 1
Handle to the service key.
Return 2
Handle to the **Parameters** key under the service key.
Return 3
Handle to the **ExtraParameters** key under the **Parameters** key.

DeleteSNAService

The **DeleteSNAService** function deletes a particular service using the Service Control Manager. All the keys for the service are deleted as well.

Parameters

Argument 0
Name of the service to be deleted.

Return Values

Return 0
Status of the operation.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

EnterServiceName

The **EnterServiceName** function presents the user with an algorithmically determined service name for a component and allows the user to change it before returning the final value. This function ensures that the new service name is unique in the Service Control Architecture before accepting it.

Parameters

Argument 0
Title of the product the user should be queried about.
Argument 1
Default service name prefix.
Argument 2
Index for this instance of the product. The algorithm uses this index to determine the default name.

Return Values

Return 0
Status of the operation:

- STATUS_SUCCESSFUL: Operation succeeded.
- STATUS_NOSUCHLANGUAGE: The language specified is not supported.
- STATUS_USERCANCEL: User pressed the **Cancel** button.

Return 1
Service name that the user entered.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

FindNextAvailableIndex

The **FindNextAvailableIndex** function is used to determine the index a new instance should receive. For example, if the current indexes in use are { 01, 02, 04 }, this function would return 03 as its return value.

Parameters

Argument 0
A list of the indexes currently in use. This list can be obtained by using the FindSNAProductServices function.

Return Values

Return 0
Status of the operation:

- STATUS_SUCCESSFUL: Operation succeeded.
- STATUS_FAILED: Operation failed.

Return 1
First available index for the list.

FindSNAProductServices

The **FindSNAProductServices** function enumerates all instances of a product. It returns lists of information for the instances that can be used in the script. This function can also be used to determine whether or not a product exists in the registry by analyzing the return status.

Parameters

Argument 0
Name of top-level registry node to use.
Argument 1
Name of the product.

Return Values

Return 0
Status of the operation:

- STATUS_SUCCESSFUL: Operation succeeded.
- STATUS_NOSUCHPRODUCT: The product does not exist in the registry.
- STATUS_FAILED: Operation failed.

Return 1
List of indexes for the instances of this product.
Return 2
List of service names for the instances of this product.
Return 3
List of titles for the instances of this product.
Return 4
List of descriptions for the instances of this product.

FindSNARegEntry

The **FindSNARegEntry** function is written as a parallel to CreateSNARegEntry. When called, it attempts to open all of the necessary registry keys and return open handles to them.

Parameters

Argument 0
Name of the top-level registry node to use.
Argument 1
Name of the product.
Argument 2
Instance index.

Return Values

Return 0
Status of the operation.
Return 1
Handle to the top-level registry node.
Return 2
Handle to the product's registry key under the top-level node.
Return 3
Handle to the instance entry under the product key.
Return 4
Handle to the NetRules entry under the instance key.

FindSNAService

The **FindSNAService** function is written as a parallel to CreateSNAService. It is written to provide an easy way to access the keys for a particular service.

Parameters

Argument 0
Name of the service to look for.

Return Values

Return 0
Status of the operation.
Return 1
Handle to the service key.
Return 2
Handle to the **Parameters** key under the service key.
Return 3
Handle to the **ExtraParameters** key under the **Parameters** key.

GrepUniqueServiceInfo

The **GrepUniqueServiceInfo** function is used to determine information about a particular instance when only one of the four elements (index, name, title, or description) is available. Because there is no way to determine the position of an element in a list, it is hard to figure out the respective name, title, or description of an instance given only the index. This function searches the list and returns the rest of the information about the instance.

Parameters

Argument 0
Type of information to search:

- INDEX: Search the list of indexes.
- NAME: Search the list of service names.
- TITLE: Search the list of titles.
- DESC: Search the list of descriptions.

Argument 1
Keyword to search for in the list.
Argument 2
List of indexes for the instances of this product.
Argument 3
List of service names for the instances of this product.
Argument 4
List of titles for the instances of this product.
Argument 5
List of descriptions for the instances of this product.

Return Values

Return 0
Status of the operation.
Return 1
Index for this instance of the product.
Return 2
Service name for this instance of the product.
Return 3
Title for this instance of the product.
Return 4
Description for this instance of the product.

SetupMessage

The **SetupMessage** function displays a dialog box with user-defined text plus **OK** and **Cancel** buttons. It is useful for debugging.

Parameters

Argument 0
Language to use (*STF_LANGUAGE*).
Argument 1
Which icon to display in the dialog box: STATUS, WARNING, NONFATAL, and so on.
Argument 2
The text to be displayed. Can contain line feeds using the LF symbol.

Return Values

Return 0
Status of the operation.

IOCTL Commands

This section provides reference information about the IOCTL functions.

This section contains:

- Function 0x41: Set Event/Semaphore Handle
- Function 0x42: Set Link Characteristics
- Function 0x43: Set V24 Output Status
- Function 0x44: Transmit Frame
- Function 0x45: Abort Transmitter
- Function 0x46: Abort Receiver
- Function 0x47: Off-Board Load
- Function 0x61: Get/Set Interface Record
- Function 0x62: Get V24 Status
- Function 0x63: Receive Frame
- Function 0x64: Read Interface Record

Function 0x41: Set Event/Semaphore Handle

This function supplies the driver with the handle of an event that can be used for signaling the SNALink software.

Parameters

IRP.UserEvent

This parameter is taken from the IOCTL call, and is an event handle. The handle must refer to an Event/Semaphore owned by the SNALink process. The driver sets the event to indicate the completion of a transmission or the availability of received data or status. Although not required by the driver, the event passed here by the SNALink is normally the global Base event.

Return Values

If the supplied parameter is NULL, the function returns a status of STATUS_INVALID_PARAMETER, with additional information of INFO_SET_EVENT_NO_EVENT. For any other illegal parameter, an exception is raised.

Remarks

This function should be called only once, immediately after the **OPEN** is issued. The event is set when:

- lFrames are transmitted from the driver buffers.
- lFrames are received into the driver buffers.
- lStatus information is updated in the Interface Record (see function 0x64).

Function 0x42: Set Link Characteristics

This function sets the link protocol parameters required by the driver.

Packet Formats

Type	Description
WORD	Frame Size
DWORD	Data rate
BYTE	Station address 1
BYTE	Station address 2
BYTE	Link Options
BYTE	Reserved

Parameters

Frame Size (packet format WORD)
Indicates to the driver the minimum amount of contiguous receiver buffering that must be available for any individual frame.
Data Rate (packet format DWORD)
Line speed in bits per second. If *Link Options* bit 3 is not set, this field is ignored.
Station Address 1 (packet format BYTE)
Station Address 2 (packet format BYTE)
Station addresses that the user wishes to receive on if selective reception is to be used (typically for multidropped secondaries). Only frames of data beginning with either of these values will be passed to the user—others are ignored or discarded.

If the SNALink wishes to listen on only one station address, *Station Address 2* should be set to zero.

A value of zero in both fields indicates that all error-free received frames are to be passed to the SNALink, regardless of the contents of their first address byte.

Link Options (packet format BYTE)
Link Options is a bitmap. The default is all values set to zero. The bits are used as shown in the following table. Note that not all of these options are supported by the standard Microsoft® Host Integration Server 2004 synchronous card drivers.

Bit	Value
Bit 7	1 = Four wire (constant RTS/CTS). 0 = Two wire (switched RTS/CTS).
Bit 6	1 = NRZI encoding. 0 = NRZ encoding.
Bit 5	1 = HDLC level 1 conventions. 0 = SDLC level 1 conventions.
Bit 4	1 = Full-duplex (simultaneous 2-way) data. 0 = Half-duplex (alternating 1-way) data.
Bit 3	1 = Generate internal clocking. 0 = Take external clocking.
Bit 2	1 = Use DMA if available. 0 = Do not use DMA on this link.
Bit 1	1 = Reset all statistics to zero. 0 = Leave accumulated statistics as is.
Bit 0	Reserved.

Reserved (packet format BYTE).

> **Note** Not all of the above options are supported by the standard Host Integration Server 2004 synchronous card drivers.

Return Values

IoStatus.Status	IoStatus.Information	Description
STATUS_INVALID_PARAMETER	IO_ERR_LINKCHARBUF_ WRONG_SIZE	
STATUS_INVALID_PARAMETER	IO_ERR_FRAME_BUF_ TOO_SMALL	Buffer must be at least 268 bytes.

STATUS_INVALID_PARAMETER	IO_ERR_FRAME_BUF_TOO_BIG	Buffer maximum size is 2048 bytes.
STATUS_INVALID_PARAMETER	IO_ERR_NO_CLOCKS	No internal clocking available.
STATUS_DATA_ERROR	IO_ERR_HARDWARE_8273CMD_TIMEOUT	
STATUS_SUCCESS	IO_ERR_NO_DMA_FDX	DMA requested, but cannot be used.

Remarks

The driver should always start the receiver after processing this request. If either the transmitter or receiver is active when this request is issued, the driver stops the current frame before resetting the link characteristics, and then restarts the previous operation.

Link Service DLLs that support the synchronous dumb card interface use the following registry entries to the control this feature.

SYSTEM\CurrentControlSet\Services\<linkService>\Parameters

where **<linkService>** is the name of the link service.

Under this node, the following entries and values must be entered or modified:

A node called **ExtraParameters** must be created or modified with the following registry entries and values:

InternalClock
The value of this entry should be defined and set to a REG_DWORD of any value to enable the internal clock.
InternalClockRate
The value of this entry should be set to a REG_DWORD equal to the number of bits per second.

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Function 0x43: Set V24 Output Status

This function allows the SNALink software to alter the modem output status on the adapter V.24 interface. There is no parameter or data packet on this request. The relevant V.24 settings are put into the driver interface record (see function 0x61) by the SNALink prior to calling the driver.

Return Values

IoStatus.Status	IoStatus.Information
STATUS_DATA_ERROR	IO_ERR_HARDWARE_8273CMD_TIMEOUT

Function 0x44: Transmit Frame

The SNALink calls this function to transfer a frame of data to the driver.

Parameters

IRP.CurrentStackLocation.OutputBufferLength

Frame length—the size of the frame pointed to by the data buffer pointer. The frame includes the control, address, and information field (if present), but no allowance should be made for flags or CRC bytes.

IRP.UserBuffer

Frame data—the contents of the frame.

Return Values

IoStatus.Status	**IoStatus.Information**
STATUS_BUFFER_TOO_SMALL	IO_ERR_TX_BUFFER_FULL
STATUS_INVALID_PARAMETER	IO_ERR_TX_FRAME_TOO_BIG

Refer also to the description of the interface record—the driver updates a field within the interface record reflecting the amount of buffer space available.

Remarks

In two-wire configurations, the driver must raise RTS and wait for CTS from the modem before initiating a transmission. The driver should then drop RTS when all frames have been transmitted. The driver assumes that the transmission is complete when both of the following are true:

- The transmit buffer becomes empty (if the link is configured as half-duplex).
- The last frame transmitted had the Poll/Final bit set in the second byte.

Function 0x45: Abort Transmitter

The SNALink calls this function to clear down the driver's transmitter.

Remarks

This request causes the driver to stop the current frame transmission and to flush its internal buffers of any further data pending transmission. In two-wire configurations, the driver should also drop RTS.

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Function 0x46: Abort Receiver

The SNALink calls this function to clear down the driver's receiver.

Remarks

This request causes the driver to stop the receiver and to flush its internal buffers of any received data. It should be used to clear down the receiver, for instance, before altering the link characteristics.

Function 0x47: Off-Board Load

This function is not supported.

Function 0x61: Get/Set Interface Record

This function has been superseded by Function 0x64: Read Interface Record.

Function 0x62: Get V24 Status

The SNALink calls this function to read the current state of the modem interface lines. No parameter or data packet is passed. This request causes the driver to update the Input V.24 Status field in the driver interface record.

Function 0x63: Receive Frame

The SNALink calls this function to read a data frame from the driver's buffers.

Parameters

IRP.CurrentStackLocation.OutputBufferLength
Frame length—the size of the frame transferred into the data buffer by the driver. The frame includes the control, address, and information field (if present), but no flags or CRC bytes. When the request is issued, frame length is set to the maximum length of the buffer addressed by the data packet pointer.

IRP.UserBuffer
Frame data—the contents of the frame that has been received.

Return Values

IoStatus.Status	IoStatus.Information
STATUS_BUFFER_TOO_SMALL	None

Remarks

The driver transfers the next available received frame to the supplied buffer. Note that if the buffer is not large enough, a buffer overflow error is returned. This allows the application to decide if oversize frames are an error. If not, then a second attempt to read should be made, using a buffer at least Frame Length bytes long. A length of zero is returned if there are no frames ready to be received.

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Function 0x64: Read Interface Record

This function reads the driver's interface record and copies it into the buffer passed by the SNALink. The buffer must be allocated by the SNALink prior to making this call.

Parameters

IRP.System.Buffer

Interface Record Address (IN)—a 32-bit pointer to the driver's interface record area.

The interface record format is as follows:

Description	Type
Received Frames	**int**
Transmit Buffer Space	**int**
Status Events	**int**
Input V.24 Status	**UCHAR**
Output V.24 Status	**UCHAR**
Statistics Counters	**int[11]**

- Received Frames is the number of frames currently queued in the driver receive buffers.
- Transmit Buffer Space is used to signal to the SNALink:

  Whether more frames can be provided to the driver.

  Whether the driver still has frames waiting to be sent.

  The Transmit Buffer Space field indicates the maximum frame size that the driver can currently accept. This is updated after each successful Transmit Frame IOCTL, and should be checked by the SNALink before sending further frames to the driver.

- Status Events is a count of the total number of increments made to the Statistics Counters.
- Input V.24 Status is a bitmap of the current logical state of the input interface lines, a value of 1 meaning ON and a value of 0 meaning OFF. The pins are mapped as follows:

Bit number	V.24 circuit name	Circuit number	RS-232C pin
7 - 5	Reserved	142	25
4	Test Indicator	125	22
3	Calling Indicator	125	22
2	RLSD (commonly DCD)	109	8
1	Data Set Ready (DSR)	107	6
0	Clear to send (CTS)	106	5

- Output V.24 Status is a bitmap of the current logical state of the output interface lines, a value of 1 meaning ON and a value of 0 meaning OFF. The pins are mapped as follows:

Bit number	V.24 circuit name	Circuit number	RS-232C pin
7 - 5	Reserved		
4	Maintenance Test	140	18
3	Select Standby	116	11
2	Data Signal Rate Selector	111	23
1	Data Terminal Ready (DTR)	108/2	22
0	Request to Send (RTS)	105	4

  Note that the driver will raise and lower RTS as necessary while transmitting, reflecting the state of RTS in the output V.24 status field. The application should not, therefore, try to manipulate RTS.

- The Statistics Counters are running counts of various kinds of link status information.The events they relate to are:

Counter number	Description
1	Frames received with incorrect CRC.
2	Frames larger than the maximum size received.
3	Frames smaller than 32 bits received.
4	Frames received that are not a multiple of 8 bits.

5	Aborted frames received.
6	Transmitter underruns.
7	Receiver overruns.
8	RLSD drops in mid-reception.
9	CTS drops in mid-transmission.
10	DSR drops.
11	Hardware failures (adapter or modem).

Remarks

The interface record provides a fast mechanism to use to decide whether a frame can be transmitted, whether there are any frames to be received, and so on. The driver maintains this information. Each time the SNALink requires this information, it calls **Read Interface Record** to get a copy of the current interface record. After each call, the driver clears the statistics counters in its own interface record. The V.24 status and transmit and receive data information are unchanged.

SNA Modem API

This section provides reference material for the SNA Modem API structure and functions.

This section contains:

- MODEM_STATUS
- SNAModemInitialize
- SNAModemAddLink
- SNAModemDeleteLink
- SNAModemTerminate

MODEM_STATUS

A **MODEM_STATUS** structure for each SNA link contains status information used by the SNA Modem Status interface.

```
struct _ModemStatus{
....char LSName[12];
    char V24In;
    char V24Out;
    unsigned short RxFrameCount;
    unsigned short TxFrameCount;
    char Reserved[6];
} MODEM_STATUS;
```

Members

LSName
A character array containing the link service name.

V24In
A set of bit fields representing the V.24 input flags that determine which signal lines to mask. These bit fields can be joined with **OR** to create a complete mask. The defined bit fields for **V24In** are as follows:

MASK_CTS Mask the clear to send line.

MASK_DSR Mask the data set ready line.

MASK_DCD Mask the data carrier detect line.

MASK_DRI Mask the data ring indicator line.

V24Out
A set of bit fields representing the V.24 output flags that determine which signal lines to mask. These bit fields can be joined with **OR** to create a complete mask. The defined bit fields for **V24Out** are as follows:

MASK_RTS Mask the request to send line.

MASK_DTR Mask the data terminal ready line.

RxFrameCount
A count of received frames.

TxFrameCount
A count of transmitted frames.

Reserved
Padding for future expansion.

SNAModemInitialize

The **SNAModemInitialize** function should be called once per link service process at initialization. This function initializes the communication path to the SNA Modem application. The ideal place to call this function is in the **SNALinkInitialize** function.

```
void SNAModemInitialize();
```

See Also

SNALinkInitialize

SNAModemAddLink

The **SNAModemAddLink** function should be called once per link initialization. For link services that support more than a single SNA link, this call can be made multiple times. For link services that support only a single link, this call can be made immediately after **SNAModemInitialize**; otherwise it is preferable to call **SNAModemAddLink** as each port is initialized.

```
void SNAModemAddLink(
MODEM_STATUS **ppModemStatus
);
```

Parameters

ppModemStatus

The address of a pointer to a **MODEM_STATUS** structure that will be used for storing modem status information. The returned **MODEM_STATUS** structure will contain a link service name.

Remarks

The IHV should declare a pointer to a **MODEM_STATUS** structure and pass its address to **SNAModemAddLink**.

The **LSName** is initially the name of the link service, but may need to be altered for multiport link services.The IHV can replace the link service name returned in the **MODEM_STATUS** structure to differentiate between possible multiple connections through a single link service.

The IHV should maintain the various input and output signal lines and the data flow frame counts in the returned **MODEM_STATUS** structure. The Microsoft® Host Integration Server 2004 Modem Monitor application will periodically read and display the data stored in this **MODEM_STATUS** structure.

Internally **SNAModemAddLink** increments the usage count of the shared memory, and signals the Host Integration Server 2004 Modem Monitor application that a new link has been added.

See Also

MODEM_STATUS

SNAModemInitialize

SNAModemDeleteLink

The **SNAModemDeleteLink** function should be called when a link is terminating to delete the resources associated with the link. The parameters passed in must correspond to those returned by a call to **SNAModemAddLink**.

```
void SNAModemDeleteLink(
MODEM_STATUS *pModemStatus
);
```

Parameters

pModemStatus
A pointer to a **MODEM_STATUS** structure that was passed to the **SNAModemAddLink** function used for storing modem status interface.

Remarks

All resources in the link service associated with the modem status are deleted, and they must not be accessed by the IHV code after calling this function.

See Also

MODEM_STATUS

SNAModemAddLink

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SNAModemTerminate

The **SNAModemTerminate** function should be called once per link service process, at termination. The ideal place is **SNALinkTerminate**. If the link service supports a single link, it is appropriate to call **SNAModemDeleteLink** immediately before **SNAModemTerminate**. Otherwise it is better to call **SNAModemDeleteLink** as each link instance is terminated.

```
void SNAModemTerminate();
```

See Also

SNALinkTerminate

SNAModemDeleteLink

SNA Perfmon API

This section provides reference material for the SNA performance monitoring structures and functions.

This section contains:

- ADAPTERCOUNTER
- ADAPTERPERFDATA
- SNAInitLinkPerfmon
- SNAGetLinkPerfArea
- SNAGetPerfValues

ADAPTERCOUNTER

The **ADAPTERCOUNTER** structure represents an individual SNA Perfmon event that can be monitored, such as the total bytes transmitted. All of the data needed to display a single Perfmon event is stored in this structure.

```
typedef struct adaptercounter
{
    ULONG count;
    ULONG type;
    LONG scale;
} ADAPTERCOUNTER;
```

Members

count
The count for a specific Perfmon event since startup of the link service. Each time a Perfmon event takes place, the count is incremented accordingly, based on the type of event being counted. This count is maintained by the link service.

type
The event type that is being monitored with this **ADAPTERCOUNTER**. The **type** member instructs Perfmon whether the **count** member represents a numeric counter such as number of connection failures, a rate such as throughput in bytes transferred per second, or a percentage. For suitable values, see the platform SDK documentation of **PERF_COUNTER_*** (for example, **PERF_COUNTER_COUNTER** or **PERF_COUNTER_RAWCOUNT**).

scale
The default scale to be used by the Perfmon application when displaying this event. The **count** member is scaled by 10 raised to the power of scale such that a scale member of –1 multiplies **count** by 0.1.

ADAPTERPERFDATA

The **ADAPTERPERFDATA** structure groups all of the ADAPTERCOUNTER structures for an SNA link service together into a single block. It also has a few fields used internally by the SNA Perfmon code. The SNA link driver should not change the first three members of this structure.

```
typedef struct adapterperfdata
{
    ULONG inuse;
    ULONG ServiceNameIndex;
    ULONG FirstCounterIndex;
    ADAPTERCOUNTER TotalBytesReceived;
    ADAPTERCOUNTER TotalBytesTransmitted;
    ADAPTERCOUNTER TotalFramesReceived;
    ADAPTERCOUNTER TotalFramesTransmitted;
    ADAPTERCOUNTER SuccessfulConnects;
    ADAPTERCOUNTER ConnectionFailures;
    ADAPTERCOUNTER TotalBytesThroughput;
    ADAPTERCOUNTER TotalFramesThroughput;
    ADAPTERCOUNTER AdapterFailures;
    ADAPTERCOUNTER reserved[11];
    ULONG pad;
} ADAPTERPERFDATA;
```

Members

inuse
A flag that indicates that the link service is using this section of shared memory.

ServiceNameIndex
An index into an array of strings describing events that can be monitored by the Perfmon functions. These strings are stored in the registry under the HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Perflib key.

FirstCounterIndex
An index into an array of events that can be monitored by the Perfmon functions.

TotalBytesReceived
The number of data bytes received per second.

TotalBytesTransmitted
The number of data bytes transmitted per second.

TotalFramesReceived
The number of data frames received per second. A frame is an information structure recognized by one of the various protocols related to SNA. Frames contain multiple bytes of data.

TotalFramesTransmitted
The number of data frames transmitted per second.

SuccessfulConnects
The number of times since startup that a successful connection has been made.

ConnectionFailures
The number of times since startup that a connection has encountered an error condition.

TotalBytesThroughput
The total number of bytes flowing through Microsoft® Host Integration Server 2004 per second. This includes both incoming and outgoing bytes, and is a good indicator of how heavily your Host Integration Server 2004 is loaded.

TotalFramesThroughput
The total number of data frames flowing through Host Integration Server 2004 per second. This includes both incoming and outgoing frames, and is a good indicator of how heavily your Host Integration Server 2004 is loaded.

AdapterFailures
The number of times since startup that a network adapter has encountered an error condition.

reserved
An array of **ADAPTERCOUNTER** structures for future expansion.

pad
Padding.

SNAInitLinkPerfmon

The **SNAInitLinkPerfmon** function initializes the Perfmon data structures and code for an SNA link. The user defines the address of a handle and a void pointer that are passed as parameters to this function. This function returns values in these parameters that are then used by subsequent calls to the Perfmon code. The SNA link driver should not modify the parameters returned by this function.

```
void SNAInitLinkPerfmon(
    HANDLE *shrlockmutx,
    void **shrptr
);
```

Parameters

shrlockmutx
An address of a handle of a mutex used to protect a block of shared memory. This handle address is used when calling other Perfmon functions after initialization.

shrptr
The address of a pointer to a block of shared memory used by subsequent Perfmon functions.

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SNAGetLinkPerfArea

The **SNAGetLinkPerfArea** function returns a pointer to the shared data area used by the Perfmon application to store the link statistics. The parameters are the returned values from **SNAInitLinkPerfmon**. The SNA link then maintains the **ADAPTERCOUNTER** members of the returned **ADAPTERPERFDATA** structure.

```
ADAPTERPERFDATA * SNAGetLinkPerfArea(
HANDLE shrlockmutx,
ADAPTERPERFDATA *shrptr
);
```

Parameters

shrlockmutx
The handle of a mutex used to protect a block of shared memory that will contain the **ADAPTERPERFDATA** structure for this SNA link. The address of this handle is returned by the **SNAInitLinkPerfmon** function.

shrptr
A pointer to a block of shared memory returned by **SNAInitLinkPerfmon** that will contain the **ADAPTERPERFDATA** structure used by the Perfmon functions for this SNA link.

See Also

ADAPTERPERFDATA

SNAInitLinkPerfmon

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SNAGetPerfValues

The **SNAGetPerfValues** function is used to provide pointers to the *ServiceNameIndex* and *FirstCounterIndex* variables so that the Perfmon application knows where to get the descriptions of the performance counters from the registry. These variables are returned as members in the **ADAPTERPERFDATA** structure returned by the **SNAGetLinkPerfArea** function.

```
USHORT SNAGetPerfValues(
int *pServiceNameIndex,
int *pFirstCounterIndex
);
```

Parameters

pServiceNameIndex
A pointer to the **ServiceNameIndex** member of the **ADAPTERPERFDATA** structure.
pFirstCounterIndex
A pointer to the **FirstCounterIndex** member of the **ADAPTERPERFDATA** structure.

See Also

ADAPTERPERFDATA

SNAGetLinkPerfArea

Administration and Management Programmer's Reference

Microsoft® Host Integration Server 2004 included the following Windows Management Interface (WMI) providers to enable scripted management.

For general information about programming for WMI providers, see the Administration and Management Programmer's Guide section of the SDK.

For sample code illustrating WMI providers, see the Administration and Management Samples section of the SDK.

This section contains:

- Configuration Provider WMI Programmer's Reference
- IPC-DLC WMI Programmer's Reference
- SNA Trace Provider WMI Programmer's Reference
- SNA Status Provider WMI Programmer's Reference
- SNA Provider WMI Programmer's Reference
- MQBridge WMI Programmer's Reference

Configuration Provider WMI Programmer's Reference

The Configuration Provider WMI Programmer's Reference describes the classes you can use to monitor the configuration of Microsoft® Host Integration Server 2004.

This section contains:

- wmiHIS WMI Provider Classes

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wmiHIS WMI Provider Classes

Microsoft® Host Integration Server provider supplies information regarding the configuration of Host Integration Server. As an instance provider, the wmiHIS provider implements the standard **IWbemProviderInit** interface and the following **IWbemServices** methods:

- **CreateInstanceEnumAsync**
- **DeleteInstanceAsync**
- **GetObjectAsync**
- **PutInstanceAsync**

For more information on **IWbemProviderInit** and **IWbemServices**, see "COM API for WMI" in the MSDN Library at http://msdn.microsoft.com/library.

You can access the WmiHIS provider classes in the \root\MicrosoftHIS namespace.

Class	Description
MsHis_Locale	Queries for locale support.
MsHis_CodePage	Queries for code page support.

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MsHis_Locale

The **MsHIS_Locale** class is used to query for locale support.

The following syntax is simplified from MOF code.

```
class MsHis_Locale : MsHis_Config
{
   uint32 ID;
   string Name;
   boolean Available;
};
```

Properties

ID
Data Type: **uint32**
Qualifiers: **Key**
Access Type: Read-Only

The locale identifier. Used for internal reference.

Name
Data Type: **String**
Access Type: Read-Only

The locale name.

Available
Data Type: **Boolean**
Access Type: Read-Only

true if the locale is available on the system; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

wmiHIS WMI Provider Classes

Administration and Management Programmer's Guide

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MsHis_CodePage Class

The **MsHIS_CodePage** class is used to query for code page support.

The following syntax is simplified from MOF code.

```
class MsHis_CodePage : MsHis_Config
{
   uint32 ID;
   string Name;
   boolean Available;
   uint32 CodePage;
   boolean DBCSEnabled;
   boolean SBCSEnabled;
   boolean MBCSEnabled;
   boolean EuroEnabled;
};
```

Properties

ID
Data Type: **uint32**
Qualifiers: **Key**
Access Type: Read-Only

The code page identifier. Used for internal reference.

Name
Data Type: **String**
Access Type: Read-Only

The name of the code page.

Available
Data Type: **Boolean**
Access Type: Read-Only

true if the code page is supported by code page translations using SNANLS; otherwise, **false**.

CodePage
Data Type: **uint32**
Access Type: Read-Only

The number of the NLS code page.

DBCSEnabled
Data Type: **Boolean**
Access Type: Read-Only

true if this code page supports Double Byte Character Sets; otherwise, **false**.

SBCSEnabled
Data Type: **Boolean**
Access Type: Read-Only

true if this code page supports Single Byte Character Sets; otherwise, **false**.

MBCSEnabled
Data Type: **Boolean**
Access Type: Read-Only

true if this code page supports Multi-Byte Character Sets; otherwise, **false**.

EuroEnabled
Data Type: **Boolean**
Access Type: Read-Only

true if this code page has Euro support; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

wmiHIS WMI Provider Classes

Administration and Management Programmer's Guide

IPC-DLC WMI Programmer's Reference

The IPC-DLC WMI Programmer's Reference describes the classes you can use to monitor the Microsoft® Host Integration Server 2004 link service.

This section contains:

- WmiSnaLinkServiceMS WMI Provider Classes

WmiSnaLinkServiceMS WMI Provider Classes

The following table describes the Common Information Model (CIM) classes used by the **WmiSnaLinkService** instance and method Windows Management Instrumentation (WMI) provider.

Class	Description
MsSna_LinkService	SNA Link service base class.
MsSna_LinkService_IpDlc	SNA IP-DLC link service.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_LinkService Class

The abstract **MsSna_LinkService** class represents an SNA link service.

The following syntax is simplified from MOF code.

```
class MsSna_LinkService
{
   String Name;
   String DllName;
   Boolean IsRemotable;
   String Title;
   String DriverName;
   uint32 Type;
}
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**, **MaxLen(8)**
Access Type: Read-Only

A US_ASCII string containing the name of the link service. The name will be assigned automatically for a new link service.

DllName
Data Type: **String**
Access Type: Read-Only

The name of the .dll that implements the link service.

IsRemotable
Data Type: **Boolean**
Access Type: Read/Write

true if the link service can be used from a remote node; otherwise, **false**.

Title
Data Type: **String**
Qualifiers: **MaxLen(255)**
Access Type: Read/Write

The title of the link service, up to 128 symbols long.

DriverName
Data Type: **String**
Access Type: Read-Only

The device driver associated with the link service.

Type
Data Type: **uint32**
Access Type: Read-Only

The type of link service. The following table describes the possible values for **Type**.

Value	Meaning
3	SDLC
4	X25
10	DFT
11	DLC8022
31	TWINAX
32	CHANNEL
35	IPDLC

Requirements

Windows Server 2003, Windows XP Professional, Windows 2000

See Also

WmiSnaLinkServiceMS WMI Provider Classes | Administration and Management Programmer's Guide

MsSna_LinkService_IpDlc Class

The **MsSna_LinkService_IpDlc** class represents the SNA IP-DLC link service.

The following syntax is simplified from MOF code and includes all inherited properties. For reference information about methods, see the table of methods later in this topic.

```
Class MsSna_LinkService_IpDlc : MsSNA_LinkService
{
   String Name;
   String DllName;
   Boolean IsRemotable;
   String Title;
   String DriverName;
   uint32 Type;
   String PrimaryNNS;
   String BackupNNS;
   uint32 AddressType;
   String LocalAddress;
   String NetworkName;
   String CPName;
   String NodeID;
   String LENNode;
   String ResolvedIP;
}
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**, **MaxLen(8)**
Access Type: Read-Only

A US_ASCII string containing the name of the link service. The name will be assigned automatically for a new link service.

DllName
Data Type: **String**
Access Type: Read-Only

The name of the .dll that implements the link service.

IsRemotable
Data Type: **Boolean**
Access Type: Read/Write

true if the link service can be used from a remote node; otherwise, **false**. **IsRemotable** is always **false** for the IP-DLC link service.

Title
Data Type: **String**
Qualifiers: **MaxLen(255)**
Access Type: Read/Write

The title of the link service, up to 128 symbols long.

DriverName
Data Type: **String**
Access Type: Read-Only

The device driver associated with the link service. **DriverName** is used for the IP-DLC link service.

Type
Data Type: **uint32**
Access Type: Read-Only

The type of link service. The following table describes the possible values for **Type**.

Value	Meaning
3	SDLC
4	X25
10	DFT
11	DLC8022
31	TWINAX
32	CHANNEL
35	IPDLC

As an IP-DLC link service, **MsSna_LinkService_IpDlc.Type** will always be set to 35.

PrimaryNNS
Data Type: **String**
Qualifiers: **MaxLen(128)**
Access Type: Read/Write

Contains the name of the primary NNS server.

BackupNNS
Data Type: **String**
Qualifiers: **MaxLen(1024)**
Access Type: Read-Only

Contains the list of backup NNS delimited with semicolons. While **BackupNNS** may contain additional names, the current build is tested only for **BackupNNS** to be equal to the **PrimaryNNS**.

AddressType
Data Type: uint32
Access Type: Read/Write

Describes the local address type. The following table describes the possible values of **AddressType**.

Value	Description
1	ADAPTER
2	STATICIP

LocalAddress
Data Type: **String**
Qualifiers: **MaxLen(256)**
Access Type: Read/Write

Contains the local network adapter or address. If **AddressType** contains a 1, **LocalAddress** will contain a valid network adapter; otherwise, **LocalAddress** contains a static IP address.

NetworkName
Data Type: **String**
Qualifiers: **MaxLen(8)**, **ToUpperCase**
Access Type: Read/Write

The network name of the Branch Network Node as implemented by the link service. The string will be a Type A string containing up to eight symbols.

CPName
Data Type: **String**
Qualifiers: **MaxLen(8)**, **ToUpperCase**
Access Type: Read/Write

Control point name of the Branch Network Node as implemented by the link service. The string will be a Type A string containing up to eight symbols.

NodeID
Data Type: **String**
Qualifiers: **MaxLen(9)**
Access Type: Read/Write

The identity of the Branch Network Node as implemented by the link service. **NodeID** will be in format HHH.HHHHH, where H is a hexadecimal digit.

LENNode

Data Type: **String**
Qualifiers: **MaxLen(20)**
Access Type: Read/Write

The name of the Associated LEN node.

ResolvedIP

Data Type: **String**
Access Type: Read-only

The resolved IP address of the network adapter or local address.

Methods

The following table describes the methods implemented for the **MsSna_LinkService_IpDlc** class.

Method	Description
GetAllStaticIPs	Returns the list of all the static IP addresses on the local machine.
GetAllNetworkAdapters	Returns the list of all network adapters with the IP protocols enabled.
GetNextAvailableOrdinal	Internal. Provides the next available link service number.

Requirements

Windows Server 2003, Windows XP Professional, Windows 2000

See Also

WmiSnaLinkServiceMS WMI Provider Classes | Administration and Management Programmer's Guide

MsSna_LinkService_IpDlc.GetAllStaticIPs Method

The **GetAllStaticIPs** method returns the list of all the static IP addresses on the local machine.

```
void GetAllStaticIps(
   string IPs[]
);
```

Parameters

IPs
[out] Returns an array of strings containing the static IP addresses on the local machine.

Requirements

Windows Server 2003, Windows XP Professional, Windows 2000

See Also

WmiSnaLinkServiceMS WMI Provider Classes | MsSna_LinkService_IpDlc Class | Administration and Management Programmer's Guide

MsSna_LinkService_IpDlc.GetAllNetworkAdapters Method

The **GetAllNetworkAdapters** method returns the list of all network adapters with the IP protocols enabled.

```
void GetAllNetworkAdapters(
   string Adapters[]
);
```

Parameters

Adapters
  [out] Returns an array of strings containing the network adapters with the IP protocols enabled.

Requirements

Windows Server 2003, Windows XP Professional, Windows 2000

See Also

WmiSnaLinkServiceMS WMI Provider Classes | MsSna_LinkService_IpDlc Class | Administration and Management Programmer's Guide

MsSna_LinkService_IpDlc.GetNextAvailableOrdinal Method

Internal. The **GetNextAvailableOrdinal** method returns the next available link service number.

```
uint32 GetNextAvailableOrdinal()
```

Return Value

The next available link service number.

Remarks

GetNextAvailableOrdinal is an internal method, and as such should not be used by third parties.

Requirements

Windows Server 2003, Windows XP Professional, Windows 2000

See Also

WmiSnaLinkServiceMS WMI Provider Classes | MsSna_LinkService_IpDlc Class |
Administration and Management Programmer's Guide

SNA Trace Provider WMI Programmer's Reference

The SNA Trace Provider WMI Programmer's Reference describes the Windows® Management Instrumentation (WMI) classes you can use to capture trace messages from your Microsoft® Host Integration Server 2004 enterprise application.

For more information, see HIS Trace Capturing with WMI.

This section contains:

- WmiSnaTrace WMI Provider Classes

WmiSnaTrace WMI Provider Classes

The Microsoft® Host Integration Server SNA Trace provider supplies information regarding the SNA service trace. As an instance and method provider, the WmiSnaStatus provider implements the standard **IWbemProviderInit** interface and the following **IWbemServices** methods:

- **CreateInstanceEnumAsync**
- **DeleteInstanceAsync**
- **ExecMethodAsync**
- **GetObjectAsync**
- **PutInstanceAsync**

For more information on **IWbemProviderInit** and **IWbemServices**, see "COM API for WMI" in the MSDN Library at http://msdn.microsoft.com/library.

You can access these provider classes in the \root\MicrosoftHIS namespace.

Class	Description
MsHisTrace_Global	Contains the global settings for Host Integration Server tracing.
MsHisTrace_COMTI	Describes tracing properties for Transaction Integrator (TI).
MsHisTrace_SharedFoldersGateway	Contains tracing properties for the Shared Folders Gateway service.
MsHisTrace_SNAApplication	Contains tracing properties for any application that runs on top of Host Integration Server 2004.
MsHisTrace_SNAManageClient	Contains tracing properties for the SNA Manage Client.
MsHisTrace_SNAMngAgent	Contains tracing properties for the SNA Manage Agent.
MsHisTrace_SNAServerManager	Contains tracing properties for the SNA Manager.
MsHisTrace_SNABase	Contains tracing properties for the SNA Base service.
MsHisTrace_SNANetMn	Contains tracing properties for an SNA Net Manager.
MsHisTrace_SNAPrint	Contains tracing properties for the Host Print service.
MsHisTrace_SNAServer	Contains tracing properties for an SNA service
MsHisTrace_TN3270	Contains tracing properties for the TN3270 service.
MsHisTrace_Config	Contains tracing properties for the TN5250 service.
MsHisTrace_ExtendedStatus	Returns error information.
MsHisTrace_Event	Retrieves error information.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisTrace_Config Class

The abstract **MsHisTrace_Config** class describes the general properties of a configuration file.

The following syntax is simplified from MOF code.

```
class MsHisTrace_Config
{
   string Name;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisTrace_Global Class

The **MsHisTrace_Global** class contains the global settings for Microsoft® Host Integration Server tracing.

The following syntax is simplified from MOF code.

```
class MsHisTrace_Global : MsHisTrace_Config
{
   string Name;
   uint32 AsyncThreadPriority;
   Boolean AsyncTraceFlag;
   uint32 FlipLength;
   string TraceFileDirectory;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

AsyncThreadPriority
Data Type: **uint32**
Access Type: Read/Write

If *AsyncTraceFlag* is **true**, *AsyncThreadFlag* specifies the level of priority for tracing to run within the Windows® operating system.

AsyncTraceFlag
Data Type: **Boolean**
Access Type: Read/Write

true to cause tracing to be run on a background thread; otherwise, **false**.

FlipLength
Data Type: **uint32**
Access Type: Read/Write

The size a trace file should be before the trace utility switches to recording trace data in a second file.

TraceFileDirectory
Data Type: **String**
Access Type: Read/Write

The directory in which to store trace files.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

MsHisTrace_COMTI Class

The **MsHisTrace_COMTI** class describes tracing properties for Transaction Integrator (TI).

The following syntax is simplified from MOF code.

```
class MsHisTrace_COMTI : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean DPLHeaderTrace;
   Boolean LU62Trace;
   Boolean BriefLU62Trace;
   Boolean COMTIProxy;
   Boolean PipeLine;
   Boolean BlackBoard;
   Boolean GeneralService;
   Boolean Repository;
   Boolean DataTransit;
   Boolean DataLayout;
   Boolean Conversions;
   Boolean Transport;
   Boolean Registrar;
   Boolean Scripting;
   Boolean SessionManager;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Qualifiers: **Qualifiers**
Access Type: Read-Only

Bitmap that indicates which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

DPLHeaderTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of DPL Headers; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

BriefLU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable a briefer version LU 6.2 tracing; otherwise, **false**.

COMTIProxy
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the COMPI Proxy API; otherwise, **false**.

PipeLine
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the PipeLine API; otherwise, **false**.

BlackBoard
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the BlackBoard API; otherwise, **false**.

GeneralService
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the GeneralService API; otherwise, **false**.

Repository
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the Repository API; otherwise, **false**.

DataTransit
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the DataTransit API; otherwise, **false**.

Conversions
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the Conversions API; otherwise, **false**.

Transport
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the Transport API; otherwise, **false**.

Registrar
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the Registrar API; otherwise, **false**.

Scripting
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the Scripting API; otherwise, **false**.

SessionManager
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of the SessionManager API; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisTrace_SharedFoldersGateway Class

The **MsHisTrace_SharedFoldersGateway** class contains tracing properties for the Shared Folders Gateway service.

The following syntax is simplified from MOF code.

```
class MsHisTrace_SharedFoldersGateway : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean T3270Trace;
   Boolean LU62Trace;
   Boolean APPCTrace;
   Boolean CPICTrace;
   Boolean LUATrace;
   Boolean CSVTrace;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap that indicates which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

T3270Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable T3270 tracing; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

APPCTrace
Data Type: **Boolean**

Access Type: Read/Write

true to enable APPC tracing; otherwise, **false**.

CPICTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CPI-C tracing; otherwise, **false**.

LUATrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LUA tracing; otherwise, **false**.

CSVTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CSV tracing; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

MsHisTrace_SNAApplication Class

The **MsHisTrace_SNAApplication** class contains tracing properties for any application that runs on top of Microsoft® Host Integration Server 2004.

The following syntax is simplified from MOF code.

```
class MsHisTrace_SNAApplication : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean T3270Trace;
   Boolean LU62Trace;
   Boolean APPCTrace;
   Boolean CPICTrace;
   Boolean LUATrace;
   Boolean CSVTrace;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap indicating which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

T3270Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable T3270 tracing; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

APPCTrace

Data Type: **Boolean**
Access Type: Read/Write

true to enable APPC tracing; otherwise, **false**.

CPICTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CPI-C tracing; otherwise, **false**.

LUATrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LUA tracing; otherwise, **false**.

CSVTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CSV tracing; otherwise, **false**.

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

MsHisTrace_SNAManageClient Class

The **MsHisTrace_SNAManageClient** contains tracing properties for the SNA Manage Client.

The following syntax is simplified from MOF code.

```
class MsHisTrace_SNAManageClient : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap indicating which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisTrace_SNAMngAgent Class

The **MsHisTrace_SNAMngAgent** class contains tracing properties for the SNA Manage Agent.

The following syntax is simplified from MOF code.

```
class MsHisTrace_SNAMngAgent : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
};
```

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap indicating which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisTrace_SNAServerManager Class

The **MsHisTrace_SNAServerManager** class contains tracing properties for the SNA Manager.

The following syntax is simplified from MOF code.

```
class MsHisTrace_SNAServerManager : MsHisTrace_Config
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean T3270Trace;
   Boolean LU62Trace;
   Boolean APPCTrace;
   Boolean CPICTrace;
   Boolean LUATrace;
   Boolean CSVTrace;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap indicating which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

T3270Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable T3270 tracing; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

APPCTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable APPC tracing; otherwise, **false**.

CPICTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CPI-C tracing; otherwise, **false**.

LUATrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LUA tracing; otherwise, **false**.

CSVTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CSV tracing; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisTrace_SNABase Class

The **MsHisTrace_SNABase** class contains tracing properties for the SNA Base service.

The following syntax is simplified from MOF code.

```
class MsHisTrace_SNABase : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean T3270Trace;
   Boolean LU62Trace;
}
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap that indicates which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

T3270Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable T3270 tracing; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

MsHisTrace_SNANetMn Class

The **MsHisTrace_SNANetMn** class contains SNA Net Management trace content.

The following syntax is simplified from MOF code.

```
class MsHisTrace_SNANetMn : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean T3270Trace;
   Boolean LU62Trace;
   Boolean DLCTrace;
   Boolean SnaTrace;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap that indicates which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

T3270Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable T3270 tracing; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

DLCTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable DLC tracing; otherwise, **false**.

SnaTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable SNA tracing; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

MsHisTrace_SNAPrint Class

The **MsHisTrace_SNAPrint** class contains tracing properties for the Host Print service.

The following syntax is simplified from MOF code.

```
class MsHisTrace_SNAPrint : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean T3270Trace;
   Boolean LU62Trace;
   Boolean APPCTrace;
   Boolean CPICTrace;
   Boolean LUATrace;
   Boolean CSVTrace;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap that indicates which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

T3270Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable T3270 tracing; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

APPCTrace
Data Type: **Boolean**

Access Type: Read/Write

true to enable APPC tracing; otherwise, **false**.

CPICTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CPI-C tracing; otherwise, **false**.

LUATrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LUA tracing; otherwise, **false**.

CSVTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CSV tracing; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

MsHisTrace_SNAServer Class

The **MsHisTrace_SNAServer** class represents tracing properties for an SNA service.

The following syntax is simplified from MOF code.

```
class MsHisTrace_SNAServer : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean T3270Trace;
   Boolean LU62Trace;
   Boolean DLCTrace;
   Boolean SnaTrace;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap that indicates which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Indicates which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask

128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

T3270Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable T3270 tracing; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

DLCTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable DLC tracing; otherwise, **false**.

SnaTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable SNA tracing; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisTrace_TN3270 Class

The **MsHisTrace_TN3270** class contains tracing properties for the TN3270 service.

The following syntax is simplified from MOF code.

```
class MsHisTrace_TN3270 : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean T3270Trace;
   Boolean LU62Trace;
   Boolean APPCTrace;
   Boolean CPICTrace;
   Boolean LUATrace;
   Boolean CSVTrace;
   Boolean TraceState;
}
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap that indicates which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

T3270Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable T3270 tracing; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

APPCTrace

Data Type: **Boolean**
Access Type: Read/Write

true to enable APPC tracing; otherwise, **false**.

CPICTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CPI-C tracing; otherwise, **false**.

LUATrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LUA tracing; otherwise, **false**.

CSVTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CSV tracing; otherwise, **false**.

TraceState
Data Type: **Boolean**
Access Type: Read/Write

true to enable the TN3270 Internal Trace; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

MsHisTrace_Config Class

The **MsHisTrace_Config** class contains tracing properties for the TN5250 service.

The following syntax is simplified from MOF code.

```
class MsHisTrace_TN5250 : MsHisTrace_Config
{
   string Name;
   uint32 EnabledTraces;
   Boolean InternalMessageTrace;
   Boolean T3270Trace;
   Boolean LU62Trace;
   Boolean APPCTrace;
   Boolean CPICTrace;
   Boolean LUATrace;
   Boolean CSVTrace;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Name of the configuration file.

EnabledTraces
Data Type: **uint32**
Access Type: Read/Write

Bitmap that indicates which Internal Trace conditions to record. The following table describes the possible values for **EnabledTraces**.

Value	Description
1	Fatal trace mask
2	Error trace mask
4	Debug trace mask
8	State trace mask
16	Function trace mask
32	Message trace mask
64	Custom trace mask
128	Plan enter exit mask

InternalMessageTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable tracing of internal messages; otherwise, **false**.

T3270Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable T3270 tracing; otherwise, **false**.

LU62Trace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LU 6.2 tracing; otherwise, **false**.

APPCTrace
Data Type: **Boolean**

Access Type: Read/Write

true to enable APPC tracing; otherwise, **false**.

CPICTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CPI-C tracing; otherwise, **false**.

LUATrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable LUA tracing; otherwise, **false**.

CSVTrace
Data Type: **Boolean**
Access Type: Read/Write

true to enable CSV tracing; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisTrace_ExtendedStatus Class

The **MsHisTrace_ExtendedStatus** class returns error information.

The following syntax is simplified from MOF code.

```
class MsHisTrace_ExtendedStatus : __ExtendedStatus
{
};
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

MsHisTrace_Event Class

The **MsHisTrace_Event** class retrieves error information.

The following syntax is simplified from MOF code.

```
class MsHisTrace_Event : __ExtrinsicEvent
{
    string Name;
    string PathToObj;
};
```

Properties

Name
Data Type: **String**
Access Type: Read/Write

Name of the event that occurred.

PathToObj
Data Type: **String**
Access Type: Read/Write

Path to the object that describes the event.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaTrace WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SNA Status Provider WMI Programmer's Reference

The SNA Status Provider WMI Programmer's Reference describes the Windows® Management Instrumentation (WMI) classes you can use to monitor the health of your SNA servers for Microsoft® Host Integration Server 2004.

For more information, see Health Monitoring for HIS with WMI.

This section contains:

- WmiSnaStatus WMI Provider Classes

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

WmiSnaStatus WMI Provider Classes

The Microsoft® Host Integration Server SNA Status provider supplies information regarding the SNA service status. As an instance and method provider, the WmiSnaStatus provider implements the standard **IWbemProviderInit** interface and the following **IWbemServices** methods:

·**CreateInstanceEnumAsync**

·**DeleteInstanceAsync**

·**ExecMethodAsync**

·**ExecQueryAsync**

·**GetObjectAsync**

·**PutInstanceAsync**

For more information on **IWbemProviderInit** and **IWbemServices**, see "COM API for WMI" in the MSDN Library at http://msdn.microsoft.com/library.

The WmiSnaStatus.mof and WmiSnaStatus_XP file contains the WMISNA provider, and association and registration classes. You can access these provider classes in the \root\MicrosoftHIS namespace.

Class	Description
MsSnaStatus_EventServiceSna	Describes a change to the **EventServiceSna** class.
MsSnaStatus_EventConnection	Describes a change to the **EventConnection** class
MsSnaStatus_EventLu3270	Describes a change to the **EventLu3270** class.
MsSnaStatus_EventUser	Describes a change to the **EventUser** class.
MsSnaStatus_EventAppcLocalLu	Describes a change to the **EventAppcLocalLu** class.
MsSnaStatus_EventAppcSession	Describes a change to the **EventAppcSession** class.
MsSnaStatus_EventServicePrint	Describes a change to the **EventServicePrint** class.
MsSnaStatus_EventPrintSession	Describes a change to the **EventPrintSession** class.
MsSnaStatus_EventServiceTN3270	Describes a change to the **EventServiceTN3270** class.
MsSnaStatus_EventTN3270Session	Describes a change to the **EventTN3270Session** class.
MsSnaStatus_EventServiceTN5250	Describes a change to the **EventTN5250Session** class.
MsSnaStatus_EventServiceSharedFolder	Describes a change to the **EventServiceSharedFolder** class.
SNA_ExtendedStatus	Used to return error information if required.
MsSnaStatus_ServiceSna	Get information on the status of the SNA service.
MsSnaStatus_Connection	Represents a SNA Service connection status.
MsSnaStatus_Lu3270	Represents a SNA Service display LU, printer LU, or LUA LU status.
MsSnaStatus_ClientConnections	Represents a SNA Service client connection status.
MsSnaStatus_AppcLocalLu	Represents an APPC Local LU status.
MsSnaStatus_AppcSession	Represents an APPC session status.
MsSnaStatus_ServicePrint	Represents an Host Printer service status.
MsSnaStatus_PrintSession	Represents an Host Printer session status.
MsSnaStatus_ServiceTN3270	Represents a TN3270 service status.
MsSnaStatus_TN3270Session	Represents a TN3270 session status.
MsSnaStatus_ServiceTN5250	Represents a TN5250 service status.
MsSnaStatus_TN5250Session	Represents a TN5250 session status.
MsSnaStatus_ServiceSharedFolder	Represents a TN3270 service status.
MsSnaStatus_Lu3270ToActiveUser	Represents an association between a User connection and a 3270 type LU.
MsSnaStatus_APPCSessionToActiveUser	Represents an association between a User connection and an APPC session.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventServiceSna Class

The **MsSnaStatus_EventServiceSna** class describes a change to the **EventServiceSna** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventServiceSna : MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventConnection Class

The **MsSnaStatus_EventConnection** class describes a change to the **EventConnection** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventConnection: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_EventLu3270 Class

The **MsSnaStatus_EventLu3270** class describes a change to the **EventLu3270** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventLu3270: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventUser Class

The **MsSnaStatus_EventUser** class describes a change to the **EventUser** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventUser: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventAppcLocalLu Class

The **MsSnaStatus_EventAppcLocalLu** class describes a change to the **EventAppcLocalLu** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventAppcLocalLu: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server2003

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_EventAppcSession Class

The **MsSnaStatus_EventAppcSession** class describes a change to the **EventAppcSession** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventAppcSession: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventServicePrint Class

The **MsSnaStatus_EventServicePrint** class describes a change to the **EventServicePrint** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventServicePrint: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventPrintSession Class

The **MsSnaStatus_EventPrintSession** class describes a change to the **EventPrintSession** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventPrintSession: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventServiceTN3270 Class

The **MsSnaStatus_EventServiceTN3270** class describes a change to the **EventServiceTN3270** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventServiceTN3270: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventTN3270Session Class

The **MsSnaStatus_EventTN3270Session** class describes a change to the **EventTN3270Session** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventTN3270Session: MsSnaStatus_Event
{
    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventServiceTN5250 Class

The **MsSnaStatus_EventServiceTN5250** class describes a change to the **EventServiceTN5250** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventServiceTN5250: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventTN5250Session Class

The **MsSnaStatus_EventTN5250** class describes a change to the **EventTN5250Session** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventTN5250Session: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path
Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action
Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_EventServiceSharedFolder Class

The **MsSnaStatus_EventServiceSharedFolder** class describes a change to the **EventServiceSharedFolder** class.

The following syntax is simplified from MOF code.

```
class MsSnaStatus_EventServiceSharedFolder: MsSnaStatus_Event

    object ref Path;
    sint16 Action;
};
```

Path

Data Type: **Object ref**
Access Type: Read-Only

The relative path to the corresponding object.

Action

Data Type: **sint16**
Access Type: Read-Only

The event that occurred to the object specified in **Path**. The following table describes the valid values for **Action**.

Value	Description
0	Create
1	Destroy
2	Modify

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

SNA_ExtendedStatus Class

Used to return error information if required

```
class MsSnaStatus_ExtendedStatus : __ExtendedStatus
{
};
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_ServiceSna Class

The **MsSnaStatus_ServiceSna** class is used to get information on the status of the SNA service.

```
class MsSnaStatus_ServiceSna : MsSnaStatus_Config
{
   string Name;
   sint32 Status;
   string StatusText;
   Boolean bOutOfDate;
   uint16 AppcSessions;
   uint16 LU3270Sessions;
   uint16 Users;
}
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The name of the service. The string can contain more than one service, in the following format:<ComputerName>, <ComputerName>.01, <ComputerName>.02, <ComputerName>.03...

Status
Data Type: **sint32**
Access Type: Read-Only

The current status of the service. The following table describes the possible values for **Status**.

Value	Description
0	
1	Inactive
2	Pending
3	Stopping
4	Active

StatusText
Data Type: **String**
Access Type: Read-Only

One of the status values.

bOutOfDate
Data Type: **Boolean**
Access Type: Read-Only

true indicates that the configuration has changed and that the service must be restarted; otherwise, **false**.

AppcSessions
Data Type:**uint16**
Access Type: Read-Only

Statistics on APPC sessions on the service.

LU3270Sessions
Data Type:**uint16**
Access Type: Read-Only

Statistics on LU 3270 sessions on the service.

Users
Data Type:**uint16**
Access Type: Read-Only

Statistics on users on the service.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.
ExecMethod	Executes the specified method.
Start	Starts the service.
Stop	Stops the service.
Pause	Pauses the service.
Resume	Resumes the service.

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Remarks

There may be more than one service running on a computer.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_ServiceSna.Start Method

Starts the service.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_ServiceSna.Stop Method

Stops the service.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_ServiceSna.Pause Method

Pauses the service.

```
void Pause();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_ServiceSna.Resume Method

Resumes the service.

```
void Resume();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_Connection Class

The **MsSnaStatus_Connection** class represents a SNA service connection status.

The following is simplified MOF syntax.

```
class MsSnaStatus_Connection : MsSnaStatus_Config
{
   string Name;
   string ServiceName;
   uint32 Status;
   string StatusText;
   uint32 InactiveState;
   uint16 Failcode;
   DateTime FailTime;
}
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The name of the connection.

ServiceName
Data Type: **String**
Access Type: Read-Only

Name of the SNA service to which this connection belongs.

Status
Data Type: **uint32**
Access Type: Read-Only

Name of the SNA service to which this connection belongs.

Value	Description
0	
1	Inactive
2	Pending
3	Stopping
4	Active

StatusText
Data Type: **String**
Access Type: Read-Only

One of the status values. The following table describes the potential values for **StatusText**.

Value	Description
0	
1	Stopping
2	Active
3	Incoming
4	OnDemand
5	OnDemandIncoming

InactiveState
Data Type: **uint32**
Access Type: Read-Only

Additional detail on inactive connections. The following table describes the possible values for **InactiveState**.

Value	Description
0	Inactive
1	Incoming
2	OnDemand
3	OnDemandIncoming

Failcode
Data Type: **uint16**
Access Type: Read-Only

The failure code. 0 indicates a non-failure.

FailTime
Data Type: **DateTime**
Access Type: Read-Only

The time the failure occurred. Valid only if **Failcode** is not 0.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.
ExecMethod	Executes the specified method.
Start	Starts the connection.
Stop	Stops the connection.

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_Connection.Start Method

Starts the connection.

```
void Start();
```

Requirements

Platforms: Windows 2000, Windows XP Professional, Windows Server 2003

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_Connection.Stop Method

Stops the connection.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_Lu3270 Class

The **MsSnaStatus_Lu3270** class represents a SNA Service display LU, printer LU, or LUA LU status.

```
class MsSnaStatus_Lu3270 : MsSnaStatus_Config
{
   string Name;
   string ConnectionName;
   uint32 Status;
   string StatusText;
   uint32 ActiveState;
   string HostAppl;
}
```

Properties

Name

Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The name of the LU.

ConnectionName

Data Type: **String**
Access Type: Read-Only

The connection on which this LU is defined.

Status

Data Type: **uint32**
Access Type: Read-Only

The current status of the connection. The following table describes the potential values for **Status**.

Value	Description
0	
1	Inactive
2	Pending
3	Stopping
4	Active

StatusText

Data Type: **String**
Access Type: Read-Only

One of the status values. The following table describes the potential values for **StatusText**.

Value	Description
0	
1	Inactive
2	Pending
3	Stopping
4	Available
5	InSession
6	SSCP

ActiveState

Data Type: **uint32**
Access Type: Read-Only

Additional detail on active ULs. The following table describes the possible values for **ActiveState**.

Value	Description

0	Available
1	InSession
2	SSCP

HostAppl

Data Type: **string**
Access Type: Read-Only

The short name of the host application.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.
ExecMethod	Executes the specified method.
Stop	Stops the LU.

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

MsSnaStatus_Lu3270.Stop Method

Stops the LU.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_ClientConnections Class

The **MsSnaStatus_ClientConnections** class represents a SNA service client connection status.

```
class MsSnaStatus_ClientConnections : MsSnaStatus_Config
{
   string UserId;
   string Domain;
   string User;
   string ClientMachine;
   DateTime ClientConnectTime;
   string ClientAppl;
};
```

Properties

UserId
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

An arbitrary unique key.

Domain
Data Type: **String**
Access Type: Read-Only

The domain on which the user is located.

User
Data Type: **String**
Access Type: Read-Only

The username of the user.

ClientMachine
Data Type: **String**
Access Type: Read-Only

The computer name on which the client application is running.

ClientConnectTime
Data Type: **DateTime**
Access Type: Read-Only

The client-server connection start time.

ClientAppl
Data Type: **string**
Access Type: Read-Only

The name of the client application.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.

For more information on **GetObject** and **EnumerateInstances**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_AppcLocalLu Class

The **MsSnaStatus_AppcLocalLu** class represents an APPC Local LU status.

```
class MsSnaStatus_AppcLocalLu : MsSnaStatus_Config
{
   string Name;
   string ServiceName;
   uint16 SessionLimit;
   uint16 SessionCount;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The Local LU alias.

ServiceName
Data Type: **String**
Access Type: Read-Only

The name of the SNA service on which this Local LU is defined.

SessionLimit
Data Type: **uint16**
Access Type: Read-Only

The session limit for the LU.

SessionCount
Data Type: **uint16**
Access Type: Read-Only

The current session count.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.

For more information on **GetObject** and **EnumerateInstances**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_AppcSession Class

The **MsSnaStatus_AppcSession** class represents an APPC session status.

```
class MsSnaStatus_AppcSession : MsSnaStatus_Config
{
   string APPCLU;
   string SessionID;
   string PartnerLU;
   string Mode;
};
```

Properties

APPCLU
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The Local APPC LU.

SessionID
Data Type: **String**
Access Type: Read-Only

A unique ID for this session.

PartnerLU
Data Type: **String**
Access Type: Read-Only

The Partner LU alias. **PartnerLU** can be a Remote LU or another Local LU.

Mode
Data Type: **String**
Access Type: Read-Only

The mode name for this session.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.
ExecMethod	Executes the specified method.
Stop	Stops the session.

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_AppcSession.Stop Method

Stops the session.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_ServicePrint Class

The **MsSnaStatus_ServicePrint** class represents an SNA Print service status.

```
class MsSnaStatus_ServicePrint : MsSnaStatus_Config
{
   string Name;
   sint32 Status;
   string StatusText;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The name of the Print Service. **Name** will be the same as the computer name.

Status
Data Type: **sint32**
Access Type: Read-Only

The current status of the service. The following table describes the possible values for **Status**.

Value	Description
0	Inactive
1	Pending
2	Stopping
3	Active

StatusText
Data Type: **String**
Access Type: Read-Only

One of the **Status** values.

Mode
Data Type: **String**
Access Type: Read-Only

The mode name for this session.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.
ExecMethod	Executes the specified method.
Start	Starts the print service.
Stop	Stops the print service

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_ServicePrint.Start Method

Starts the print service.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_ServicePrint.Stop Method

Stops the print service.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_PrintSession Class

The **MsSnaStatus_PrintSession** class represents an SNA Print session status.

```
class MsSnaStatus_PrintSession : MsSnaStatus_Config
{
   string Name;
   uint32 Status;
   string StatusText;
   uint32 PrintState;
   uint16 Type;
}
```

Properties

Name

Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

A unique ID for the session.

Status

Data Type: **sint32**
Access Type: Read-Only

The current status of the service. The following table describes the possible values for **Status**.

Value	Description
0	Inactive
1	Pending
2	Stopping
3	Active

StatusText

Data Type: **String**
Access Type: Read-Only

One of the **Status** values. The following describes the possible values for **StatusText**.

Value
Inactive
Pending
Stopping
Spooling
Printing
Paper Out
Printer Offline
Printer Error
Printer Paused
Printer Idle
InSession
Ready
Paused
Unknown

PrintState

Data Type: **String**
Access Type: Read-Only

The printer state that indicates the status of the printer or any printer errors. The following table describes the possible values for **PrintState**.

Value
Spooling
Printing
Paper Out
Printer Offline
Printer Error
Printer Paused
Printer Idle
InSession
Ready
Paused
Unknown

Type

Data Type: **uint16**
Access Type: Read-Only

The type of print session. The following table describes the possible values for **Type**.

Value	Description
0	3270
1	APPC

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.
ExecMethod	Executes the specified method.
Start	Starts the print session.
Stop	Stops the print session.
Pause	Pauses the print session.
Restart	Restarts the print session.
PA1Key	Simulates pressing the PA1Key.
PA2Key	Simulates pressing the PA2Key.
Cancel	Cancels the print session.

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_PrintSession.Start Method

Starts the print session.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_PrintSession.Stop Method

Stops the print session.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_PrintSession.Pause Method

Pauses the print session.

```
void Pause();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_PrintSession.Restart Method

Restarts the print session.

```
void Restart();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_PrintSession.PA1Key Method

Simulates pressing the PA1 key.

```
void PA1Key();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_PrintSession.PA2Key Method

Simulates pressing the PA2 key.

```
void PA2Key();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_PrintSession.Cancel Method

Cancels the print session.

```
void Cancel();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_ServiceTN3270 Class

The **MsSnaStatus_ServiceTN3270** class represents a TN3270 service status.

```
class MsSnaStatus_ServiceTN3270 : MsSnaStatus_Config
{
   string Name;
   sint32 Status;
   string StatusText;
}
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The service name. **Name** will be identical to the local computer name.

Status
Data Type: **sint32**
Access Type: Read-Only

The current status of the service. The following table describes the possible values for **Status**.

Value	Description
0	
1	Inactive
2	Pending
3	Stopping
4	Active

StatusText
Data Type: **String**
Access Type: Read-Only

One of the status values.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.
ExecMethod	Executes the specified method.
Start	Starts the service.
Stop	Stops the service.

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_ServiceTN3270.Start Method

Starts the service.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_ServiceTN3270.Stop Method

Stops the service.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_TN3270Session Class

The **MsSnaStatus_TN3270Session** class represents a TN3270 session status.

```
class MsSnaStatus_TN3270Session : MsSnaStatus_Config
{
   string Name;
   string Client;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The service name. **Name** will be identical to the LUA LU or Pool name.

Client
Data Type: **String**
Access Type: Read-Only

The client computer name or IP address.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

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MsSnaStatus_ServiceTN5250 Class

The **MsSnaStatus_ServiceTN5250** class represents a TN5250 service status.

```
class MsSnaStatus_ServiceTN5250 : MsSnaStatus_Config
{
   string Name;
   sint32 Status;
   string StatusText;
}
```

Properties

Name

Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The service name. **Name** will be identical to the local computer name.

Status

Data Type: **sint32**
Access Type: Read-Only

The current status of the service. The following table describes the possible values for **Status**.

Value	Description
0	
1	Inactive
2	Pending
3	Stopping
4	Active

StatusText

Data Type: **String**
Access Type: Read-Only

One of the status values.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.
ExecMethod	Executes the specified method.
Start	Starts the method.
Stop	Stops the method.

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_ServiceTN5250.Start Method

Starts the service.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_ServiceTN5250.Stop Method

Stops the service.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_TN5250Session Class

The **MsSnaStatus_TN5250Session** class represents a TN5250 session status.

```
class MsSnaStatus_TN5250Session : MsSnaStatus_Config
{
   string TNSessionID;
   string APPCLU;
   string PartnerLU;
   string Mode;
   string Client;
};
```

Properties

TNSessionID
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

An arbitrary unique ID representing the session ID.

APPCLU
Data Type: **String**
Access Type: Read-Only

APPC Local LU alias.

PartnerLU
Data Type: **String**
Access Type: Read-Only

APPC Partner LU alias. **PartnerLU** can be a Remote LU or another Local LU.

Mode
Data Type: **String**
Access Type: Read-Only

The mode name for this session.

Client
Data Type: **String**
Access Type: Read-Only

The client computer name or IP address.

Methods

Method	**Description**
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.

For more information on **GetObject** and **EnumerateInstances**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_ServiceSharedFolder Class

The **MsSnaStatus_ServiceSharedFolder** class represents a TN3270 service status.

```
class MsSnaStatus_ServiceSharedFolder : MsSnaStatus_Config
{
   string Name;
   sint32 Status;
   string StatusText;
}
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The name of the service. **Name** will be the same as the local computer name.

Status
Data Type: **sint32**
Qualifiers: **Key**
Access Type: Read-Only

The status of the service. The following table describes the potential values for **Status**.

Value	Description
0	
1	Inactive
2	Pending
3	Stopping
4	Active

StatusText
Data Type: **String**
Access Type: Read-Only

One of the status values.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates the instance.
ExecMethod	Executes the specified method.
Start	Starts the service.
Stop	Stops the service.

For more information on **GetObject**, **EnumerateInstances**, and **ExecMethod**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_ServiceSharedFolder.Start Method

Starts the service.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_ServiceSharedFolder.Stop Method

Stops the service.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

MsSnaStatus_Lu3270ToActiveUser Class

The **MsSnaStatus_Lu3270ToActiveUser** class represents an association between a User connection and a 3270 type LU.

```
class MsSnaStatus_Lu3270ToActiveUser : MsSnaStatus_Association
{
   MsSnaStatus_Lu3270 ref PathToLU3270;
   MsSnaStatus_ActiveUser ref PathToUser;
};
```

Properties

PathToLU3270
Data Type: **MsSnaStatus_Lu3270 ref**
Qualifiers: **Key**
Access Type: Read-Only

The path to the APPC session.

PathToUser
Data Type: **MsSnaStatus_ActiveUser ref**
Qualifiers: **Key**
Access Type: Read-Only

The path to the user.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.

For more information on **GetObject** and **EnumerateInstances** see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSnaStatus_APPCSessionToActiveUser Class

The **MsSnaStatus_APPCSessionToActiveUser** class represents an association between a User connection and an APPC session.

```
class MsSnaStatus_APPCSessionToActiveUser : MsSnaStatus_Association
{
   MsSnaStatus_AppcSession ref PathToAPPCSession;
   MsSnaStatus_ActiveUser ref PathToUser;
};
```

Properties

PathToAPPCSession
Data Type: **MsSnaStatus_AppcSession ref**
Qualifiers: **Key**
Access Type: Read-Only

The path to the APPC session.

PathToUser
Data Type: **String**
Qualifiers: **Key**
Access Type: **MsSnaStatus_ActiveUser ref**

The path to the user.

Methods

Method	Description
GetObject	Retrieves the instance.
EnumerateInstances	Enumerates all instances of the object.

For more information on **GetObject** and **EnumerateInstances**, see "IWbemServices interface" in the MSDN Library at http://msdn.microsoft.com/library.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WmiSnaStatus WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SNA Provider WMI Programmer's Reference

The SNA Provider WMI Programmer's Reference describes the Windows® Management Instrumentation (WMI) classes you can use to monitor and control SNA services.

For more information, see Controlling Services and Connections with WMI.

This section contains:

- WMISNA WMI Provider Classes

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

WMISNA WMI Provider Classes

The Microsoft® Host Integration Server SNA configuration provider supplies information regarding the SNA service configuration. As an instance and method provider, the WMISNA provider implements the standard **IWbemProviderInit** interface and the following **IWbemServices** methods:

- **CreateInstanceEnumAsync**
- **DeleteInstanceAsync**
- **ExecMethodAsync**
- **ExecQueryAsync**
- **GetObjectAsync**
- **PutInstanceAsync**

For more information on **IWbemProviderInit** and **IWbemServices**, see "COM API for WMI" in the MSDN Library at http://msdn.microsoft.com/library.

The WmiSna.mof and WmiSna_XP.mof files contain the WMISNA provider, and association and registration classes. You can access the WMISNA provider classes in the \root\MicrosoftHIS namespace.

Class	Description
MsSna_Domain	Global properties that affect all servers in the group. Sometimes called a subdomain or OU.
MsSna_ServiceSNA	SNA service implements the SNA protocol. Contains the connections and LU resources.
MsSna_ServiceTN3270	TN3270 service enables clients to connect to a host via the TN3270 protocol.
MsSna_ServiceTN5250	TN5250 service enables clients to connect via the TN5250 protocol to a host.
MsSna_ServiceSharedFolder	The Shared Folders Gateway service for AS/400 file access.
MsSna_ServicePrint	Host Print service contains print sessions.
MsSna_UserInfo	Base class for a User or Group account configured in SNA.
MsSna_ConfiguredUser	A User or Group account configured in SNA. Can determine access to LUs and pools.
MsSna_LogInUserAndGroups	For the logged-on user, an enumeration returns the configured user and groups.
MsSna_Workstation	A workstation configured in SNA, specified by name or IP address. Can determine access to LUs and pools.
MsSna_Lu3270	Base class for 3270 LU resource. Each 3270 LU must belong to a connection.
MsSna_LuDisplay	A 3270 LU display resource. Often used for terminal emulator access.
MsSna_LuLua	A 3270 LU LUA resource. Often used for programmatic access.
MsSna_TN3270Session	The part of the TN3270 session that specifies client configuration. References a SNA_LU_LUA class.
MsSna_TN3270Port	Describes a port with security properties.
MsSna_TN3270SessionIPFilter	An IP address/name assigned to a TN3270 session. Multiple IP address/name pairs of these can be assigned to one session.
MsSna_TN5250SessionIPFilter	An IP address/name assigned to a TN5250 session. Multiple IP address/name pairs of these can be assigned to one session.
MsSna_LuPassThrough	One half of the dowstream LU/pool pairs. Represents a downstream LU/pool that is associated with a downstream connection.
MsSna_LuDown	A 3270 LU downstream resource. Reserved for use with downstream connections.
MsSna_LuPrint	A 3270 LU printer resource. Used by Print Session or by printer emulator.
MsSna_Pool	Base class for 3270 LU pools. A pool is associated with one or more 3270 LUs.
MsSna_PoolDisplay	The 3270 LU display pool.
MsSna_PoolLua	The 3270 LU LUA pool.
MsSna_PoolDown	The 3270 LU downstream pool.
MsSna_LuAppcLocal	An APPC Local LU resource. Used for LU 6.2 protocol.
MsSna_LuAppcRemote	An APPC remote LU resource. Used for LU 6.2 protocol. References a connection.
MsSna_AppcMode	An APPC Mode definition. Defines properties of an LU 6.2 session.
MsSna_Connection	Base class for SNA connection. Belongs to an SNA service. May own 3270 LUs.
MsSna_Connection8022Dlc	A type of SNA connection that uses 802.2 DLC protocol over Token Ring or Ethernet.
MsSna_ConnectionSdlc	A type of SNA connection that uses SDLC protocol over dial-up or leased lines.

MsSna_ConnectionX25	A type of SNA connection that uses X.25 protocol over dial-up or leased lines.
MsSna_ConnectionChannel	A type of SNA connection that uses Channel links.
MsSna_ConnectionDft	A type of SNA connection that uses DFT over coaxial cable.
MsSna_ConnectionTwinax	A type of SNA connection that uses twinax cable. Host Integration Server 2004 does not support twinax cable.
MsSna_Cpic	A global CPIC definition for APPC.
MsSna_TN5250Definition	The definition of a TN5250 session.
MsSna_PrintSession	Base class for a print session on a Host Print service.
MsSna_PrintSession3270	Extends a Print session. Uses 3270 protocols to communicate with the host.
MsSna_PrintSessionAppc	Extends a Print session. Uses APPC LU 6.2 protocols to communicate with the host.
MsSna_AppcPartner	A preconfigured combination of APPC Local LU, Remote LU, and Mode.
MsSna_AccountAssigned3270	Used to query for 3270 LUs assigned to a specific workstation or user.
MsSna_AccountAssignedLua	Used to query for LUA LUs assigned to a specific workstation or user.
MsSna_AccountAssigned3270Services	Used to query for services on which a specific workstation or user has 3270 LUs/pools.
MsSna_AccountAssignedLuaServices	Used to query for services on which a specific workstation or user has LUA LUs/pools.
MsSna_AccountAvailableAppcLu	For the logged-on user account and workstation, the assigned APPC LU resources.
MsSna_AdapterOnMachine	Associates an adapter with a computer.
MsSna_ConnectionOnServer	Associates a connection with a server.
MsSna_Lu3270OnConnection	Associates a 3270 LU with a connection.
MsSna_LuDisplayAssignedToUser	Associates a display LU with a user.
MsSna_LuPrintAssignedToUser	Associates a print LU with a user.
MsSna_LuLuaAssignedToUser	Associates an LUA LU with a user.
MsSna_PoolDisplayAssignedToUser	Associates a display pool with a user.
MsSna_PoolLuaAssignedToUser	Associates the pool LUA with a user.
MsSna_LuDisplayAssignedToWorkstation	Associates a display LU with a workstation.
MsSna_LuPrintAssignedToWorkstation	Associates a print LU with a workstation.
MsSna_LuLuaAssignedToWorkstation	Associates an LUA LU with a workstation.
MsSna_PoolDisplayAssignedToWorkstation	Associates a display pool with a workstation.
MsSna_PoolLuaAssignedToWorkstation	Associates an LUA pool with a workstation.
MsSna_ConnectionUsingAdapter	Associates a connection with an adapter.
MsSna_Lu3270AssignedToPool	Associates a 3270 LU with a pool.
MsSna_PoolOnServer	Associates a pool with a server.
MsSna_ExtendedStatus	Describes the extended status of a specified message.

MsSna_Domain Class

Contains global properties that affect all servers in the group.

The following syntax is simplified from MOF code.

```
class MsSna_Domain : MsSna_Config
{
   String Name;
   String NetViewConnection;
   String DispVerbConnection;
   String EventlogServer;
   String PopupServer;
   sint16 AuditLevel;
   sint32 BroadcastMeanTime;
   boolean NamedPipes;
   boolean IpxSpx;
   boolean BanyanVines;
   boolean TcpIp;
   boolean RTMOverflow;
   boolean RTMEndOfSession;
   sint16 RTMTimerUntil;
   sint16 RTMThreshold1;
   sint16 RTMThreshold2;
   sint16 RTMThreshold3;
   sint16 RTMThreshold4;
   String ConfigServer;
   String ClientBackupSponsorNames;   // names separated by ';'
   String ClientBackupDomainName;
   sint16 ClientDomainBackupType;
   boolean Security3270;
   boolean SecurityLUA;
   boolean SecurityAPPC;
   sint32 Status;
   datetime DateTimeSaved;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key**
Access Type: Read-Only

The name of the subdomain.

NetViewConnection
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

A connection to which NetView data should be sent.

DispVerbConnection
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The default connection for Display verbs. If set to **null**, selects a random connection.

EventlogServer
Data Type: **String**
Qualifiers: **MAXLEN(16)**
Access Type: Read/Write

The name of the server on which Windows 2000 Event Logs for this server installation should be stored.

PopupServer
Data Type: **String**
Qualifiers: MAXLEN(16)
Access Type: Read/Write

The name of the server to which pop-up error messages should be routed.

AuditLevel
Data Type: **sint16**
Qualifiers: **QualifierType**
Access Type: Read/Write

The default audit log level, which determines what events, if any, are audited. The following table describes the possible values for **AuditLevel**.

Value	Description
0	Detailed
1	General
2	Significant
3	Disabled

BroadcastMeanTime
Data Type: **sint32**
Qualifiers: **MINVALUE(45), MAXVALUE(65535), UNITS("sec")**
Access Type: Read/Write

The interval at which server broadcasts are repeated.

NamedPipes
Data Type: **Boolean**
Access Type: Read/Write

true to send server broadcasts over Windows Networking, also known as named pipes; otherwise, **false**.

IpxSpx
Data Type: **Boolean**
Access Type: Read/Write

true to sends server broadcasts over IPX/SPX, also known as Novell NetWare; otherwise, **false**.

BanyanVines
Data Type: **Boolean**
Access Type: Read/Write

true to send server broadcasts over Banyan VINES; otherwise, **false**.

TcpIp
Data Type: **Boolean**
Access Type: Read/Write

true to send server broadcasts over TCP/IP; otherwise, **false**.

RTMOverflow
Data Type: **Boolean**
Access Type: Read/Write

true to cause Response Time Monitor (RTM) data to be sent to the host when the number of host responses in a given time period overflows the size of the available counter; otherwise, **false**.

RTMEndOfSession
Data Type: **Boolean**
Qualifiers: **QualifierType**
Access Type: Read-Only

true to cause Response Time Monitor (RTM) data to be sent to the host at the end of each LU-to-LU session; otherwise, **false**.

RTMTimerUntil
Data Type: **sint16**
Access Type: Read-Only

The point at which the Response Time Monitor (RTM) registers that a host has responded, at which point the RTM stops the timers. The following table describes the possible values for **RTMTimerUnit**.

Value	Description
0	FirstData
1	Unlock
2	AllowSent

RTMThreshold1
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(1000), UNITS("tenthsec")**
Access Type: Read/Write

The cut-off times at which the RTM saves the count of host responses, and then restarts the count.

RTMThreshold2
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(1000), UNITS("tenthsec")**
Access Type: Read/Write

The cut-off times at which the RTM saves the count of host responses, and then restarts the count.

RTMThreshold3
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(1000), UNITS("tenthsec")**
Access Type: Read/Write

The cut-off times at which the RTM saves the count of host responses, and then restarts the count.

RTMThreshold4
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(1000), UNITS("tenthsec")**
Access Type: Read/Write

The cut-off times at which the RTM saves the count of host responses, and then restarts the count.

ConfigServer
Data Type: **sint16**
Qualifiers: **MAXLEN(16)**
Access Type: Read/Write

The primary configuration server for the subdomain.

ClientBackupSponsorNames
Data Type: **String**
Qualifiers: **MAXLEN(256)**
Access Type: Read/Write

A list describing all of the SNA sponsor servers to which the server updates the client. The names of each server must be separated with a semicolon (;).

ClientBackupDomainName
Data Type: **String**
Qualifies: **MAXLEN(16)**
Access Type: Read/Write

A list of backup SNA subdomains with which the server updates the client.

ClientDomainBackupType
Data Type: **sint16**
Access Type: Read/Write

A value describing how client backup information is sent. The following table describes the possible values for **ClientDomainBackupType**.

Value	Description
0	None
1	Domain
2	Sponsors

Security3270
Data Type: **Boolean**
Access Type: Read/Write

true if access to 3270 LUs is restricted to users assigned to the LU; otherwise, **false**.

SecurityLUA
Data Type: **Boolean**
Access Type: Read/Write

true if access to LUA LUs is restricted to users assigned to the LU; otherwise, **false**.

SecurityAPPC
Data Type: **Boolean**
Access Type: Read/Write

true if access to APPC LUs is restricted to users assigned to the LU; otherwise, **false**.

Status
Data Type: **sint32**
Access Type: Read-Only

The status of the subdomain.

DateTimeSaved
Data Type: **datetime**
Access Type: Read-Only

The time and date for which the object was saved.

Remarks

The object **MsSna_Domain** represents can also be refered to as a subdomain or OU.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ServiceSNA Class

Implements the SNA protocol, which contains the connections and LU resources.

The following syntax is simplified from MOF code.

```
class MsSna_ServiceSNA : MsSna_Service
{
   String Name;
   String Comment;
   String ControlPoint;
   String NetworkName;
   String StatusText;
   sint32 Status;
};
```

Properties

Name

Data Type: **String**
Qualifier: Key, MAXLEN(20)
Access Type: Read-Only

The service name.

Comment

Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

ControlPoint

Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The control point for this SNA node.

NetworkName

Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The Network Name name for this SNA node.

StatusText

Data Type: **String**
Access Type: Read-Only

The status of the service. The following table describes the possible values for **StatusText**.

Value	Description
Not configured	The service is not currently configured.
Inactive	The service is inactive.
Stopping	The service is in the process of stopping.
Active	The service is active.
Out of Date	The service is out-of-date.
Paused	The service is paused.

Status

Data Type: **sint32**
Access Type: Read-Only

The status of the service. The following table desribes the status of the service:

Value	Description
0	Not configured
1	Inactive
2	Inactive
3	Stopping
4	Active
5	
6	Out-of-date
7	Paused
8	
9	

Methods

Method	Description
Start	Starts the service.
Stop	Stops the service.
Pauses	Pauses the service.
Resume	Restarts a paused service.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServiceSNA.Start Method

Starts the service.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServiceSNA.Stop Method

Stops the service.

The following syntax is simplified from MOF code.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServiceSNA.Pauses Method

Pauses the service.

The following syntax is simplified from MOF code.

```
void Pause();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServiceSNA.Resume Method

Restarts a paused service.

The following syntax is simplified from MOF code.

```
void Resume();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ServiceTN3270 Class

Enables clients to connect to a host via the TN3270 protocol.

The following syntax is simplified from MOF code.

```
class MsSna_ServiceTN3270 : MsSna_Service
{
   String Name;
   String Comment;
   boolean LogNormal;
   boolean LogSna;
   boolean UseNameResolution;
   boolean PrinterFlowControl;
   boolean TNModeOnly;
   sint32 CloseDelay;
   sint32 IdleTimeout;
   sint32 InboundRU;
   sint32 OutboundRU;
   sint32 RefreshTime;
   sint32 StatusDelay;
   sint32 Port;
   String StatusText;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **MAXLEN(16)**
Access Type: Read-Only

The TN3270 service name. **Name** is the same as the computer name.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment string.

LogNormal
Data Type: **Boolean**
Access Type: Read/Write

true if access to log successful client connections and successful client terminations; otherwise, **false**.

LogSna
Data Type: **Boolean**
Access Type: Read/Write

true to log all TN3270 service event messages to the Event Log being used by the Host Integration Server 2004 system, instead of to the Event Log on the local computer; otherwise, **false**.

UseNameResolution
Data Type: **Boolean**
Access Type: Read/Write

true to specify the name of a computer rather than the IP address—use only if you are running a domain name resolver; otherwise, **false**.

PrinterFlowControl
Data Type: **Boolean**
Access Type: Read/Write

true to have the TN3270 service send all messages to a TN3270 printer client as RESPONSE-REQUIRED, and not to send any messages until it has received a response for the previous message; otherwise, **false**.

SocketListen
Data Type: **Boolean**
Access Type: Read/Write

To have the TN3270 service stop listening on this socket once all of the defined LUs are in use; otherwise, **false**.

TNModeOnly
Data Type: **Boolean**
Access Type: Read/Write

true to prevent the TN3270 service from using TN3270E, an enhancement to TN3270; otherwise, **false**.

CloseDelay
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(86400),UNITS("sec")**
Access Type: Read/Write

The time between sending a disconnect message to the client computer and closing the socket with the client computer.

IdleTimeout
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(70560),UNITS("min")**
Access Type: Read/Write

The time in which the the session idles before the TN3270 service disconnects the client system. Specifiying 0 means there will be no time-out.

InboundRU
Data Type: **sint32**
Qualifiers: **MINVALUE(256), MAXVALUE(32768),UNITS("bytes")**
Access Type: Read/Write

The RU, or SNA message, size used by the TN3270 service for logon messages from the host.

OutboundRU
Data Type: **sint32**
Qualifiers: **MINVALUE(256), MAXVALUE(32768),UNITS("bytes")**
Access Type: Read/Write

The RU, or SNA message, size used by the TN3270 service for logon messages to the host.

RefreshTime
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(60),UNITS("sec")**
Access Type: Read/Write

The delay between updates of the status on the display.

StatusDelay
Data Type: **sint32**
Qualifiers: MINVALUE**(0), MAXVALUE(86400),UNITS("sec")**
Access Type: Read/Write

The delay between the time when TN3270 service connects to a host session and the time the TN3270 service starts updating the client screen.

Port
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(9999)**
Access Type: Read/Write

The default port number for the TN3270 service. You can override **Port** on a per-session basis. Use 0 for the default TN3270 port.

StatusText
Data Type: **String**
Access Type: Read-Only

The current status of the service. The following table describes the possible values for **StatusText**.

Value	Description
Not configured	The status is not configured.
Inactive	The status is inactive.
Pending	The status is pending.
Stopping	The status is stopping.
Active	The status is active.
Out of Date	The status is out-of-date.
Paused	The status is paused.

Methods

Method	Description
Start	Starts the service.
Stop	Stops the service.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ServiceTN3270.Start Method

Starts the service.

The following syntax is simplified from MOF code.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ServiceTN3270.Stop Method

Stops the service.

The following syntax is simplified from MOF code.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ServiceTN5250 Class

Enables clients to connect via the TN5250 protocol to a host.

The following syntax is simplified from MOF code.

```
class MsSna_ServiceTN5250 : MsSna_Service
{
   String Name;
   String Comment;
   sint32 Port;
   String StatusText;
};
```

Name

Data Type: **String**
Qualifiers: **Key, MAXLEN(16)**
Access Type: Read-Only

The TN5250 service name. **Name** is the same as the computer name.

Comment

Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

Port

Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(9999)**
Access Type: Read/Write

The default port number for the TN5250 service. Port can be overridden on a per-session basis. Use 0 for the default TN5250 port.

StatusText

Data Type: **String**
Access Type: Read-Only

The current status of the service. The following table describes the possible values for **StatusText**.

Value	Description
Not configured	The service is not configured.
Inactive	The service is inactive.
Pending	The service is pending.
Stopping	The service is stopping.
Active	The service is active.
Out of Date	The service is out-of-date.
Paused	The service is paused.

Methods

Method	Description
Start	Starts the service.
Stop	Stops the service.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServiceTN5250.Start Method

Starts the service.

The following syntax is simplified from MOF code.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServiceTN5250.Stop Method

Stops the service.

The following syntax is simplified from MOF code.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServiceSharedFolder Class

Describes a service for AS/400 file access.

The following syntax is simplified from MOF code.

```
class MsSna_ServiceSharedFolder : MsSna_Service
{
   String Name;
   String Comment;
   String StatusText;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(16)**
Access Type: Read-Only

The Shared Folder Gateway service name. **Name** is the same as the computer name.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

StatusText
Data Type: **String**
Access Type: Read/Write

The current status of the service. The following table describes the possible values for **StatusText**.

Value	Description
Not configured	The service is not configured.
Inactive	The service is inactive.
Pending	The service is pending.
Stopping	The service is stopping.
Active	The service is active.
Out of Date	The service is out-of-date.
Paused	The service is paused.

Methods

Method	Description
Start	Starts the service.
Stop	Stops the service.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ServiceSharedFolder.Start Method

Starts the service.

The following syntax is simplified from MOF code.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ServiceSharedFolder.Stop Method

Stops the service.

The following syntax is simplified from MOF code.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServicePrint Class

Contains print sessions.

The following syntax is simplified from MOF code.

```
class MsSna_ServicePrint : MsSna_Service
{
   String Name;
   boolean NoEventLogOnSkippingTransparentSection;
   boolean UseProportionalFontChange;
   boolean FlushFinalFF;
   boolean DelayPrintStart;
   boolean AlwaysDoNL;
   boolean NoSpaceAfterFF;
   boolean DoAllFF;
   boolean IgnoreCharsUnder3F;
   boolean UseFixedTabs;
   sint32 ActivationRetryInterval;
   sint32 ActivationRetryLimit;
   String StatusText;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(16)**
Access Type: Read/Write

The Host Print service name. **Name** is the same as the machine name.

NoEventLogOnSkippingTransparentSection
Data Type: **Boolean**
Access Type: Read/Write

true to prevent an entry in the Event Log every time a print service skips a transparent section found while printing a host print job; otherwise, **false**.

UseProportionalFontChange
Data Type: **Boolean**
Access Type: Read/Write

true to prevent overlapping characters in documents containing nonfixed type fonts printed through Host Print service; otherwise, **false**.

FlushFinalFF
Data Type: **Boolean**
Access Type: Read/Write

true to cause Host Print service to explicitly form-feed the document at the end of a print job; otherwise, **false**.

DelayPrintStart
Data Type: **Boolean**
Access Type: Read/Write

true to delay the start of the print job until printable data is received by Host Print services; otherwise, **false**.

AlwaysDoNL
Data Type: **Boolean**
Access Type: Read/Write

true to insert a new line when the Host Print service determines that the Maximum Print Position has been reached for a particular line of data; otherwise, **false**.

NoSpaceAfterFF
Data Type: **Boolean**

Access Type: Read/Write

true to prevent print services from inserting a space character following a form feed; otherwise, **false**.

DoAllFF
Data Type: **Boolean**
Access Type: Read/Write

true to force the printer driver to honor all form-feed commands; otherwise, **false**.

IgnoreCharsUnder3F
Data Type: **Boolean**
Access Type: Read/Write

true to cause the Host Print service to ignore hexadecimal characters 3F and below; otherwise, **false**.

UseFixedTabs
Data Type: **Boolean**
Access Type: Read/Write

true to disable normal tab functionality (such as aligning tabs in columns) and interpret each tab as a fixed number of spaces; otherwise, **false**.

ActivationRetryInterval
Data Type: **sint32**
Access Type: Read/Write

The number of seconds to wait before trying to print the job again. The default value is 10 seconds.

ActivationRetryLimit
Data Type: **sint32**
Access Type: Read/Write

The number of times Host Print service attempts to activate the APPC conversation following a terminated connection. The default value is -1 (infinite).

StatusText
Data Type: **String**
Access Type: Read/Write

The current status of Host Print service. The following table describes the possible values for **StatusText**.

Value	Description
Not configured	The service is not configured.
Inactive	The service is inactive.
Pending	The service is pending.
Stopping	The service is stopping.
Active	The service is active.
Out of Date	The service is out-of-date.
Paused	The service is paused.

Methods

Method	Description
Start	Starts the service.
Stop	Stops the service.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServicePrint.Start Method

Starts the service.

The following syntax is simplified from MOF code.

```
void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ServicePrint.Stop Method

Stops the service.

The following syntax is simplified from MOF code.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_UserInfo Class

Base class for a User or Group account configured in SNA.

The following syntax is simplified from MOF code.

```
class MsSna_UserInfo : MsSna_Config
{
   String Name;
   sint32 UserType;
   boolean DynRemote;
   String DefLocalLu;
   String DefRemoteLu;
   boolean Encryption;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(255)**
Access Type: Read-Only

The user name.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

UserType
Data Type: **String**
Access Type: Read-Only

The account type. The following table describes the possible values for **UserType**.

Value	Description
1	User
2	Group
3	Domain
4	Alias
5	WellKnownGroup
6	DeletedAccount
7	Invalid
8	Unknown
9	Computer

DynRemote
Data Type: **Boolean**
Access Type: Read/Write

true to let this user or group use dynamically created APPC LUs.

DefLocalLu
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

A default local APPC LU to be used when the user starts APPC programs.

DefRemoteLu
Data Type: **String**
Qualifiers: **MAXLEN(8)**

Access Type: Read/Write

A default remote APPC LU to be used when the user starts APPC programs.

Encryption
Data Type: **Boolean**
Access Type: Read/Write

true to enable encryption between the client system and the Host Integration Server 2004; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ConfiguredUser Class

Describes a User or Group account configured in SNA.

The following syntax is simplified from MOF code.

```
class MsSna_ConfiguredUser : MsSna_UserInfo
{
};
```

Remarks

MsSna_ConfiguredUser can determine access to LUs and Pools.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_LogInUserAndGroups Class

Enumerates the configured user and groups for a logged-on user.

The following syntax is simplified from MOF code.

```
class MsSna_LogInUserAndGroups : MsSna_UserInfo
{
};
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_Workstation Class

Describes a workstation configured in SNA, specified by name or IP address.

The following syntax is simplified from MOF code.

```
class MsSna_Workstation : MsSna_Config
{
   String Name;
   sint32 IdType;
   sint16 Secure;
   String IPmask;
   boolean DynRemote;
   String Comment;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(20)**
Access Type: Read-Only

The workstation ID. **Name** is usually the workstation name.

IdType
Data Type: **sint32**
Access Type: Read/Write

The type of workstation specified in **Name**. The following table describes the possible values for **IdType**.

Value	Description
0	Name
1	IPAddress
2	IPSubnet

Secure
Data Type: **sint16**
Access Type: Read/Write

Describes a value indicating whether the workstation can access LUs that are not directly assigned to it. The following table describes the possible values for **Secure**.

Value	Description
0	False
1	True

IPmask
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The IP Subnet mask. Use **IPmask** only if **WorkstationIdType** is set to **IPSubnet**.

DynRemote
Data Type: **Boolean**
Access Type: Read/Write

true to enable users access to remote APPC LU as they are created; otherwise, **false**.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

Remarks

MsSna_Workstation can describe access to LUs and Pools.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_Lu3270 Class

Describes the base class for a 3270 LU resource.

The following syntax is simplified from MOF code.

```
class MsSna_Lu3270 : MsSna_Resource
{
   String Name;
   String ConnectionName;
   String Comment;
   String PoolName;
   sint16 Number;
   boolean Compression;
   boolean UserWksSecure;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(8), TOUPPERCASE**
Access Type: Read-Only

The LU Name.

ConnectionName
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The connection on which this LU is defined.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

PoolName
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read-Only

The pool name. **PoolName** is valid only if the LU has already been assigned to a pool.

Number
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(254)**
Access Type: Read/Write

The LU Number for LUs on 802.2, SDLC, or X.25. For a DFT connection, **Number** is `(Port Number * 16 + LT Number)`.

Compression
Data Type: **Boolean**
Access Type: Read/Write

true to enable 3270 LU data stream compression; otherwise, **false**. This option must also be set in the host VTAM configuration for the LU.

UserWksSecure
Data Type: **Boolean**
Access Type: Read/Write

true to require both the user and the workstation be assigned to this LU in order to acquire it; otherwise, **false**.

Remarks

Each 3270 LU must belong to a connection.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuDisplay Class

Describes a 3270 LU display resource.

```
class MsSna_LuDisplay : MsSna_Lu3270
{
   sint16 Model;
   boolean ModelOverride;
   String AssociatedLU;
};
```

Properties

Model
Data Type: **sint16**
Access Type: Read/Write

The default display model for Terminal service. The following table describes the possible values for **Model**.

Value	Description
0	Model12
1	Model13
2	Model14
3	Model1215

ModelOverride
Data Type: **Boolean**
Access Type: Read/Write

true to indicate whether the default model can be overridden; otherwise, **false**. Some emulators can only emulate certain display models.

AssociatedLU
Data Type: **String**
Qualifiers:**MAXLEN(8)**
Access Type: Read-Only

Associates a printer LU with the current object.

Remarks

MsSna_LuDisplay is often used for terminal emulator access.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuLua Class

Describes a 3270 LU LUA resource.

The following syntax is simplified from MOF code.

```
class MsSna_LuLua : MsSna_Lu3270
{
   boolean HighPriorityMode;
};
```

Properties

HighPriorityMode
Data Type: **Boolean**
Access Type: Read/Write

true to increase the priority for this LU; otherwise, **false**.

Remarks

MsSna_LuLua is often used for programmatic access.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_TN3270Session Class

Describes the part of the TN3270 session that specifies client configuration.

The following syntax is simplified from MOF code.

```
class MsSna_TN3270Session : MsSna_Config
{
   String Name;
   String ConnectionName;
   String Comment;
   String PoolName;
   sint16 Number;
   boolean Compression;
   boolean UserWksSecure;
   String Service;
   sint32 TnType;
   sint32 NumSessions;
   sint32 TermTypes;
   String AssociatedLu;
   sint32 Port;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(8)**
Access Type: Read-Only

The LU name.

ConnectionName
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read-Only

The connection on which this LU is defined.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

PoolName
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read-Only

If the LU has already been assigned to a pool, the pool name appears here.

Number
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(254)**
Access Type: Read/Write

The LU Number for LUs on 802.2, SDLC, or X.25. For a DFT connection, this should be the Port Number * 16 + LT Number.

Compression
Data Type: **Boolean**
Access Type: Read/Write

true to enable 3270 LU data stream compression; otherwise, **false**. This option must also be set in the host VTAM configuration for the LU.

UserWksSecure
Data Type: **Boolean**
Access Type: Read/Write

true to require both the user and the workstation to be assigned to this LU in order to acquire it; otherwise, **false**.

Service
Data Type: **String**
Qualifiers: **Key, MAXLEN(20)**
Access Type: Read/Write

The SNA service to which this LU belongs.

TnType
Data Type: **sint32**
Access Type: Read/Write

The display or printer type. The following table describes the possible values for **TnType**.

Value	Description
0	Generic
1	Specific
2	GenericPrinter
3	SpecificPrinter
4	AssoicatedPrinter

NumSessions
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(65535)**
Access Type: Read/Write

This is the number of TN3270 sessions allowed for the selected LU or pool.

TermTypes
Data Type: **sint32**
Access Type: Read/Write

The terminal names supported by this LU. The following table describes the possible values for **TermTypes**.

Value	Description
0	3275-2
1	3276_2
2	3277_2
3	3278_2
4	3278_2_E
5	3279_2
6	3279_2_
7	E 3276_3
8	3278_3
9	3278_3_E
10	3279_3
11	3279_3_E
12	3276_4
13	3278_4
14	3278_4_E
15	3279_4
16	3279_4_E
17	3278_5
18	3278_5_E
19	3279_5
20	3279_5_E

AssociatedLu
Data Type: **String**

Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

Used to associate a printer LU with this display LU.

Port
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(9999)**
Access Type: Read/Write

The port to be used for this session—or 0 to use the default TN3270 port.

Remarks

MsSna_TN3270Session references a SNA_LU_LUA class.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_TN3270Port Class

Describes a port with security properties.

The following syntax is simplified from MOF code.

```
class MsSna_TN3270Port : MsSna_Config
{
   String Service;
   sint32 Port;
   String Comment;
   sint16 Security;
   boolean ClientCertVal;
   boolean Default;
   String Name;
};
```

Properties

Service
Data Type: **String**
Qualifiers: **Key, MAXLEN(20)**
Access Type: Read/Write

The TN service to which this LU belongs.

Port
Data Type: **sint32**
Qualifiers: **Key, MINVALUE(1), MAXVALUE(0xffff)**
Access Type: Read/Write

The port number.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An option comment field.

Security
Data Type: **sint16**
Access Type: Read/Write

The security level. The following table describes the possible values for **Security**.

Value	Description
0	Unsecured
1	Low
2	Medium
3	High

ClientCertVal
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the client ceritificate should be validated; otherwise, **false**.

Default
Data Type: **Boolean**
Qualifiers: **(TRUE)**
Access Type: Read-Only

true to indicate a default port; otherwise, **false**.

Name

Data Type: **String**
Qualifiers: **Something**
Access Type: Read/Write

Name of the port.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_TN3270SessionIPFilter Class

An IP address or name assigned to a TN3270 session.

The following syntax is simplified from MOF code.

```
class MsSna_TN3270SessionIPFilter : MsSna_Config
{
   String Name;
   String Session;
   sint16 Type;
   String SubnetMask;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(15)**
Access Type: Read-Only

The IP address or name of the computer assigned to the TN3270 session.

Session
Data Type: **String**
Qualifiers: **Key, MAXLEN(8)**
Access Type: Read-Only

The TN3270 session name.

Type
Data Type: **sint16**
Qualifiers: **Key**
Access Type: Read/Write

A value that determines if **Name** contains an IP address or a name. The following table describes the possible values for **Type**.

Value	Description
0	Name
1	IPAddress

SubnetMask
Data Type: **String**
Access Type: Read/Write

The IP Subnet mask, if an IP address is specified for **Name**.

Remarks

Multiple IP addresses or names can be assigned to one session.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_TN5250SessionIPFilter Class

Contains the IP address or name assigned to a TN5250 session.

The following syntax is simplified from MOF code.

```
class MsSna_TN5250SessionIPFilter : MsSna_Config
{
   String Name;
   String AS400;
   sint16 Type;
   String SubnetMask;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(15)**
Access Type: Read-Only

The IP address or name of the computer assigned to the TN5250 session.

AS400
Data Type: **String**
Qualifiers: **Key, MAXLEN(8)**
Access Type: Read-Only

The AS/400 definition.

Type
Data Type: **sint16**
Qualifiers: **Key**
A value that indicates whether **Name** contains an IP address or a name. The following table describes the possible values for **Type**.

Value	Description
0	Name
1	IPAddress

SubnetMask
Data Type: **String**
Access Type: Read/Write

The IP Subnet mask, if an IP address is specified for 'Name'.

Remarks

You may assign multiple IP addresses or names in a single session.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuPassThrough Class

Contains one half of a dowstream LU/pool pair.

The following syntax is simplified from MOF code.

```
class MsSna_LuPassThrough : MsSna_Config
{
   String Connection;
   sint16 Number;
   String Name;
   boolean IsPool;
};
```

Properties

Connection
Data Type: **String**
Qualifiers: **Key, MAXLEN(8)**
Access Type: Read-Only

The associated downstream connection.

Number
Data Type: **sint16**
Qualifiers: **Key, MINVALUE(0)**
Access Type: Read-Only

The number of the downstream connection.

Name
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The downstream LU or pool name.

IsPool
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the object is a downstream a pool; **false** to indicate that the object is a downstream LU.

Remarks

MsSna_LuPassThrough represents a downstream LU/pool associated with a downstream connection.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_LuDown Class

A 3270 LU downstream resource.

The following syntax is simplified from MOF code.

```
class MsSna_LuDown   : MsSna_Lu3270
{
};
```

Remarks

MsSna_LuDown is reserved for use with downstream connections.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuPrint Class

Describes a 3270 LU printer resource.

The following syntax is simplified from MOF code.

```
class MsSna_LuPrint   : MsSna_Lu3270
{
   String AssociatedLU;
};
```

Properties

AssociatedLU
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The associated display LU.

Remarks

MsSna_LuPrint is used by Print session or by printer emulation.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_Pool Class

Base class for 3270 LU pools.

The following syntax is simplified from MOF code.

```
class MsSna_Pool : MsSna_Resource
{
   String Name;
   String Comment;
};
```

Properties

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(8)**
Access Type: Read-Only

The pool name.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

Remarks

A pool is associated with one or more 3270 LUs.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_PoolDisplay Class

Contains the 3270 LU Display pool.

The following syntax is simplified from MOF code.

```
class MsSna_PoolDisplay : MsSna_Pool
{
   sint16 Model;
   boolean ModelOverride;
   boolean AssocPrint;
};
```

Properties

Model
Data Type: **sint16**
Access Type: Read/Write

The default display model for terminal emulation. The following table describes the possible values for **Model**.

Value	Description
0	Model2
1	Model3
2	Model4
3	Model5

ModelOverride
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the default model can be overridden; otherwise, **false**. Some emulators can only emulate certain display models.

AssocPrint
Data Type: **Boolean**
Qualifiers: **Something**
Access Type: Read/Write

true to associate a printer LU with this display LU pool; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_PoolLua Class

The 3270 LU LUA pool.

The following syntax is simplified from MOF code.

```
class MsSna_PoolLua : MsSna_Pool
{
};
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_PoolDown Class

The 3270 LU downstream pool.

The following syntax is simplified from MOF code.

```
class MsSna_PoolDown : MsSna_Pool
{
};
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuAppcLocal Class

An APPC local LU resource.

The following syntax is simplified from MOF code.

```
class MsSna_LuAppcLocal : MsSna_Config
{
   String Service;
   String Alias;
   String Comment;
   String NetName;
   String LUName;
   boolean PoolMember;
   String IncomingLu;
   sint16 TpTimeout;
   sint16 Number;
   string Connection;
   boolean SyncPoint;
   String SyncPointClient;
};
```

Properties

Service
Data Type: **String**
Qualifiers: **Key, MAXLEN(20), TOUPPERCASE**
Access Type: Read-Only

The SNA service to which this LU belongs.

Alias
Data Type: **String**
Qualifiers: **Key, MAXLEN(8), TOUPPERCASE**
Access Type: Read-Only

The LU alias.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

NetName
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The network name, which must match that configured on the remote computer.

LUName
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The LU name, which can be the same as the LU alias.

PoolMember
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that this LU is a member of the default outgoing Local APPC LU pool; otherwise, **false**.

IncomingLu
Data Type: **String**

Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

An implicit incoming remote LU.

TpTimeout
Data Type: **sint16**
Qualifiers: **MINVALUE(0), MAXVALUE(3600)**
Access Type: Read/Write

The time-out value, in seconds. If you wish to manually start the invokable TP, be sure to specify at least 60 seconds; this will give the operator sufficient time to perform the necessary actions.

Number
Data Type: **sint16**
Qualifiers: **MINVALUE(0), MAXVALUE(254)**
Access Type: Read/Write

The LU number, for dependent LUs.

Connection
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The connection on which a dependent LU is configured.

SyncPoint
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that you have a very specialized transaction program (TP) that requires Resync Service; otherwise, **false**.

SyncPointClient
Data Type: **String**
Qualifiers: **MAXLEN(15)**
Access Type: Read/Write

The IP address or the name of the client computer.

Remarks

MsSna_LuAppcLocal is used for LU 6.2 protocols.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuAppcRemote Class

An APPC remote LU resource.

The following syntax is simplified from MOF code.

```
class MsSna_LuAppcRemote : MsSna_Config
{
   String Service;
   String Connection;
   String Alias;
   String Comment;
   String NetName;
   String LUName;
   String UnName;
   boolean Parallel;
   String IncomingMode;
   sint16 Security;
   String SecKeyHex;
   String SecKeyChar;
   boolean SyncPoint;
};
```

Properties

Service
Data Type: **String**
Qualifiers: **MAXLEN(20), TOUPPERCASE**
Access Type: Read-Only

The SNA service to which this LU belongs.

Connection
Data Type: **String**
Qualifiers: **Key,MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The connection on which a dependent LU is configured.

Alias
Data Type: **String**
Qualifiers: **Key, MAXLEN(8)**
Access Type: Read-Only

The LU Alias.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

NetName
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The network name. You can obtain the correct name from the host or peer administrator.

LUName
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The LU name, which can be the same as the LU alias.

UnName
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The uninterpreted LU name for LUs, which are paired with a dependent local APPC LU.

Parallel
Data Type: **String**
Access Type: Read/Write

A value that indicates that parallel sessions will be used. **Parallel** must be used with an independent, local LU.

IncomingMode
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The implicit incoming mode for this LU.

Security
Data Type: **sint16**
Access Type: Read/Write

A value that indicates what sort of session-level security will be used with this LU. The following table describes the possible values for **Security**.

Value	Description
0	None
1	Hex
2	Characters

SecKeyHex
Data Type: **String**
Qualifiers: **MAXLEN(16)**
Access Type: Read/Write

The security key, in hexadecimal. Requires that **Security** be set to '**1**'.

SecKeyChar
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The security key, in characters. Requires that **Security** be set to **2**.

SyncPoint
Data Type: **Boolean**
Access Type: Read/Write

true to enable **SyncPoint**; otherwise, **false**. **SyncPoint** requires that the Local LU alias be unique.

Remarks

MsSna_LuAppcRemote is used for LU 6.2 protocol, and references a connection.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_AppcMode Class

Contains an APPC Mode definition.

The following syntax is simplified from MOF code.

```
class MsSna_AppcMode : MsSna_Config
{
   String Name;
   String Comment;
   sint32 SessionLimit;
   sint32 MinContWin;
   sint32 PartMinContWin;
   sint32 AutoActivate;
   boolean Priority;
   sint32 TxPacing;
   sint32 RxPacing;
   sint32 TxRu;
   sint32 RxRu;
   sint16 MaxSendCompression;
   sint16 MaxRcvCompression;
   boolean AllowLZandRLE;
   boolean EndpointOnly;
};
```

Properties

Name

Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read-Only

The mode name.

Comment

Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

SessionLimit

Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(15000)**
Access Type: Read/Write

The maximum number of parallel sessions allowed with this mode.

MinContWin

Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(15000)**
Access Type: Read/Write

The minimum contention winner limit.

PartMinContWin

Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(15000)**
Access Type: Read/Write

The partner minimum contention winner limit.

AutoActivate

Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(15000)**
Access Type: Read/Write

The number of contention winner sessions to be activated for the local LU whenever the connection for this mode is started.

Priority
Data Type: **Boolean**
Access Type: Read/Write

true to give preference to communication with this mode over communication with a low-priority mode; otherwise, **false**.

TxPacing
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(63)**
Access Type: Read/Write

The maximum number of frames for the local LU to send without an SNA pacing response from the partner LU. Setting **TxPacing** to 0 indicates a unlimited number of frames.

RxPacing
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(63)**
Access Type: Read/Write

The maximum number of frames for the local LU to receive from the partner LU before the local LU sends an SNA pacing response. Setting **RxPacing** to **0** (zero) indicates a unlimited number of frames.

TxRu
Data Type: **sint32**
Qualifiers: **MINVALUE(256), MAXVALUE(65527)**
Access Type: Read/Write

The maximum size for RUs sent by the TPs on the local system.

RxRu
Data Type: **sint32**
Qualifiers: **MINVALUE(256), MAXVALUE(65527)**
Access Type: Read/Write

The maximum size for RUs received from the TPs on the remote system.

MaxSendCompression
Data Type: **sint32**
Access Type: Read/Write

The maximum compression allowed when sending. The following table describes the possible values for **MaxSendCompression**.

Values	Description
0	None
1	RLE
2	LZ9

MaxRcvCompression
Data Type: **sint16**
Access Type: Read/Write

The maximum compression allowed when receiving. The following table describes the possible values for **MaxRcvCompression**.

Values	Description
0	None
1	RLE
2	LZ9

AllowLZandRLE
Data Type: **Boolean**
Access Type: Read/Write

true to compress data using RLE before being further compressed using LZ9; otherwise, **false**. **AllowLZandRLE** is valid only if you are using LZ9.

EndpointOnly

Data Type: **Boolean**
Access Type: Read/Write

true to allow intermediate nodes to use compression if one of the endpoints does not support or otherwise does not use compression; otherwise, **false**.

Remarks

MsSna_AppcMode defines properties of an LU 6.2 session.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_Connection Class

Base class for SNA connection.

The following syntax is simplified from MOF code.

```
class MsSna_Connection : MsSna_Config
{
   String Service;
   String Name;
   String Comment;
   String Adapter;
   sint32 RemoteEnd;
   sint16 PeerRole;
   sint16 Activation;
   boolean AllowIncoming;
   boolean DynamicLuDef;
   String PartnerConnectionName;
   String BlockId;
   String NodeId;
   String RemoteNetName;
   String RemoteControlPoint;
   String RemoteBlockId;
   String RemoteNodeId;
   sint16 XIDFormat;
   String LocalNetName;
   String LocalControlPoint;
   sint16 CompressionLevel;
   sint16 RetryLimit;
   sint16 RetryDelay;
   String StatusText;
}
```

Properties

Service
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read-Only

The SNA service to which this connection belongs.

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(8)**
Access Type: Read-ONly

The connection name.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

Adapter
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The link service to be used by this connection.

RemoteEnd
Data Type: **sint32**
Access Type: Read/Write

The remote end. The following table describes the possible values of **RemoteEnd**.

Value	Description
0	Host
1	Peer
2	Downstream
3	Passthrough

For 3270 or LUA access, be sure to set **RemoteEnd** to *Host*.

PeerRole
Data Type: **String**
Access Type: Read/Write

The peer role. The following table describes the possible values of **PeerRole**.

Value	Description
0	Primary
1	Secondary
2	Negotiable
-1	Invalid

PeerRole only applies to connections with **RemoteEnd** set to **Peer** or **Passthrough**.

Activation
Data Type: **sint16**
Access Type: Read/Write

The activation setting. Applicable only if Outgoing Calls are included in Allowed Directions. The following table describes the possible values for **Activation**.

Value	Description
0	Initial
1	OnDemand
2	Administrator
3	Incoming

AllowIncoming
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that incoming calls are allowed; otherwise, **false**.

DynamicLuDef
Data Type: **Boolean**
Access Type: Read/Write

true to automatically configure the APPC Remote LUs as users request them; otherwise, **false**. **DynamicLuDef** requires that an APPN End Node or Net Node be available on the connection.

PartnerConnectionName
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The name of the connecting partner. Valid only if **RemoteEnd** is of **Passthrough**.

BlockId
Data Type: **String**
Qualifiers: **MAXLEN(3), TOUPPERCASE**
Access Type: Read/Write

The block ID.

NodeId
Data Type: **String**
Qualifiers: **MAXLEN(5), TOUPPERCASE**
Access Type: Read/Write

The local node ID. Applicable only for connections which use a switched SDLC line (standard telephone line) to connect to a host system.

RemoteNetName
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The network name of the remote system. Applicable if you are using Format 3 XIDs.

RemoteControlPoint
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The control point of the reomote system. Applicable if you are using Format 3 XIDs.

RemoteBlockId
Data Type: **String**
Qualifiers: **MAXLEN(3), TOUPPERCASE**
Access Type: Read/Write

The remote block ID.

RemoteNodeId
Data Type: **String**
Qualifiers: **MAXLEN(5), TOUPPERCASE**
Access Type: Read/Write

The remote node ID.

XIDFormat
Data Type: **sint16**
Access Type: Read/Write

The XID Type. The following table describes the possible values for **XIDFormat**.

Value	Description
0	Format 0
3	Format 3

Most systems use Format 3.

LocalNetName
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The network name that, along with the **LocalControlPoint**, identifies a system.

LocalControlPoint
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The control point that, along with **LocalNetName**, identifies a system.

CompressionLevel
Data Type: **sint16**
Access Type: Read/Write

The compression type used by this connection. The following table describes the possible values for **CompressionLevel**.

Value	Description
0	None
1	RLE
2	LZ9
3	LZ10
4	LZ12

RetryLimit
Data Type: **sint16**
Qualifiers: **MINVALUE(0), MAXVALUE(255)**
Access Type: Read/Write

The number of times the local system tries to send data to the remote system if there is no response.

RetryDelay
Data Type: **String**
Qualifiers: **MINVALUE(0), MAXVALUE(255), UNITS("sec")**
Access Type: Read/Write

The length of time for the local system to wait for a response to a transmission before trying again.

StatusText
Data Type: **String**
Access Type: Read-Only

The current status of the connection. The following table describes the possible values of **StatusText**.

Value	Description
0	Unconfigured
1	Inactive
2	Incoming
3	OnDemand
4	OnDemand/Incoming
5	Pending
6	Stopping
7	Active
8	Error
9	

Name
Data Type: **String**
Qualifiers: **Something**
Access Type: Read/Write

The name of the connection.

Methods

Method	Description
Start	Starts the connection.
Stop	Stops the connection.
ExchangePassthroughLus	Returns a value that determines if two LUs are part of a passthrough connection pair.

Remarks

MsSna_Connection belongs to a SNA service, and may own 3270 LUs.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_Connection.Start Method

Starts the connection.

The following syntax is simplified from MOF code.

```
    void Start();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_Connection.Stop Method

Stops the connection.

The following syntax is simplified from MOF code.

```
void Stop();
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

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MsSna_Connection.ExchangePassthroughLus Method

Returns a value that determines if two LUs are part of a passthrough connection pair.

The following syntax is simplified from MOF code.

```
boolean ExchangePassthroughLus
(
   [In] sint16 FirstLu;
   [In] sint16 SecondLu;
);
```

Parameters

FirstLu
The first LU.
SecondLu
The second LU.

Return Values

true if the LUs are part of a passthrough pair; otherwise, **false**.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

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MsSna_Connection8022Dlc Class

Describes a type of SNA connection that uses 802.2 DLC protocol over a Token Ring or Ethernet.

The following syntax is simplified from MOF code.

```
class MsSna_Connection8022Dlc : MsSna_Connection
{
   String Address;
   sint16 DlcRetryLimit;
   sint16 DlcTimerT1;
   sint16 DlcTimerT2;
   sint16 DlcXidRetry;
   sint16 DlcRecvThresh;
   sint16 DlcSendLimit;
   sint16 DlcRemoteSAP;
   sint16 DLCType;
   sint16 DlcLocalSAP;
   sint32 MaxBtu;
};
```

Parameters

Address
Data Type: **String**
Qualifiers: **MAXLEN(12), TOUPPERCASE**
Access Type: Read/Write

The 12-digit hexadecimal remote network address. You can receive the correct value for **Address** by contacting the administrator of the remote system.

DlcRetryLimit
Data Type: **sint16**
Qualifiers: **MINVALUE(0), MAXVALUE(255)**
Access Type: Read/Write

The number of times that the local system should retransmit a frame if no response is received from the remote system.

DlcTimerT1
Data Type: **sint16**
Access Type: Read/Write

The amount of time that the local system should wait for the remote system to respond to a transmission before the local system tries again. The following table describes the possible values for **DlcTimer**.

Value	Description
0	Default
1	200 ms
2	400 ms
3	600 ms
4	800 ms
5	1000 ms
6	1 s
7	2 s
8	3 s
9	4 s
10	5 s

DlcTimerT2
Data Type: **sint16**
Access Type: Read/Write

The maximum amount of time that should be allowed before the local system sends an acknowledgment of a received transmission. The following table describes the possible values for **DlcTimerT2**.

Value	Description
0	Default
1	40 ms
2	80 ms
3	120 ms
4	160 ms
5	200 ms
6	400 ms
7	800 ms
8	1200 ms
9	1600 ms
10	2000 ms

DlcXidRetry
Data Type: **sint16**
Qualifiers: **QualiferValueHere**
Access Type: Read/Write

The amount of time that the link can be inactive before the local system treats it as nonfunctioning and shuts it down. The following table describes the possible values for **DlcXidRetry**.

Value	Description
0	1 s
1	2 s
2	3 s
3	4 s
4	5 s
5	5 s (2)
6	10 s
7	15 s
8	20 s
9	25 s

DlcXidRetry
Data Type: **sint16**
Qualifiers: **MINVALUE(0), MAXVALUE(30)**
Access Type: Read/Write

The number of times that the local system should retransmit an XID, an identifying message, if no response is received from the remote system.

DlcRecvThresh
Data Type: **sint16**
Qualifiers: **MINVALUE(0), MAXVALUE(127)**
Access Type: Read/Write

The maximum number of frames that the local system can receive from the remote system before sending a response.

DlcSendLimit
Data Type: **sint16**
Qualifiers: **MINVALUE(0), MAXVALUE(127)**
Access Type: Read/Write

The maximum number of frames that the local system can send without receiving a response from the remote system.

DlcRemoteSAP
Data Type: **sint16**
Qualifiers: **MINVALUE(4), MAXVALUE(252)**
Access Type: Read/Write

A 2-digit hexadecimal number that is a multiple of 04, between 04 and EC. See your Token Ring or Ethernet manual for more information.

DLCType
Data Type: **sint16**

Access Type: Read-Only

The DLC type. The following table describes the possible values for **DLCType**.

Value	Description
0	Token
1	Ether

DlcLocalSAP
Data Type: sint16
Qualifiers: **MINVALUE(4), MAXVALUE(252)**
Access Type: Read/Write

A 2-digit hexadecimal number that is a multiple of 04, between 04 and EC. See your Token Ring or Ethernet manual for more information.

MaxBtu
Data Type: **sint16**
Qualifiers: **MINVALUE(265), MAXVALUE(16393)**
Access Type: Read/Write

The maximum Basic Transmission Unit (BTU) Length.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ConnectionSdlc Class

A type of SNA connection that uses SDLC protocol over dial-up or leased lines.

The following syntax is simplified from MOF code.

```
class MsSna_ConnectionSdlc : MsSna_Connection
{
   String DialData;
   sint16 SdlcEncoding;
   sint16 SdlcDuplex;
   String SdlcPollAddress;
   boolean SdlcLeasedLine;
   sint16 SdlcDataRate;
   sint16 SdlcContactLimit;
   sint16 SdlcContactTO;
   sint16 SdlcIdleLimit;
   sint16 SdlcIdleTO;
   boolean SdlcMultiPrimary;
   sint16 SdlcPollLimit;
   sint16 SdlcPollTO;
   sint16 SdlcPollRate;
   boolean SdlcStandby;
   sint16 SdlcSwitchTO;
   sint32 MaxBtu;
};
```

Parameters

DialData
Data Type: **String**
Qualifiers: **MAXLEN(40)**
The dial data for connections which use a switched line and the phone number is not stored in the modem.

SdlcEncoding
Data Type: **sint16**
Access Type: Read/Write

The encoding scheme (NRZ or NRZI) for the modem to use. The following table describes the possible values for **3dlcEncoding**.

Value	Description
0	NRZ
1	NRZI

SdlcEncoding must match the remote modem.

SdlcDuplex
Data Type: **sint16**
Access Type: Read/Write

The duplex setting of the modem. The following table describes the possible values for **SdlcDuplex**.

Value	Description
0	Half
1	Full

SdlcPollAddress
Data Type: **String**
Qualifiers: **MAXLEN(2)**
Access Type: Read/Write

A 2-digit hexadecimal number describing the poll address. Contact the administrator of the remote system to determine the appropriate value.

SdlcLeasedLine

Data Type: **Boolean**
Access Type: Read-Only

The value depends on the Link service.

SdlcDataRate
Data Type: **sint16**
Access Type: Read/Write

The data rate for transmissions between the communications adapter and the modem. The following table describes the possible values for **SdlcDataRate**.

Value	Description
0	Low
1	High

SdlcContactLimit
Data Type: **String**
Qualifiers: **MINVALUE(1), MAXVALUE(20)**
Access Type: Read/Write

The maximum number of times the link service resends an XID or SNRM before declaring an outage to Host Integration Server 2004.

SdlcContactTO
Data Type: **String**
Qualifiers: **MINVALUE(5), MAXVALUE(300)**
Access Type: Read/Write

The length of time, in tenths of a second, which the SDLC link service waits for an XID or SNRM response before resending the XID or SNRM.

SdlcIdleLimit
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(255)**
Access Type: Read/Write

The number of times for the local system to try to send data to the remote system if there is no response.

SdlcIdleTO
Data Type: **sint16**
Access Type: **MINVALUE(1), MAXVALUE(300)**

The length of time, in tenths of a second, for the local system to wait for a response to a transmission before trying again.

SdlcMultiPrimary
Data Type: **Boolean**
Access Type: Read/Write

true to indicate this is a leased SDLC line to downstream systems, and this server will be the primary station for a multidrop connection; otherwise, **false**.

SdlcPollLimit
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(255)**
Access Type: Read/Write

The number of times for the local system to poll the remote system, if there is no response.

SdlcPollTO
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(300)**
Access Type: Read/Write

The length of time, in tenths of a second, for the local system to wait for a response to a poll before trying again.

SdlcPollRate
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(50)**
Access Type: Read/Write

The poll rate, in polls per second. Valid only if the remote system is a peer or downstream system.

SdlcStandby
Data Type: **Boolean**
Access Type: Read/Write

true to set the Standby line to of a modem; otherwise, **false**.

SdlcSwitchTO
Data Type: **sint16**
Qualifiers: **MINVALUE(10), MAXVALUE(500)**
Access Type: Read/Write

The number of seconds that are allowed for the user or modem to dial and make a connection to the remote computer.

MaxBtu
Data Type: **sint32**
Qualifiers: **MINVALUE(265), MAXVALUE(16393)**
Access Type: Read/Write

The Maximum Basic Transmission Unit (BTU) length.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ConnectionX25 Class

Describes a type of SNA connection that uses X.25 protocol over dial-up or leased lines.

The following syntax is simplified from MOF code.

```
class MsSna_ConnectionX25 : MsSna_Connection
{
   String Address;
   sint16 PVCAlias;
   sint16 VCType;
   String X25Facility;
   String X25UserData;
   sint16 X25PacketSize;
   sint16 X25WindowSize;
   sint32 MaxBtu;
};
```

Parameters

Address
Data Type: **String**
Qualifiers: **MAXLEN(15), TOUPPERCASE**
Access Type: Read/Write

The Switched Virtual Circuit (SVC) address of the host for connections using switched virtual circuit.

PVCAlias
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(65535)**
Access Type: Read/Write

The Permanent Virtual Circuit (PVC) alias of the host for connections using permanent virtual circuit.

VCType
Data Type: **sint16**
Access Type: Read/Write

The type of virtual circuit used by the connection. The following table describes the possible values for **VCType**.

Value	Description
0	Switched
1	Permanent

X25Facility
Data Type: **String**
Qualifiers: **MAXLEN(132), TOUPPERCASE**
Access Type: Read/Write

The codes for any Facility Data required by your network provider or by the administrator of the remote system. Valid only for an SVC channel.

X25UserData
Data Type: **String**
Qualifiers: **MAXLEN(32), TOUPPERCASE**
Access Type: Read/Write

The codes for any User Data required by your network provider. Valid only for an SVC channel.

X25PacketSize
Data Type: **sint16**
Qualifiers: **QualiferValueHere**
Access Type: Read/Write

The maximum number of data bytes, not header bytes, to be sent in a frame. The following table describes the possible values for **X25PacketSize**.

Value	Description
0	64
1	128
2	256
3	512
4	1024

X23PacketSize is valid only for a PVC channel.

X25WindowSize
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(7)**
Access Type: Read/Write

The maximum number of frames that the local system can send without receiving a response from the remote system. Valid only for a PVC channel.

MaxBtu
Data Type: **sin32**
Qualifiers: **MINVALUE(265), MAXVALUE(16393)**
Access Type: Read/Write

The Maximum Basic Transmission Unit (BTU) length.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ConnectionChannel Class

A type of SNA connection that uses channel links.

The following syntax is simplified from MOF code.

```
class MsSna_ConnectionChannel : MsSna_Connection
{
   String Address;
   String CtrlUnit;
   sint32 MaxBtu;
};
```

Properties

Address
Data Type: **String**
Qualifiers: **MAXLEN(2)**
Access Type: Read/Write

A 2-digit hexadecimal number identifying the channel. The range is from 00 through FF; the default is FF.

CtrlUnit
Data Type: **String**
Qualifiers: **MAXLEN(1)**
Access Type: Read-Only

A value for the control unit image number. The range is 0 through F; the default is 0 (zero).

MaxBtu
Data Type: **String**
Qualifiers: **MINVALUE(265), MAXVALUE(65536)**
Access Type: Read/Write

The Maximum Basic Transmission Unit (BTU) length.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ConnectionDft Class

A type of SNA connection that uses DFT over a coaxial cable.

The following syntax is simplified from MOF code.

```
class MsSna_ConnectionDft : MsSna_Connection
{
};
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ConnectionTwinax Class

A type of SNA connection that uses a Twinax cable.

The following syntax is simplified from MOF code.

```
class MsSna_ConnectionTwinax : MsSna_Connection
{
};
```

Remarks

Twinax is not supported by Host Integration Server 2004.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_Cpic Class

A global CPIC definition for APPC.

The following syntax is simplified from MOF code.

```
class MsSna_Cpic : MsSna_Config
{
   String Name;
   String ApplicationTPName;
   String ServiceTPHexName;
   String FullLUName;
   String FullNetName;
   sint16 SecurityType;
   String UserId;
   String Password;
   String AliasLUName;
   sint16 LUNameType;
   sint16 TPNameType;
   String ModeName;
};
```

Parameters

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(8), TOUPPERCASE**
Access Type: Read-Only

The Symbolic Destination name.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

ApplicationTPName
Data Type: **String**
Qualifiers: **MAXLEN(64)**
Access Type: Read/Write

The application TP name.

ServiceTPHexName
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

A hexadecimal value describing the SNA service TP number.

FullLUName
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The partner LU name. Valid only for identifying a partner LU with a fully qualified name.

FullNetName
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The partner network name. Valid only for identifying a partner LU with a fully qualified name.

SecurityType

Data Type: **sint16**
Qualifiers: **QualiferValueHere**
Access Type: Read/Write

The **Conversation Security** option to be used. The following table describes the possible values for **SecurityType**.

Value	Description
0	None
1	Same
2	Program

UserId
Data Type: **String**
Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The user ID to be used when specifying *Program* for **SecurityType**.

Password
Data Type: **String**
Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The password to be used when specifying *Program* for **SecurityType**

AliasLUName
Data Type: **String**
Qualifiers: MAXLEN(8), TOUPPERCASE
Access Type: Read/Write

An alias. Valid only when identifying the Partner LU by alias.

LUNameType
Data Type: **sint16**
Access Type: Read/Write

A value that indicates whether the Partner LU name is specified with an alias or a fully qualified LU name. The following table describes the possible values for **LUNameType**.

Value	Description
0	Alias
1	Full

TPNameType
Data Type: **sint16**
Qualifiers: **QualiferValueHere**
Access Type: Read/Write

A value that indicates whether the Partner TP name is specified in characters or hex. The following table describes the possible values for **TPNameType**.

Value	Description
0	Character
1	Hex

ModeName
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The name of the mode to be used.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_TN5250Definition Class

The definition of a TN5250 session.

The following syntax is simplified from MOF code.

```
class MsSna_TN5250Definition : MsSna_Config
{
   String Name;
   String Service;
   String RemoteLUAlias;
   String LocalLUAlias;
   String Comment;
   String User;
   String Password;
   String Mode;
   sint32 TermTypes;
   sint32 Port;
};
```

Parameters

Name
Data Type: **String**
Qualifiers**: Key,MAXLEN(10)**
Access Type: Read/Write

The session name.

Service
Data Type: **String**
Qualifiers: **MAXLEN(20), TOUPPERCASE**
Access Type: Read/Write

The SNA service to which this session belongs.

RemoteLUAlias
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The local LU alias used in the session.

LocalLUAlias
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The local LU alias used in the session.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

User
Data Type: **String**
Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The AS/400 user name used in the session.

Password
Data Type: **String**

Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The AS/400 password used in the session.

Mode
Data Type: **String**
Access Type: Read/Write

The mode used in the session (QPCSUPP).

TermTypes
Data Type: **String**
Qualifiers: **QualiferValueHere**
Access Type: Read/Write

The terminal types allowed for the session. The following list describes the possible values for **TermType.**

- 5555_C01
- 5555_B01
- 3477_FC
- 3180_2
- 3179_2
- 3196_A1
- 5292_2
- 5291_1
- 5251_11

Port
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(9999)**
Access Type: Read/Write

The port used for the session. By default the value is 0.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_PrintSession Class

A base class for a print session on a Print service.

The following syntax is simplified from MOF code.

```
class MsSna_PrintSession : MsSna_Config
{
   String Name;
   String Service;
   String Comment;
   String StatusText;
   sint16 Activation;
   sint16 CodePage;
   sint16 CodePageLanguage;
   String PrinterDeviceName;
   String CodePageCustomFile;
   String PrinterFile;
   boolean PrintToFile;
   String FaceName;
   boolean FaceNameOverride;
   sint32 LeftMargin;
   sint32 RightMargin;
   sint32 TopMargin;
   sint32 BottomMargin;
   boolean MarginOverride;
   boolean UniqueExtension;
   String PDTFile;
   boolean CheckPDTFile;
   String Filter;
   boolean bFilter;
   sint16 FontSize;
   sint16 SessionType;
   sint16 LinesPerInch;
   sint16 CharsPerLine;
   boolean IgnoreTransparentSections;
   boolean NoHorizontalScaling;
   boolean NoVerticalScaling;
   boolean LPIOverride;
   boolean PageSetupOverride;
};
```

Parameters

Name
Data Type: **String**
Qualifiers: **Key, MAXLEN(32), TOUPPERCASE**
Access Type: Read/Write

The session name, which distinguishes different printers on the network.

Service
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The SNA service to which the print session belongs.

Comment
Data Type: **String**
Qualifiers: **MAXLEN(25)**
Access Type: Read/Write

An optional comment field.

StatusText

Data Type: **String**
Access Type: Read/Write

The status of the print session.

Activation
Data Type: **String**
Access Type: Read/Write

The print session activation. The following table describes the possible values for **Activation**.

Value	Description
0	Automatic. Activates the print session automatically when the Host Print service is started
1	Manual. Activates the print session manually.

CodePage
Data Type: **sint16**
Access Type: Read/Write

A value that indicates whether a standard language code or a custom code page will be used. The following table describes the possible values for **CodePage**.

Value	Description
0	Language
1	Custom

CodePageLanguage
Data Type: **sint16**
Access Type: Read/Write

The code page to be used in the print session. For more information about the possible values for **CodePageLanguage**, see the **Remarks** section.

PrinterDeviceName
Data Type: **String**
Qualifiers: **MAXLEN(256)**
Access Type: Read/Write

The name of the destination printer.

CodePageCustomFile
Data Type: **String**
Qualifiers: **MAXLEN(256)**
Access Type: Read/Write

The file name if a custom code page is to be used.

PrinterFile
Data Type: **String**
Qualifiers: **MAXLEN(256)**
Access Type: Read/Write

The name of the file. Valid only when printing to a file.

PrintToFile
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the print job will be sent to a file; otherwise, **false**. Note that you must still configure a destination printer.

FaceName
Data Type: **String**
Qualifiers: **MAXLEN(31)**
Access Type: Read/Write

The name of the face.

FaceNameOverride
Data Type: **Boolean**
Access Type: Read/Write

true to override the host commands; otherwise, **false**.

LeftMargin
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(255)**
Access Type: Read/Write

The left margin, in inches.

RightMargin
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(255)**
Access Type: Read/Write

The right margin, in inches.

TopMargin
Data Type: **String**
Qualifiers: **MINVALUE(0), MAXVALUE(255)**
Access Type: Read/Write

The top margin, in inches.

BottomMargin
Data Type: **sint32**
Qualifiers: **MINVALUE(0), MAXVALUE(255)**
Access Type: Read/Write

The bottom margin, in inches.

MarginOverride
Data Type: **Boolean**
Access Type: Read/Write

true to override the host margin commands; otherwise, **false**.

UniqueExtension
Data Type: **Boolean**
Access Type: Read/Write

true to instruct the print service to give each file a unique extension when printing a file.

PDTFile
Data Type: **String**
Qualifiers: **MAXLEN(256)**
Access Type: Read/Write

A PDT file used to format the print job.

CheckPDTFile
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that a PDT file will be used to format the print job; otherwise, **false**.

Filter
Data Type: **String**
Qualifiers: **MAXLEN(256)**
Access Type: Read/Write

The filter DLL to be used to filter the printer data stream.

bFilter
Data Type: **Boolean**
Qualifiers: **QualiferValueHere**
Access Type: Read/Write

true to indicate that a filter DLL will be used to filter the printer data stream; otherwise, **false**.

FontSizeOverride
Data Type: **Boolean**

Access Type: Read/Write

true to override the host font size commands.

FontSize
Data Type: **sint16**
Qualifiers: **MINVALUE(0), MAXVALUE(3276)**
Access Type: Read/Write

The font size to be used when printing.

SessionType
Data Type: **sint16**
Access Type: Read/Write

A value that indicates whether this is an APPC or 3270 print session. The following table describes the possible values for **SessionType**.

Value	Description
0	APPC
1	3270

LinesPerInch
Data Type: **sint16**
Qualifiers: **MINVALUE(1), MAXVALUE(12)**
Access Type: Read/Write

The number of lines per inch to be printed.

CharsPerLine
Data Type: **sint16**
Access Type: Read/Write

The number of characters per line to be printed.

IgnoreTransparentSections
Data Type: **Boolean**
Access Type: Read/Write

true to ignore sections of the print data stream that have been marked as Transparent; otherwise, **false**. This value is valid only when using a PDT file to format the data.

NoHorizontalScaling
Data Type: **Boolean**
Access Type: Read/Write

true to turn off off the horizontal scaling feature of the printer driver; otherwise, **false**.

NoVerticalScaling
Data Type: **Boolean**
Access Type: Read/Write

true to turn off off the vertical scaling feature of the printer driver; otherwise, **false**.

LPIOverride
Data Type: **Boolean**
Access Type: Read/Write

true to enable host commands for lines per inch to be overridden; otherwise, **false**.

PageSetupOverride
Data Type: **String**
Access Type: Read/Write

The override for the page setup.

Remarks

The following table describes the possible values for **CodePageLanguage**.

0	Afrikaans[500]

1	Albanian[870]
2	Arabic (Algeria)[420]
3	Arabic (Bahrain)[420]
4	Arabic (Egypt)[420]
5	Arabic (Iraq)[420]
6	Arabic (Jordan)[420]
7	Arabic (Kuwait)[420]
8	Arabic (Lebanon)[420]
9	Arabic (Libya)[420]
10	Arabic (Morocco)[420]
11	Arabic (Oman)[420]
12	Arabic (Qatar)[420]
13	Arabic (Saudi Arabia)[420]
14	Arabic (Syria)[420]
15	Arabic (Tunisia)[420]
16	Arabic (U.A.E.)[420]
17	Arabic (Yemen)[420]
18	Basque[284]
19	Belarusian[1025]
20	Bulgarian[1025]
21	Catalan[284]
22	Chinese (PRC)[935]
23	Chinese (Singapore)[935]
24	Chinese (Hong Kong)[937]
25	Chinese (Macau)[937]
26	Chinese (Taiwan)[937]
27	Croatian[870]
28	Czech[870]
29	Danish[277]
30	Dutch (Belgium)[500]
31	Dutch (Standard)[037]
32	English (Australian)[037]
33	English (Belize)[500]
34	English (Canadian)[037]
35	English (Caribbean)[500]
36	English (Ireland)[285]
37	English (Jamaica)[500]
38	English (New Zealand)[037]
39	English (South Africa)[037]
40	English (Trinidad)[500]
41	English (United Kingdom)[285]
42	English (United States)[037]
43	Estonian[1112]
44	Faeroese[277]
45	Finnish[278]
46	French (Belgium)[500]
47	French (Canadian)[037]
48	French (Luxembourg)[500]
49	French (Standard)[297]
50	French (Swiss)[500]
51	German (Austrian)[273]
52	German (Liechtenstein)[500]
53	German (Luxembourg)[500]
54	German (Standard)[273]

55	German (Swiss)[500]
56	Greek[423]
57	Greek (Modern)[875]
58	Hebrew[424]
59	Hungarian[870]
60	Icelandic[871]
61	Indonesian[037]
62	Italian[280]
63	Italian (Swiss)[500]
64	International[500]
65	Japanese (Extend Katakana)[930]
66	Japanese (English-lower)[931]
67	Japanese (Extend English)[939]
68	Japanese (Katakana)[290]
69	Korean[933]
70	Latvian[1112]
71	Lithuanian[1112]
72	Macedonian (FYROM)[1025]
73	Malay[037]
74	Norwegian (Bokmal)[277]
75	Norwegian (Nynorsk)[277]
76	Polish[870]
77	Portuguese (Brazilian)[037]
78	Portuguese (Portugal)[037]
79	Romanian[870]
80	Russian[880]
81	Serbian (Cyrillic)[1025]
82	Serbian (Latin)[870]
83	Slovak[870]
84	Slovenian[870]
85	Spanish (Argentina)[284]
86	Spanish (Bolivia)[284]
87	Spanish (Chile)[284]
88	Spanish (Columbia)[284]
89	Spanish (Costa Rica)[284]
90	Spanish (Dominican Rep.)[284]
91	Spanish (Ecuador)[284]
92	Spanish (El Salvador)[284]
93	Spanish (Guatemala)[284]
94	Spanish (Honduras)[284]
95	Spanish (Mexico)[284]
96	Spanish (Modern Sort)[284]
97	Spanish (Nicaragua)[284]
98	Spanish (Panama)[284]
99	Spanish (Paraguay)[284]
100	Spanish (Peru)[284]
101	Spanish (Puerto Rico)[284]
102	Spanish (Trad. Sort)[284]
103	Spanish (Uruguay)[284]
104	Spanish (Venezuela)[284]
105	Swedish[278]
106	Thai[838]
107	Turkish[905]
108	Turkish (Latin-5)[1026]

109	Ukrainian[1025]
110	Danish (Euro)[1142]
111	English (Canadian) (Euro)[1140]
112	English (United Kingdom) (Euro)[1146]
113	English (United States) (Euro)[1140]
114	Finnish (Euro)[1143]
115	French (Standard) (Euro)[1147]
116	German (Standard) (Euro)[1141]
117	Icelandic (Euro)[1149]
118	International (Euro)[1148]
119	Italian (Euro)[1144]
120	Latin-1 Open System (Euro)[924]
121	Norwegian (Bokmal) (Euro)[1142]
122	Norwegian (Nynorsk) (Euro)[1142]
123	Spanish (Trad. Sort) (Euro)[1145]
124	Swedish (Euro)[1143]
125	Latin-1 Open System[1047]
126	English (Australian) (Euro)[1140]
127	French (Canadian) (Euro)[1140]

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_PrintSession3270 Class

Extends a print session.

The following syntax is simplified from MOF code.

```
class MsSna_PrintSession3270 : MsSna_PrintSession
{
   sint16 JobTermination;
   sint16 JobTimeoutSecs;
   boolean JobTimeout;
   boolean UseGDI;
   boolean TRNisASCII;
   boolean CustomTRN;
   sint32 CustomTRNChar;
   String LUName;
   boolean MonitorJob;
   boolean LineWrap;
   boolean JobRenderedAtHost;
};
```

Parameters

JobTermination
Data Type: **sint16**
Access Type: Read/Write

'EndBracket' means the job completes when the print server receives the End Bracket notification—otherwise, the print server spools the job until the session ends. The following table describes the possible values for **JobTermination**.

Value	Description
0	EndBracket
1	UnBind

JobTimeoutSecs
Data Type: **sint16**
Qualifiers: **MINVALUE(0),MAXVALUE(99),UNITS("sec")**
Access Type: Read/Write

The timeout for terminating 3270 print jobs—use with 'JobTimeout'.

JobTimeout
Data Type: **Boolean**
Access Type: Read/Write

true to indicate whether a time-out will be used; otherwise, **false**. **JobTimeout** is most often used with **JobTimeoutSecs**.

UseGDI
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the Windows Graphical Device Interface (GDI) is used to format the print job; otherwise, **false**.

TRNisASCII
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that transparent data from the host is in ASCII and needs no translation from EBCDIC to ASCII; otherwise, **false**.

CustomTRN
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that a custom transparency byte, such as one other than the IBM standard of 0x35, will be used; otherwise, **false**.

CustomTRNChar

Data Type: **sint32**
Qualifiers: **MINVALUE(0),MAXVALUE(255)**
Access Type: Read/Write

The custom transparency byte—use this with 'CustomTRN' set to **true**.

LUName
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The 3270 printer LU for the print session.

MonitorJob
Data Type: **Boolean**
Access Type: Read/Write

true to cause the print server to send a message to the host stating that the print job completed; otherwise, **false**.

LineWrap
Data Type: **Boolean**
Access Type: Read/Write

true to line wrap; otherwise, **false**.

JobRenderedAtHost
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the print job is rendered at the host rather than by the Host Integration Server Host Print service; otherwise, **false**.

Remarks

MsSna_PrintSession3270 uses 3270 protocols to communicate with the host.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_PrintSessionAppc Class

Extends a print session. Uses APPC LU 6.2 protocols to communicate with the host.

The following syntax is simplified from MOF code.

```
class MsSna_PrintSessionAppc : MsSna_PrintSession
{
   String LocalLUAlias;
   String RemoteLUAlias;
   String RemoteFQName;
   sint16 Remote;
   String Mode;
   String UserId;
   String Password;
   String AS400Device;
   sint16 System36;
   sint16 HostPrintTransform;
   sint16 DeviceType;
   String FontId;
   String MsgQName;
   String MsgLibName;
   String PrinterName;
   sint16 PaperSrc1;
   sint16 PaperSrc2;
   sint16 CodePage899;
   String SpecialObjName;
   String SpecialLibName;
};
```

Parameters

LocalLUAlias
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The local LU alias to be used for this print session. Valid only when a **RemoteLUAlias** is provided.

RemoteLUAlias
Data Type: **String**
Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The remote LU alias. Valid only if a fully qualified name is not provided.

RemoteFQName
Data Type: **String**
Qualifiers: **MAXLEN(17)**
Access Type: Read/Write

The remote LU fully qualified name. Valid only if **RemoteLUAlias** and **LocalLUAlias** are not provided.

Remote
Data Type: **sint16**
Access Type: Read/Write

A value that specifies what type of connection to use: either a remote APPC LU alias or a fully qualified name. The following table describes the possible values for **Remote**.

Value	Description
0	Alias
1	Fully qualified name

Mode
Data Type: **String**

Qualifiers: **MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The name of the mode to use. The default mode name is QPCSUPP.

UserId
Data Type: **String**
Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The remote user name.

Password
Data Type: **String**
Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The remote password.

AS400Device
Data Type: **String**
Qualifiers: **MAXLEN(10), TOUPPERCASE**
Access Type: Read/Write

The name for the AS/400 printer device. **AS400Device** should be a descriptive name that distinguishes different printers on the network.

System36
Data Type: **sint16**
Access Type: Read/Write

A value that indicates whether the remote system is an AS/400 or a System/36. The following table describes the possible values for **System36**.

Value	Description
0	AS400
1	System/36

HostPrintTransform
Data Type: **sint16**
Access Type: Read/Write

A value that indicates whether Host Print Transform (HPT) will be used. The following table describes the possible values for **HostPrintTransform**.

Value	Description
0	FALSE
1	TRUE

DeviceType
Data Type: **sint16**
Access Type: Read/Write

The print device for Host Print Transform. The following table describes the possible values for **DeviceType**.

Value	Description
0	5224
1	3812

The default value for **DeviceType** is 5224.

FontId
Data Type: **String**
Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

A font, which should be used instead of the default.

MsgQName
Data Type: **String**

Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The qualified name of the message queue to which operational messages for this device are sent.

MsgLibName
Data Type: **String**
Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The name of the library in which the message queue is located.

PrinterName
Data Type: **TOUPPERCASE**
Access Type: Read/Write

The printer type to be used with Host Print Transform. For more information on the possible values for **PrinterName**, see the **Remarks** section.

PaperSrc1
Data Type: **sint16**
Access Type: Read/Write

The type of paper used in paper source 1. The following table describes the possible values for **PaperSrc1**.

Value	Description
0	Default
1	Letter (8.5 x 11 inches)
2	Legal (8.5 x 14 inches)
3	Executive (7.25 x 10.5 inches)
4	A4 (210 x 297 mm)
5	A5 (148 x 210 mm)
6	B5 (182 x 257 mm)
7	Continuous Form (8.0 inches)
8	Continuous Form (13.2 inches)
9	None

PaperSrc2
Data Type: **sint16**
Access Type: Read/Write

The type of paper used in paper source 2. The following table describes the possible values for **PaperSrc2**.

Value	Description
0	Default
1	Letter (8.5 x 11 inches)
2	Legal (8.5 x 14 inches)
3	Executive (7.25 x 10.5 inches)
4	A4 (210 x 297 mm)
5	A5 (148 x 210 mm)
6	B5 (182 x 257 mm)
7	Continuous Form (8.0 inches)
8	Continuous Form (13.2 inches)
9	None

CodePage899
Data Type: **sint16**
Access Type: Read/Write

A value that indicates whether code page 899 is used. The following table describes the possible values of **CodePage899**.

Value	Description
0	FALSE
1	TRUE

SpecialObjName

Data Type: **String**
Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The name of the special object.

SpecialLibName
Data Type: **String**
Qualifiers: **MAXLEN(10)**
Access Type: Read/Write

The name of the special library.

Remarks

The following table describes the possible values for **PrinterName**.

Value	Description
0	*IBM2380
1	*IBM2381
2	*IBM2390
3	*IBM2391
4	*IBM3812
5	*IBM3816
6	*IBM3912HP
7	*IBM3916HP
8	*IBM39302
9	*IBM39303
10	*IBM4019
11	*IBM4019HP
12	*IBM4029
13	*IBM4029HP
14	*IBM4037
15	*IBM4037HP
16	*IBM4070
17	*IBM4070EP
18	*IBM42011
19	*IBM42012
20	*IBM42013
21	*IBM42021
22	*IBM42022
23	*IBM42023
24	*IBM42071
25	*IBM42072
26	*IBM42081
27	*IBM4212
28	*IBM4216
29	*IBM4226
30	*IBM4230
31	*IBM4232
32	*IBM47121
33	*IBM47122
34	*IBM47221
35	*IBM47222
36	*IBM4770
37	*IBM5152
38	*IBM5210
39	*IBM5202

40	*IBM5204
41	*IBM5216
42	*IBM6408
43	*IBM6412
44	*CPQPM15
45	*CPQPM20
46	*HPII
47	*HPIID
48	*HPIIP
49	*HPIIID
50	*HPIIIP
51	*HPIIISI
52	*HP4
53	*HP500
54	*HP550C
55	*HP560C
56	*HPPAINT
57	*EPAP2250
58	*EPAP3250
59	*EPAP5000
60	*EPAP5500
61	*EPDFX5000
62	*EPDFX8000
63	*EPDFX850
64	*EPDFX870
65	*EPDFX1170
66	*EPLQ570
67	*EPLQ860
68	*EPLQ870
69	*EPLQ1070
70	*EPLQ1170
71	*EPLX810
72	*EPLQ510
73	*EPLQ2550
74	*EPSQ870
75	*EPSQ1170
76	*EPEPL7000
77	*EPEPL8000
78	*OKI320IBM
79	*OKI321IBM
80	*OKI390IBM
81	*OKI393IBM
82	*OKI590IBM
83	*OKI591IBM
84	*OKI400
85	*OKI800
86	*OKI810
87	*OKI820
88	*OKI3410
89	*NECP2
90	*NEC2200
91	*NECP2200XE
92	*NECP5200
93	*NECP5300

94	*NECP6200
95	*NECP6300
96	*PAN1123EP
97	*PAN1124
98	*PAN1124IEP
99	*PAN1180EP
100	*PAN1180IEP
101	*PAN1191
102	*PAN1624EP
103	*PAN1654EP
104	*PAN1695EP
105	*PAN2123EP
106	*PAN2124
107	*PAN2180
108	*PAN2624EP
109	*PAN4410
110	*PAN4420
111	*PAN4430
112	*PAN4450IHP
113	*PAN4451HP
114	*XRX4215MRP
115	*XRX4219MRP
116	*XRX4220MRP
117	*XRX4235
118	*XRX4700II
119	*WSCST

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_AppcPartner Class

A preconfigured combination of APPC local LU, remote LU, and Mode.

The following syntax is simplified from MOF code.

```
class MsSna_AppcPartner : MsSna_Config
{
   String Mode;
   String Server;
   String LocalLUAlias;
   String PartnerLUAlias;
   String Connection;
};
```

Properties

Mode

Data Type: **String**
Qualifiers: **Key, MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The mode to be used in the partnership.

Server

Data Type: **String**
Qualifiers: **Key, MAXLEN(16), TOUPPERCASE**
Access Type: Read/Write

The Host Integration Server name on which this partnership will be added.

LocalLUAlias

Data Type: **String**
Qualifiers: **Key, MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The Local LU alias to be used in the partnership.

PartnerLUAlias

Data Type: **String**
Qualifiers: **Key, MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The partner LU. **PartnerLUAlias** can be a Remote LU or a different Local LU.

Connection

Data Type: **String**
Qualifiers: **Key, MAXLEN(8), TOUPPERCASE**
Access Type: Read/Write

The connection name for the Remote LU.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_AccountAssigned3270 Class

Used to query for 3270 LUs assigned to a specific workstation or user.

The following syntax is simplified from MOF code.

```
class MsSna_AccountAssigned3270 : MsSna_Assigned
{
   String Wks;
   String IPAddress;
   String MacAddress;
   String Account;
   String Service;
   String LU;
   boolean IsPool;
   boolean IsAssociatedPrinterLU;
   boolean ModelOverridable;
   sint16 Model;
};
```

Parameters

Wks
Data Type: **String**
Qualifiers**: MAXLEN(20)**
Access Type: Read/Write

The workstation name. By default, returns LUs assigned to all workstations.

IPAddress
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The workstation IP. By default, returns LUs assigned to all workstations.

MacAddress
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

A value that returns LUs configured to a specific media access control (MAC) address.

Account
Data Type: **String**
Access Type: Read/Write

The user for which to query for LUs. By default, will return LUs assigned to all users.

Service
Data Type: **String**
Access Type: Read/Write

The SNA service on which to query for LUs.

LU
Data Type: **String**
Qualifiers: Key, MAXLEN(8)
Access Type: Read/Write

A value that indicates whether the returned LU is part of an LU pool.

IsPool
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the returned LU is part of an LU pool; otherwise, **false**.

IsAssociatedPrinterLU
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the returned LU has an Associated Printer LU; otherwise, **false**.

ModelOverridable
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the returned LU has an display model which can be overridden; otherwise, **false**.

Model
Data Type: **sint16**
Access Type: Read/Write

The default display model of the returned LU. The following table describes the possible values for **Model**.

Value	Description
0	Model12
1	Model13
2	Model14
3	Model15

Remarks

MsSna_AccountAssigned3270 is used in querying for LUA LUs assigned to a workstation as well as to the specified user.

On specifying "" for **Workstation**, only the LUs for the user will be returned.

On specifying "*" for **User**, the LUs for the logged in user will be returned.

If User is omitted, LUs assigned to all Users will be returned.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_AccountAssignedLua Class

Used to query for LUA LUs assigned to a specific workstation or user.

The following syntax is simplified from MOF code.

```
class MsSna_AccountAssignedLua : MsSna_Assigned
{
   String Wks;
   String IPAddress;
   String MacAddress;
   String Account;
   String Service;
   String LU;
   boolean IsPool;
   boolean ModelOverridable;
};
```

Properties

Wks
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The workstation name. By default, LUs assigned to all workstations are returned.

IPAddress
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The workstation IP. By default, LUs assigned to all workstations are returned.

MacAddress
Data Type: **String**
Access Type: Read/Write

The user for which to query for LUs. By default, returns LUs assigned to all users.

Account
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

The name of the service.

Service
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

The SNA service on which to query for LUs.

LU
Data Type: **String**
Qualifiers: **Key, MAXLEN(8)**
Access Type: Read/Write

The name of the LU.

IsPool
Data Type: **Boolean**
Access Type: Read/Write

true to indicate that the returned LU is part of an LU pool; otherwise, **false**.

ModelOverridable
Data Type: **Boolean**
Access Type: Read/Write

true if the LU has a display model which can be overridden.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_AccountAssigned3270Services Class

Used to query for services on which a specific workstation or user has 3270 LUs/pools.

The following syntax is simplified from MOF code.

```
class MsSna_AccountAssigned3270Services : MsSna_Assigned
{
   String Wks;
   String IPAddress;
   String MacAddress;
   String Account;
   String Service;
};
```

Properties

Wks

Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The workstation name. By default, those assigned to all workstations are returned.

IPAddress

Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read-Only

The workstation IP address. By default, those assigned to all workstations are returned.

MacAddress

Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

Returns services with LUs configured to a specific media access control (MAC) address.

Account

Data Type: **String**
Access Type: Read/Write

The user to which the LUs are assigned. By default, returns services with LUs assigned to all users.

Service

Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

The name of the service.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_AccountAssignedLuaServices Class

Used to query for services on which a specific workstation or user has LUA LUs/pools.

The following syntax is simplified from MOF code.

```
class MsSna_AccountAssignedLuaServices : MsSna_Assigned
{
   String Wks;
   String IPAddress;
   String MacAddress;
   String Account;
   String Service;
};
```

Properties

Wks
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The workstation name. By default, those assigned to all workstations are returned.

IPAddress
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The workstation IP address. By default, those assigned to all workstations are returned.

MacAddress
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

Returns services with LUs configured to a specific media access control (MAC) address.

Account
Data Type: **String**
Access Type: Read/Write

The user to which the LUs are assigned. By default, returns services with LUs assigned to all users.

Service
Data Type: **String**
Qualifiers: **Key**
Access Type: Read/Write

Returns the name of the service.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_AccountAvailableAppcLu Class

For the logged-on user account and workstation, the assigned APPC LU resources.

The following syntax is simplified from MOF code.

```
class MsSna_AccountAvailableAppcLu : MsSna_Assigned
{
   String LocalLu;
   String RemoteLu;
   String Wks;
   String IPAddress;
   String MacAddress;
};
```

Properties

LocalLu
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The local LU name.

RemoteLu
Data Type: **String**
Qualifiers: **MAXLEN(8)**
Access Type: Read/Write

The remote LU name.

Wks
Data Type: **String**
Qualifiers: **MAXLEN(20**
Access Type: Read/Write

The workstation name.

IPAddress
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The workstation IP address.

MacAddress
Data Type: **String**
Qualifiers: **MAXLEN(20)**
Access Type: Read/Write

The MAC address.

Remarks

MsSna_AccountAvailableAppcLu is used in querying for the remote APPC LUs for a given local APPC LU on a given workstation and associated with the logged-on user.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_AdapterOnMachine Class

Associates an adapter with a computer.

The following syntax is simplified from MOF code.

```
class MsSna_AdapterOnMachine : MsSna_Association
{
   MsSna_Adapter ref PathToAdapter;
   MsSna_Server ref PathToServer;
};
```

Properties

MsSna_Adapter
Data Type: **ref PathToAdapter**
Qualifiers: **Key**
Access Type: Read-Only

The adapter to associate with.

MsSna_Server
Data Type: **ref PathToServer**
Qualifiers: **Key**
Access Type: Read-Only

The server to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ConnectionOnServer Class

Associates a connection with a server.

The following syntax is simplified from MOF code.

```
class MsSna_ConnectionOnServer : MsSna_Association
{
   MsSna_Connection ref PathToConnection;
   MsSna_Server ref PathToServer;
};
```

Properties

MsSna_Connection
Data Type: **ref PathToConnection**
Qualifiers: **Key**
Access Type: Read-Only

The connection to associate with.

MsSna_Server
Data Type: **ref PathToServer**
Qualifiers: **Key**
Access Type: Read-Only

The path to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_Lu3270OnConnection Class

Associates a 3270 LU with a connection.

The following syntax is simplified from MOF code.

```
class MsSna_Lu3270OnConnection : MsSna_Association
{
   MsSna_Connection ref PathToConnection;
   MsSna_Lu3270 ref PathToLu3270;
};
```

Properties

MsSna_Connection
Data Type: **ref PathToConnection**
Qualifiers: **Key**
Access Type: Read-Only

The connection to associate with.

MsSna_Lu3270
Data Type: **ref PathToLu3270**
Qualifiers: **Key**
Access Type: Read-Only

The 3270 LU to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuDisplayAssignedToUser Class

Associates a display LU with a user.

The following syntax is simplified from MOF code.

```
class MsSna_LuDisplayAssignedToUser : MsSna_Lu3270AssignedToUser
{
   MsSna_LuDisplay ref PathToLuDisplay;
   MsSna_ConfiguredUser ref PathToUser;
};
```

Properties

MsSna_LuDisplay
Data Type: **ref PathToLuDisplay**
Qualifiers: **Key**
Access Type: Read-Only

The display LU to associate with.

MsSna_ConfiguredUser
Data Type: **ref PathToUser**
Qualifiers: **Key**
Access Type: Read-Only

The user to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuPrintAssignedToUser Class

Associates a print LU with a user.

The following syntax is simplified from MOF code.

```
class MsSna_LuPrintAssignedToUser : MsSna_Lu3270AssignedToUser
{
   MsSna_LuPrint ref PathToLuPrint;
   MsSna_ConfiguredUser ref PathToUser;
};
```

Properties

MsSna_LuPrint
Data Type: **ref PathToLuPrint**
Qualifiers: **Key**
Access Type: Read-Only

The print LU to associate with.

MsSna_ConfiguredUser
Data Type: **ref PathToUser**
Qualifiers: **Key**
Access Type: Read-Only

The user to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

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MsSna_LuLuaAssignedToUser Class

Associates an LUA LU with a user.

The following syntax is simplified from MOF code.

```
class MsSna_LuLuaAssignedToUser : MsSna_Lu3270AssignedToUser
{
   MsSna_LuLua ref PathToLuLua;
   MsSna_ConfiguredUser ref PathToUser;
};
```

Properties

MsSna_LuLua
Data Type: **ref PathToLuLua**
Qualifiers: **Key**
Access Type: Read-Only

The LUA LU to associate with.

MsSna_ConfiguredUser
Data Type: **ref PathToUser**
Qualifiers: **Key**
Access Type: Read-Only

The user to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_PoolDisplayAssignedToUser Class

Associates a display pool with a user.

The following syntax is simplified from MOF code.

```
class MsSna_PoolDisplayAssignedToUser : MsSna_PoolAssignedToUser
{
   MsSna_PoolDisplay ref PathToPoolDisplay;
   MsSna_ConfiguredUser ref PathToUser;
};
```

Properties

MsSna_PoolDisplay
Data Type: **ref PathToPoolDisplay**
Qualifiers: **Key**
Access Type: Read-Only

The display pool to associate with.

MsSna_ConfiguredUser
Data Type: **ref PathToUser**
Qualifiers: **Key**
Access Type: Read-Only

The user to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_PoolLuaAssignedToUser Class

Associates a pool LUA with a user.

The following syntax is simplified from MOF code.

```
class MsSna_PoolLuaAssignedToUser : MsSna_PoolAssignedToUser
{
   MsSna_PoolLua ref PathToPoolLua;
   MsSna_ConfiguredUser ref PathToUser;
};
```

Properties

MsSna_PoolLua
Data Type: **ref PathToPoolLua**
Qualifiers: **Key**
Access Type: Read-Only

The pool LUA to associate with.

MsSna_ConfiguredUser
Data Type: **ref PathToUser**
Qualifiers: **Key**
Access Type: Read-Only

The user to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuDisplayAssignedToWorkstation Class

Associates a display LU with a workstation.

The following syntax is simplified from MOF code.

```
class MsSna_LuDisplayAssignedToWorkstation : MsSna_Lu3270AssignedToWorkstation
{
   MsSna_LuDisplay ref PathToLuDisplay;
   MsSna_Workstation ref PathToWorkstation;
};
```

Properties

MsSna_LuDisplay
Data Type: **ref PathToLuDisplay**
Qualifiers: **Key**
Access Type: Read-Only

The display LU to associate with.

MsSna_Workstation
Data Type: **ref PathToWorkstation**
Qualifiers: **Key**
Access Type: Read-Only

The user to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_LuPrintAssignedToWorkstation Class

Associates a print LU with a workstation.

The following syntax is simplified from MOF code.

```
class MsSna_LuPrintAssignedToWorkstation : MsSna_Lu3270AssignedToWorkstation
{
   MsSna_LuPrint ref PathToLuPrint;
   MsSna_Workstation ref PathToWorkstation;
};
```

Properties

MsSna_LuPrint
Data Type: **ref PathToLuPrint**
Qualifiers: **Key**
Access Type: Read-Only

The print LU to associate with.

MsSna_Workstation
Data Type: **ref PathToWorkstation**
Qualifiers: **Key**
Access Type: Read-Only

The user to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

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MsSna_LuLuaAssignedToWorkstation Class

Associates an LUA LU with a workstation.

The following syntax is simplified from MOF code.

```
class MsSna_LuLuaAssignedToWorkstation : MsSna_Lu3270AssignedToWorkstation
{
   MsSna_LuLua ref PathToLuLua;
   MsSna_Workstation ref PathToWorkstation;
};
```

Properties

MsSna_LuLua
Data Type: **ref PathToLuLua**
Qualifiers: **Key**
Access Type: Read-Only

The LUA LU to associate with.

MsSna_Workstation
Data Type: **ref PathToWorkstation**
Qualifiers: **Key**
Access Type: Read-Only

The workstation to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_PoolDisplayAssignedToWorkstation Class

Associates a display pool with a workstation.

The following syntax is simplified from MOF code.

```
class MsSna_PoolDisplayAssignedToWorkstation : MsSna_PoolAssignedToWorkstation
{
   MsSna_PoolDisplay ref PathToPoolDisplay;
   MsSna_Workstation ref PathToWorkstation;
};
```

Properties

MsSna_PoolDisplay
Data Type: **ref PathToPoolDisplay**
Qualifiers: **Key**
Access Type: Read-Only

The display pool to associate with.

MsSna_Workstation
Data Type: **ref PathToWorkstation**
Qualifiers: **Key**
Access Type: Read-Only

The workstation to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_PoolLuaAssignedToWorkstation Class

Associates an LUA pool with a workstation.

The following syntax is simplified from MOF code.

```
class MsSna_PoolLuaAssignedToWorkstation : MsSna_PoolAssignedToWorkstation
{
   MsSna_PoolLua ref PathToPoolLua;
   MsSna_Workstation ref PathToWorkstation;
};
```

Properties

MsSna_PoolLua
Data Type: **ref PathToPoolLua**
Qualifiers: **Key**
Access Type: Read-Only

The LUA pool to associate with.

MsSna_Workstation
Data Type: **ref PathToWorkstation**
Qualifiers: **Key**
Access Type: Read-Only

The workstation to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsSna_ConnectionUsingAdapter Class

Associates a connection with an adapter.

The following syntax is simplified from MOF code.

```
class MsSna_ConnectionUsingAdapter : MsSna_Association
{
   MsSna_Adapter ref PathToAdapter;
   MsSna_Connection ref PathToConnection;
};
```

Properties

MsSna_Adapter
Data Type: **ref PathToAdapter**
Qualifiers: **Key**
Access Type: Read-Only

The adapter to associate with.

MsSna_Connection
Data Type: **ref PathToConnection**
Qualifiers: **Key**
Access Type: Read-Only

The connection to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

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MsSna_Lu3270AssignedToPool Class

Associates a 3270 LU with a pool.

The following syntax is simplified from MOF code.

```
class MsSna_Lu3270AssignedToPool : MsSna_Association
{
   MsSna_Pool ref PathToPool3270;
   MsSna_Lu3270 ref PathToLu3270;
};
```

Properties

MsSna_Pool
Data Type: **ref PathToPool3270**
Qualifiers: **Key**
Access Type: Read-Only

The pool to associate with.

MsSna_Lu3270
Data Type: **ref PathToLu3270**
Qualifiers: **Key**
Access Type: Read-Only

The 3270 LU to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_PoolOnServer Class

Associates a pool with a server.

The following syntax is simplified from MOF code.

```
class MsSna_PoolOnServer : MsSna_Association
{
   MsSna_Pool ref PathToPool3270;
   MsSna_Server ref PathToServer;
};
```

Properties

MsSna_Pool
Data Type: ref PathToPool3270
Qualifiers: **Key**
Access Type: Read-Only

The pool to associate with.

MsSna_Server
Data Type: **ref PathToServer**
Qualifiers: **Key**
Access Type: Read-Only

The server to associate with.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MsSna_ExtendedStatus Class

Describes the extended staus of a specified message.

The following syntax is simplified from MOF code.

```
class MsSna_ExtendedStatus: __ExtendedStatus
{
};
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMISNA WMI Provider Classes

Administration and Management Programmer's Guide

MQBridge WMI Programmer's Reference

The MQBridge WMI Programmer's Reference describes the WMI provider classes that you can use to monitor the MSMQ-MQSeries Bridge.

For general information about programming for messaging, see the Messaging Programmer's Guide section of the SDK.

For sample programs illustratating MSMQ-MQSeries Bridge, see the Messaging Samples section of the SDK.

This section contains:

- WMIMQBridge WMI Provider Classes

WMIMQBridge WMI Provider Classes

The Microsoft® Host Integration Server MSMQ-MQSeries Bridge provider supplies information regarding the MSMQ-MQSeries Bridge. As an instance and method provider, the WMIMQBridge provider implements the standard **IWbemProviderInit** interface and the following **IWbemServices** methods:

- **CreateInstanceEnumAsync**
- **DeleteInstanceAsync**
- **ExecMethodAsync**
- **GetObjectAsync**
- **PutInstanceAsync**

For more information on **IWbemProviderInit** and **IWbemServices**, see "COM API for WMI" in the MSDN Library at http://msdn.microsoft.com/library.

You can access these provider classes in the \root\MicrosoftHIS namespace.

Class	**Description**
MsHisBridge_ExtendedStatus	Returns error information.
MsHisBridge_Service	Describes the MQSeries Bridge service.
MsHisBridge_Channel	Describes an MQI channel.
MsHisBridge_Channel_In_Service	Associates the channel and the service.
MsHisBridge_MessagePipe	Describes an MSMQ-MQSeries message pipe.
MsHisBridge_ConnectedNetwork	Describes a connected network.
MsHisBridge_ConnectedNetwork_In_Service	Associates the connected network to a specified service.

Requirements

Platforms: Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisBridge_ExtendedStatus Class

Returns error information.

The following syntax is simplified from MOF code.

```
class MsHisBridge_ExtendedStatus : __ExtendedStatus
{
};
```

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMIMQBridge WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisBridge_Service Class

Describes the MQSeries Bridge service.

The following syntax is simplified from MOF code.

```
class MsHisMQBridge_Service : MsHisMQBridge_Config
{
   string Name;
   uint32 F2QR_MaxThreads;
   uint32 F2QT_MaxThreads;
   uint32 Q2FD_MaxThreads;
   uint32 Q2FO_MaxThreads;
   uint32 CacheReresh;
   Boolean Encryption;
};
```

Properties

Name
Data Type: **String**

Qualifiers: **key**
Access Type: Read/Write

The name of the computer.

F2QR_MaxThreads
Data Type: **uint32**

Access Type: Read/Write

The maximum number of threads for the MSMQ-to-MQSeries High service message pipe.

F2QT_MaxThreads
Data Type: **uint32**

Access Type: Read/Write

The maximum number of threads for the MSMQ-to-MQSeries Normal service message pipe.

Q2FD_MaxThreads
Data Type: **uint32**

Access Type: Read/Write

The maximum number of threads for the MQSeries-to-MSMQ High service message pipe.

Q2FO_MaxThreads
Data Type: **uint32**

Access Type: Read/Write

The maximum number of threads for the MQSeries-to-MSMQ Normal service message pipe.

CacheReresh
Data Type: **uint32**

Access Type: Read/Write

The interval (in minutes) at which the message pipes check for Cache Time-out.

Encryption
Data Type: **Boolean**

Access Type: Read/Write

Enables the Encryption feature from MSMQ to MSMQ-MQSeries Bridge.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMIMQBridge WMI Provider Classes

Administration and Management Programmer's Guide

MsHisBridge_Channel Class

Describes an MQI channel.

The following syntax is simplified from MOF code.

```
class MsHisMQBridge_Channel : MsHisMQBridge_Config
{
   string Name;
   string QueueManagerName;
   uint32 TransportType;
   string TCPAddress;
   string TCPPort;
   string LU62SideInfoRecord;
   string McaUser;
};
```

Properties

Name
Data Type: **String**

Qualifiers: **key**
Access Type: Read/Write

The name of the computer.

QueueManagerName
Data Type: **String**
Access Type: Read/Write

The MQSeries Queue Manager to which the channel connects.

TransportType
Data Type: **uint32**
Access Type: Read-Only

Specifies whether TCP/IP or SNA LU 6.2 communication will be used. The following table describes the possible values for **TransportType**.

Value	Description
1	LU 6.2
2	TCP/IP

TCPAddress
Data Type: **String**
Access Type: Read/Write

The TCP/IP Address of the MQSeries listener (used with TCP/IP transport).

TCPPort
Data Type: **String**
Access Type: Read/Write

The TCP/IP Port of the MQSeries listener (used with TCP/IP transport).

LU62SideInfoRecord
Data Type: **String**
Access Type: Read/Write

The CPI-C Symbolic Name defined in Host Integration Server 2004 (used with SNA LU 6.2 transport).

McaUser
Data Type: **String**
Access Type: Read/Write

An existing or new MQSeries user name, such as *FMQUSER1*, under which the server side of the MQI channel runs.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMIMQBridge WMI Provider Classes

Administration and Management Programmer's Guide

MsHisBridge_Channel_In_Service Class

Associates the channel and the service.

```
class MsHisMQBridge_Channel_In_Service : MsHisMQBridge_Association
{
   MsHisMQBridge_Channel ref PathToChannel;
   MsHisMQBridge_Service ref PathToService;
};
```

Properties

PathToChannel
Data Type: **MsHisMQBridge_Channel ref**
Qualifiers: **key**
Access Type: Read-Only

The path to the channel.

PathToService
Data Type: **MsHisMQBridge_Service ref**
Qualifiers: **key**
Access Type: Read-Only

The path to the service.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMIMQBridge WMI Provider Classes

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

MsHisBridge_MessagePipe Class

Describes an MSMQ-MQSeries message pipe.

The following syntax is simplified from MOF code.

```
class MsHisMQBridge_MessagePipe
{
   string TransmitQueue;
   uint32 Startup;
   uint32 MaxMessageCount;
   uint32 MaxMessageSize;
   uint32 MaxTime;
   uint32 CacheReresh;
   uint32 ShortRetryCount;
   uint32 ShortRetryDelay;
   uint32 LongRetryCount;
   uint32 LongRetryDelay;
};
```

Properties

TransmitQueue
Data Type: **String**
Access Type: Read/Write

A unique MQSeries transmission queue name for the pipe. The default names are <*CN name*>*.XMITQ* for the transactional message pipe, and <*CN name*>*.XMITQ.HIGH* for the nontransactional message pipe.

Startup
Data Type: **uint32**
Access Type: Read/Write

Enabled or disabled at MSMQ-MQSeries Bridge Startup.

MaxMessageCount
Data Type: **uint32**
Access Type: Read/Write

The maximum number of messages in a batch.

MaxMessageSize
Data Type: **uint32**
Access Type: Read/Write

The maximum size (in bytes) of a batch.

MaxTime
Data Type: **uint32**
Access Type: Read/Write

The interval (in minutes) at which the message pipes check for Cache Time-out.

CacheReresh
Data Type: **uint32**
Access Type: Read/Write

The maximum time (in milliseconds) during which messages are batched.

ShortRetryCount
Data Type: **uint32**
Access Type: Read/Write

The maximum number of retries for the short retry cycle.

ShortRetryDelay
Data Type: **uint32**

Access Type: Read/Write

The interval between retries for the short retry cycle.

LongRetryCount
Data Type: **uint32**
Access Type: Read/Write

The maximum number of retries for the long retry cycle.

LongRetryDelay
Data Type: **uint32**
Access Type: Read/Write

The interval between retries for the long retry cycle.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMIMQBridge WMI Provider Classes

Administration and Management Programmer's Guide

MsHisBridge_ConnectedNetwork Class

Describes a connected network.

The following syntax is simplified from MOF code.

```
class MsHisMQBridge_ConnectedNetwork : MsHisMQBridge_Config
{
   string Name;
   string MQSeriesQMNGR;
   string ReplyToQMNGR;
   uint32 Startup;
   MsHisMQBridge_MessagePipe MSMQ2MQSeries_MessagePipe;
   MsHisMQBridge_MessagePipe MSMQ2MQSeriesTx_MessagePipe;
   MsHisMQBridge_MessagePipe MQSeries2MSMQ_MessagePipe;
   MsHisMQBridge_MessagePipe MQSeries2MSMQTx_MessagePipe;
};
```

Properties

Name
Data Type: **String**

Qualifiers: **key**
Access Type: Read/Write

The name of the computer.

MQSeriesQMNGR
Data Type: **String**
Access Type: Read/Write

The MQSeries Queue Manager to which this CN is connected.

ReplyToQMNGR
Data Type: **String**
Access Type: Read/Write

The default MSMQ QM to which MQSeries should return report or acknowledgment messages. Ordinarily, **ReplyToQMNGR** contains the name of the MSMQ-MQSeries Bridge computer.

Startup
Data Type: **uint32**
Access Type: Read/Write

Enabled or disabled at MSMQ-MQSeries Bridge Startup.

MSMQ2MQSeries_MessagePipe
Data Type: **MsHisMQBridge_MessagePipe**
Access Type: Read/Write

The MSMQ to MQ Series High service (nontransacted) message pipe.

MSMQ2MQSeriesTx_MessagePipe
Data Type: **MsHisMQBridge_MessagePipe**
Access Type: Read/Write

The MSMQ to MQ Series Normal service (transacted) message pipe.

MQSeries2MSMQ_MessagePipe
Data Type: **MsHisMQBridge_MessagePipe**
Access Type: Read/Write

The MQ Series to MSMQ High service (nontransacted) message pipe.

MQSeries2MSMQTx_MessagePipe
Data Type: **MsHisMQBridge_MessagePipe**

Access Type: Read/Write

The MQ Series to MSMQ Normal service (transacted) message pipe.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMIMQBridge WMI Provider Classes

Administration and Management Programmer's Guide

MsHisBridge_ConnectedNetwork_In_Service Class

Associates the connected network to a specified service.

The following syntax is simplified from MOF code.

```
class MsHisMQBridge_ConnectedNetwork_In_Service : MsHisMQBridge_Association
{
   MsHisMQBridge_ConnectedNetwork ref PathToConnectedNetwork;
   MsHisMQBridge_Service ref PathToService;
};
```

Properties

PathToConnectedNetwork
Data Type: **MsHisMQBridge_ConnectedNetwork ref**

Qualifiers: **key**
Access Type: Read-Only

The path to the connected network.

PathToService
Data Type: **MsHisMQBridge_Service ref**

Qualifiers: **key**
Access Type: Read-Only

The path to the service.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

WMIMQBridge WMI Provider Classes

Administration and Management Programmer's Guide

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Messaging Programmer's Reference

This section of the Microsoft® Host Integration Server 2004 Developer's Guide lists the extensions and components that make up the MSMQ-MQSeries Bridge.

For general information about programming for the MSMQ-MQSeries Bridge, see the Messaging Programmer's Guide section of the SDK.

For sample code using the MSMQ-MQSeries Bridge, see the Messaging Programmer's Guide section of the SDK.

This section contains:

- MSMQ-MQSeries Bridge Extensions Reference
- SDK Components for MSMQ-MQSeries Bridge Extensions

MSMQ-MQSeries Bridge Extensions Reference

This section provides an alphabetic reference to all of the API calls for the Microsoft® MSMQ-MQSeries Bridge Extension Property API.

This section contains:

- EPAdd
- EPClose
- EPDelete
- EPDeleteAll
- EPGet
- EPGetBuffer
- EPOpen
- EPUpdate

EPAdd

The **EPAdd** function adds a new extension field at the end of an existing **EP** object and optionally returns a cursor pointing to the new extension field in the **EP** object.

```
HRESULT EPAdd(
    HANDLE hExtension,
    PCGUID pFieldID
    void *pFieldData,
    DWORD dwDataLength,
    PHANDLE phCursor
    );
```

Parameters

hExtension
Supplied parameter. The **EP** object handle to the **EP** object that is to have data added.
pFieldID
Supplied parameter. A pointer to the GUID of the new extension field. A GUID is 16 bytes in length.
pFieldData
Supplied parameter. A pointer to the buffer containing the data for the new extension field.
dwDataLength
Supplied parameter. The length of the buffer containing the data for the new extension field.
phCursor
Supplied and returned parameter. A pointer to a cursor, which points to the new extension field. If *phCursor* is NULL when this function is called; the cursor is not created.

Return Codes

MQ_OK
The function executed successfully.
MQ_ERROR_ALLOC_FAIL
The function failed because memory could not be allocated for the internal data buffers used to extend the **EP** object.
MQ_ERROR_INVALID_HANDLE
The function failed because the **EP** object handle passed to the function is invalid.
MQ_ERROR_INVALID_PARAMETER
The function failed because one or more of the parameters passed to this function are invalid.

Remarks

In an **EP** object possessing a cursor, the extension fields are sorted in ascending order based on the GUID of each extension field. The message extension API functions may run more slowly while the cursor is in effect.

All cursors are canceled if the **EPDeleteAll** function is called with a *pFieldID* of NULL.

The following example illustrates how to use this function.

```
HANDLE hExt;
HANDLE hCursor;
GUID guid;
...
/* Add a new field containing the data "test" */
EPAdd(hExt, &guid, "test", 5, NULL);

/* Add a new field and create a cursor */
EPAdd(hExt, &guid, "another test", 13, &hCursor);
```

See Also

EPDelete, EPDeleteAll

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EPClose

The **EPClose** function closes an open **EP** object freeing the extension handle and associated memory of an **EP** object. The entire contents of the object are deleted.

```
HRESULT EPClose(
    PHANDLE phExtension
    );
```

Parameters

phExtension
Supplied and returned parameter. A pointer to an existing **EP** object handle to close.

Return Codes

MQ_OK
The function executed successfully.
MQ_ERROR_INVALID_HANDLE
The function failed because the **EP** object handle passed to the function is invalid.
MQ_ERROR_INVALID_PARAMETER
The function failed because the parameter passed to this function is invalid.

Remarks

If the **EP** object handle is successfully closed, *phExtension* is reset to NULL on output.

See Also

EPOpen

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EPDelete

The **EPDelete** function deletes a single extension field from an existing **EP** object.

```
HRESULT EPDelete(
    HANDLE hExtension,
    PHANDLE phCursor
    );
```

Parameters

hExtension
Supplied parameter. The **EP** object handle to the **EP** object that is to have extension field deleted.
phCursor
Supplied and returned parameter. On input, *phCursor* is a cursor pointing to the extension field to be deleted. On output, *phCursor* is set to the next extension field in the extension, or to NULL if there are no more fields.

Return Codes

MQ_OK
The function executed successfully.
MQ_ERROR_INVALID_HANDLE
The function failed because the **EP** object handle passed to the function is invalid.
MQ_ERROR_INVALID_PARAMETER
The function failed because one or more of the parameters passed to this function are invalid.

Remarks

After successful deletion, the cursor is set to point to the next field after the deleted one. If the last field is deleted, the cursor is set to NULL (to the beginning).

In an **EP** object possessing a cursor, the extension fields are sorted in ascending order based on the GUID of each extension field. The message extension API functions may run more slowly while the cursor is in effect.

All cursors are canceled if the **EPDeleteAll** function is called with a *pFieldID* of NULL.

See Also

EPDeleteAll

EPDeleteAll

The **EPDeleteAll** function deletes all extension fields from an existing **EP** object or all extension fields matching a specific GUID.

```
HRESULT EPDeleteAll(
    HANDLE hExtension,
    PCGUID pFieldsId,
    PHANDLE phCursor
    );
```

Parameters

hExtension
Supplied parameter. The **EP** object handle to the **EP** object that is to have extension field deleted.
pFieldsId
Supplied parameter. A pointer to a 16-byte buffer containing the GUID of the fields to delete. If this parameter is NULL, all extension fields are deleted.
phCursor
Supplied and returned parameter. On output, this field is a pointer to an extension field cursor. The cursor is positioned at the first field of the next higher GUID after the one that was deleted. If there are no more GUIDs, or if all fields were deleted, *phCursor* is set to NULL. The *phCursor* may be NULL on input if no cursor is desired.

Return Codes

MQ_OK
The function executed successfully.
MQ_ERROR_EXTENSION_FIELD_NOT_FOUND
The function failed because the extension field matching the specified GUID could not be found.
MQ_ERROR_INVALID_HANDLE
The function failed because the **EP** object handle passed to the function is invalid.
MQ_ERROR_INVALID_PARAMETER
The function failed because one or more of the parameters passed to this function are invalid.

Remarks

If the *phCursor* parameter is not NULL, **phCursor* will point to the next field after all the deleted ones (even if MQ_ERROR_EXTENSION_FIELD_NOT_FOUND is returned). If the last field is deleted, the cursor is set to NULL.

In an **EP** object possessing a cursor, the extension fields are sorted in ascending order based on the GUID of each extension field. The message extension API functions may run more slowly while the cursor is in effect.

All cursors are canceled if the **EPDeleteAll** function is called with a *pFieldID* of NULL.

The following example illustrates how to use this function.

```
HANDLE hExt;
GUID guid;
HANDLE hCursor;
...
/* Delete all fields having a specified GUID and set a cursor */
EPDeleteAll(hExt, &guid, &hCursor);

/* Delete all extension fields */
EPDeleteAll(hExt, NULL, NULL);
```

See Also

EPDelete

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EPGet

The **EPGet** function reads a specified extension field from an **EP** object, storing the GUID, length, and data subfields in separate variables. **EPGet** can also be used to locate extension fields containing a specified GUID

```
HRESULT EPGet(
    HANDLE hExtension,
    NAVTYPE Directive,
    PHANDLE phCursor
    GUID *pFieldID,
    void *pFieldData,
    PDWORD pdwDataLength,
    );
```

Parameters

hExtension
Supplied parameter. The **EP** object handle.

Directive
Supplied parameter. This parameter and *phCursor* together control the behavior of the function. Possible values and their usage are discussed in the table following this parameter list.

phCursor
Supplied and returned parameter. A pointer to a cursor, which points to the matching extension field. If *phCursor* is NULL, the first field having a GUID matching *pFieldID* is read, and the cursor is positioned to this field. See the *Directive* argument in this list for specific details.

pFieldID
Supplied and returned parameter. If the *Directive* argument is EP_NEXT_KEY_FIELD, *pFieldId* is a pointer to a 16-byte buffer containing the GUID to be read. If the *Directive* argument is EP_CURRENT_FIELD or EP_NEXT_FIELD, on output this parameter is a pointer to a 16-byte buffer where the function stores the GUID. The GUID can be NULL if the GUID output is not desired.

pFieldData
Supplied and returned parameter. On input, a pointer to a buffer where the function should store the extension field data. On input, this parameter can be NULL if the data output is not desired. On output, a pointer to a buffer where the function stores the extension field data.

pdwDataLength
Supplied and returned parameter. On input, the length of the buffer for the data from the extension field. On output, the actual length of the data. If the buffer is too short or NULL, the data is not read but *pdwDataLength* is reset to the required buffer length.

Values for the *Directive* parameter

Directive	Description
EP_CURRENT_FIELD	Retrieves the extension field pointed to by the *phCursor* parameter, which must be a valid non-NULL cursor handle.
EP_NEXT_FIELD	Advances the cursor and reads the next field. If there are no more fields, returns MQ_ERROR_EXTENSION_FIELD_NOT_FOUND and *phCursor* is set to NULL. If *phCursor* is NULL or **phCursor* is NULL, the cursor is positioned to the first field (sorted in ascending order of GUID) and this field is read. If *phCursor* is not NULL, **phCursor* is set to the extension field. If *phCursor* is not NULL and **phCursor* is not NULL, the cursor (*phCursor*) is positioned to the first field (sorted in ascending order of GUID) and this field's ID and data are read and returned.
EP_NEXT_KEY_FIELD	Advances the cursor and reads the next field having a GUID matching *pFieldID*. If there are no more matching fields, returns MQ_ERROR_EXTENSION_FIELD_NOT_FOUND and sets phCursor to the first field having the next higher GUID, or to NULL if there are no more fields. If *phCursor* is NULL or **phCursor* is NULL, then the first field having a GUID matching *pFieldID* is read, and the cursor is positioned to this field. If the field is found, its field ID and data are returned and if *phCursor* is not NULL, **phCursor* is set to the field.

Return Codes

MQ_OK
  The function executed successfully.
MQ_ERROR_ALLOC_FAIL
  The function failed because memory could not be allocated for the internal data buffers used for the **EP** object.
MQ_ERROR_EXTENSION_FIELD_NOT_FOUND
  The function failed because the extension field matching the specified GUID could not be found.
MQ_ERROR_INVALID_HANDLE
  The function failed because the **EP** object handle passed to the function is invalid.
MQ_ERROR_INVALID_PARAMETER
  The function failed because one or more of the parameters passed to this function are invalid.
MQ_ERROR_USER_BUFFER_TOO_SMALL
  The function failed because the length of the buffer passed was too small for the data.

Remarks

In an **EP** object possessing a cursor, the extension fields are sorted in ascending order based on the GUID of each extension field. The message extension API functions may run more slowly while the cursor is in effect.

All cursors are canceled if the **EPDeleteAll** function is called with a *pFieldID* of NULL.

The following example illustrates how to use this function.

```
HANDLE hExt;
HANDLE hCursor;
GUID guid;
void *pBuffer;
DWORD dwSize, dwCount;
DWORD dwTotalSize = 0;
...

/* Retrieve one field by GUID */
dwSize = 1024;
EPGet(hExt, EP_NEXT_KEY_FIELD, NULL, &guid, pBuffer, &dwSize);

/* Count the fields in a message extension */
for (hCursor = NULL, dwCount = 0;
     EPGet(hExt, EP_NEXT_FIELD, &hCursor, NULL, NULL, NULL)==MQ_OK;
     dwCount++);

/* Compute the total length of all extension fields
   having a given GUID */
for (hCursor = NULL, dwCount = 0;
         EPGet(hExt, EP_NEXT_KEY_FIELD, &hCursor, &guid, NULL,
             &dwSize) == MQ_OK;
     dwTotalSize += dwSize);
```

See Also

EPDelete, EPDeleteAll

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EPGetBuffer

The **EPGetBuffer** function converts an **EP** object to a message extension (PROPID_M_EXTENSION format) that can be sent in a message and packs the message extension into the supplied buffer.

```
HRESULT EPGetBuffer(
    HANDLE hExtension,
    void *pBuf,
    PDWORD pdwBufLength,
    );
```

Parameters

hExtension
Supplied parameter. The **EP** object handle.
pBuf
Supplied parameter. A pointer to the buffer where this function will store the PROPID_M_EXTENSION message extension.
pdwBufLength
Supplied and returned parameter. On input, the length of the buffer for the message extension. On output, the actual length of the stored data. If the buffer is too short or NULL, the data is not converted but *pdwBufLength* is reset to the required buffer length.

Return Codes

MQ_OK
The function executed successfully.
MQ_ERROR_INVALID_HANDLE
The function failed because the **EP** object handle passed to the function is invalid.
MQ_ERROR_INVALID_PARAMETER
The function failed because one or more of the parameters passed to this function are invalid.
MQ_ERROR_USER_BUFFER_TOO_SMALL
The function failed because the length of the buffer passed was too small for the data.

Remarks

If this function executed successfully, the *pdwBufLength* parameter contains the actual length of the packed extension buffer. If MQ_ERROR_USER_BUFFER_TOO_SMALL is returned, *pdwBufLength* contains the required buffer length.

The following example illustrates how to use this function.

```
HANDLE hExt;
void *pBuffer;
DWORD dwSize;

/* Read the required buffer length */
dwSize = 0;
EPGetBuffer(hExt, NULL, &dwSize);

/* Allocate the buffer */
pBuffer = malloc(dwSize);

/* Write the message extension to the buffer */
EPGetBuffer(hExt, pBuffer, &dwSize);
```

See Also

EPAdd, EPOpen

EPOpen

The **EPOpen** function creates an **EP** object and optionally unpacks the supplied message extension buffer into it.

```
HRESULT EPOpen(
    PHANDLE phExtension,
    void *pExtBuffer,
    DWORD dwExtBufLength
    );
```

Parameters

phExtension
Returned parameter. A pointer to an **EP** object handle of the **EP** object that is created.
pExtBuffer
Supplied parameter. The pointer to a buffer containing the message extension data in the sequence GUID (16 bytes), length of data (4 bytes), data, GUID, length of data, data, etc.
dwExtBufLength
Supplied parameter. The length of the buffer containing the message extension data.

Return Codes

MQ_OK
The function executed successfully.
MQ_ERROR_ALLOC_FAIL
The function failed because memory could not be allocated for the **EP** object handle and internal data buffers.
MQ_ERROR_CORRUPTED_EXTENSION_BUFFER
The function failed because the buffer containing the message extension data was corrupted.
MQ_ERROR_INVALID_PARAMETER
The function failed because one or more of the parameters passed to this function are invalid.

Remarks

If a NULL pointer is passed for *pExtBuffer* or *dwExtBufLength* is zero, an **EP** object with no extension fields is created.

The following example illustrates how to use this function.

```
HANDLE hExt1, hExt2;
void *pBuffer;
DWORD dwBufLength;
...
/* Create an empty EP object */
EPOpen(&hExt1, NULL, 0);
/* Create an EP object, copying data from a message extension */
EPOpen(&hExt2, pBuffer, dwBufLength);
```

See Also

EPClose

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EPUpdate

The **EPUpdate** function updates (replaces) the data and length subfields of an existing extension field in an **EP** object.

```
HRESULT EPUpdate(
    HANDLE hExtension,
    HANDLE hCursor
    void *pFieldData,
    DWORD dwDataLength,
    );
```

Parameters

hExtension
Supplied parameter. The **EP** object handle to the **EP** object that is to have data updated.
hCursor
Supplied parameter. The cursor pointing to the extension field to be updated which must not be NULL.
pFieldData
Supplied parameter. A pointer to the buffer containing the new data for the extension field. This parameter may be NULL for an empty data subfield.
dwDataLength
Supplied parameter. The length of the buffer containing the new data for the extension field.

Return Codes

MQ_OK
The function executed successfully.
MQ_ERROR_ALLOC_FAIL
The function failed because memory could not be allocated for the internal data buffers used to update the **EP** object.
MQ_ERROR_INVALID_HANDLE
The function failed because the **EP** object handle passed to the function is invalid.
MQ_ERROR_INVALID_PARAMETER
The function failed because one or more of the parameters passed to this function are invalid.

Remarks

The following example illustrates how to use this function.

```
HANDLE hExt;
HANDLE hCursor;
GUID guid;
...
/* Find an extension field containing a specified GUID */
EPGet (hExt, EP_NEXT_KEY_FIELD, &hCursor, &guid, NULL, 0)
/* Change the length and data subfields of the extension field */
EPUpdate(hExt, hCursor, "newdata", 8);
```

See Also

EPAdd, EPGet

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SDK Components for MSMQ-MQSeries Bridge Extensions

The Microsoft® Host Integration Server 2004 SDK contains software components used for application integration using messaging and the MSMQ-MQSeries Bridge.

This section contains:

- Program and DLL Files for MSMQ-MQSeries Bridge
- Symbol Files for MSMQ-MQSeries Bridge
- Header Files for MSMQ-MQSeries Bridge
- Import Library Files for MSMQ-MQSeries Bridge

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Program and DLL Files for MSMQ-MQSeries Bridge

The following table lists the executable system files, DLL library files, and other files that are included with the Microsoft® Host Integration Server 2004 SDK for use with the MSMQ-MQSeries Bridge.

File name	Description
BCluster.exe	A program used to create or remove the MSMQ-MQSeries Bridge Service resource in a cluster.
explres.dll	The resource file for Q2QEXPL.exe, the MSMQ-MQSeries Bridge explorer program.
MQBInst.dll	The COM component used to create, delete, or modify MSMQ-MQSeries Bridge objects in Active Directory® directory service.
mqfrgnky.dll	A library to provide a function for the MSMQ-MQSeries Bridge to store a public key in a foreign computer object (for example, MQFrgn_StorePubKeysInDS).
MQSRRecv.exe	A sample program that uses the MQSeries API to receive messages from a specified MQSeries queue. This program can be used to test the operation of the MSMQ-MQSeries Bridge.
MQSRSend.exe	A sample program that uses the MQSeries API to send ten test messages to a specified MQSeries queue. This program can be used to test the operation of the MSMQ-MQSeries Bridge.
MSMQRecv.exe	A sample program that uses the Message Queuing (also known as MSMQ) API to receive messages from a specified Message Queuing queue. This program can be used to test the operation of the MSMQ-MQSeries Bridge.
MSMQSend.exe	A sample program that uses the Message Queuing API to sends 10 test messages to a specified Message Queuing local or foreign queue. This program can be used to test the operation of the MSMQ-MQSeries Bridge.
Q2QCLDLL.dll	A helper DLL (now obsolete) that contains functions to work with a cluster.
Q2QEXPL.exe	The MSMQ-MQSeries Bridge explorer program.
Q2QGW.exe	The MSMQ-MQSeries Bridge service program.
q2qmsg.dll	The Event Log message file.
q2qperf.ini	The performance counter definition file for the MSMQ-MQSeries Bridge.
q2qprfdl.dll	The performance counter implementation DLL for the MSMQ-MQSeries Bridge extension.
q2qprfsm.def	Defines the performance counter object in q2qperf.ini.
Q2QSHDLL.dll	A helper DLL (now obsolete) that contains functions for installing and uninstalling the MSMQ-MQSeries Bridge.
SHDLLRes.dll	The resource DLL (now obsolete) for Q2QSHDLL.DLL for installing and uninstalling the MSMQ-MQSeries Bridge.
wmiMQBridge.dll	The MSMQ-MQSeries Bridge Windows Management Instrumentation (WMI) Provider.
wmimqbridge.mof	The WMI Managed Object File (MOF) for the MSMQ-MQSeries Bridge.

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Symbol Files for MSMQ-MQSeries Bridge

The following symbol files for use when debugging are included with Microsoft® Host Integration Server 2004 for use with the MSMQ-MQSeries Bridge. These files are installed as part of the Host Integration Server package and copies of these files are also located on the Host Integration Server CD under the Support\Symbols folder.

File name	Description
EXE\BCluster.dbg	Symbols from BCluster.exe
DLL\explres.dbg	Symbols from Explres.dll
DLL\MQBInst.dbg	Symbols from MQBInst.dll
EXE\MQSRRecv.dbg	Symbols from MQSRRecv.exe
EXE\MQSRSend.dbg	Symbols from MQSRSend.exe
EXE\MSMQRecv.dbg	Symbols from MSMQRecv.exe
EXE\MSMQSend.dbg	Symbols from MSMQSend.exe
DLL\Q2QCLDLL.dbg	Symbols from Q2QCLDLL.dll.
EXE\Q2QClIns.dbg	Symbols from Q2QClIns.exe.
EXE\Q2QClUni.dbg	Symbols from Q2QClUni.exe.
EXE\Q2QEXPL.dbg	Symbols from Q2QEXPL.exe.
EXE\Q2QGW.dbg	Symbols from Q2QGW.exe.
EXE\Q2QInst.dbg	Symbols from Q2QInst.exe.
DLL\q2qmsg.dbg	Symbols from q2qmsg.dll.
DLL\q2qprfdl.dbg	Symbols from q2qprfdl.dll.
DLL\Q2QSHDLL.dbg	Symbols from Q2QSHDLL.dll.
DLL\SHDLLRes.dbg	Symbols from SHDLLRes.dll.
DLL\wmiMQBridge.dbg	Symbols from wmiMQBridge.dll.

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Header Files for MSMQ-MQSeries Bridge

Provider-specific header files needed to build the MSMQ-MQSeries Bridge sample applications are included with Microsoft® Host Integration Server 2004. These files are installed as part of the Host Integration Server package and copies of these files are also located on the Host Integration Server CD under the SDK\Include folder.

The following provider-specific files are provided with Host Integration Server 2004 for developing applications using the MSMQ-MQSeries Bridge.

File name	**Description**
msmqep.h	Globally unique identifier (GUID) definitions, enumeration constants, and error codes for use with the MSMQ-MQSeries Bridge.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Import Library Files for MSMQ-MQSeries Bridge

Provider-specific import library files needed to build the MSMQ-MQSeries Bridge extension sample applications are included with Microsoft® Host Integration Server 2004. These files are installed as part of the Host Integration Server package and copies of these files are also located on the Host Integration Server CD under the SDK\Lib folder.

The following provider-specific files are provided with Host Integration Server for developing applications using the MSMQ-MQSeries Bridge:

File name	Description
msmqep.lib	Import library of functions for use with the MSMQ-MQSeries Bridge extension.

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Security Programmer's Reference

This section provides information required to develop applications which use the Enterprise Single Sign-On features integrated into Microsoft® Host Integration Server 2004.

Enterprise Single Sign-On (SSO) provides a way to map a Windows® user ID to non-Windows user credentials. This service can simplify business processes that use applications on diverse systems.

For general information about programming for security, see the Security Programmer's Guide.

This section contains:

Single Sign-On Programmer's Reference

Single Sign-On Programmer's Reference

Enterprise Single Sign-On (SSO) is a technology that enables you to map a Microsoft® Windows® user ID to a non-Windows user credential, thus enabling your users to transparently log on to non-Windows servers.

For general information about programming for SSO, see the Single Sign-On Programmer's Guide.

This section contains:

- COM Mapper Programmer's Reference
- Microsoft.BizTalk.SSOClient.Interop Namespace

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COM Mapper Programmer's Reference

Component Object Model (COM) objects are used for accessing the Enterprise Single Sign-On (SSO) technology for Microsoft® Host Integration Server 2004.

This section contains:

- IBTSTicket Interface
- ISSOAdmin Interface
- ISSOConfigStore Interface
- ISSOLookup1 Interface
- ISSOLookup2 Interface
- ISSOMapper Interface
- ISSOMapping Interface
- ISSONotification Interface
- ISSOTicket Interface
- SAdapter Structure
- SExternalAccount Structure
- SPasswordChange Structure
- SPasswordChangeComplete Structure
- SSO_NOTIFICATION_TYPE Enumeration
- SSO_NOTIFICATION_FLAG Enumeration
- SStatus Structure

IBTSTicket Interface

The **IBTSTicket** interface interacts with the Enterprise Single Sign-On (SSO) ticket server.

> **Note** To use this class from managed code, use the sample provided on **IBTSTicket.ValidateAndRedeemTicket** method. The interface is not provided in the product.

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

IBTSTicket Members

Programming with Enterprise Single Sign-On

IBTSTicket Members

The member of the **IBTSTicket** interface is described in the following table.

Public Member

Member	Description
ValidateAndRedeemTicket	Retrieves the credentials associated with a Microsoft® Host Integration Server message.

See Also

IBTSTicket Interface

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IBTSTicket Methods

The method of the **IBTSTicket** interface is described in the following table. For a complete list of **IBTSTicket** interface members, see IBTSTicket Members.

Public Methods

Method	Description
ValidateAndRedeemTicket	Retrieves the credentials associated with a Microsoft® Host Integration Server message.

See Also

IBTSTicket Interface

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

IBTSTicket.ValidateAndRedeemTicket Method

The **ValidateAndRedeemTicket** method retrieves the credentials associated with a Microsoft® Host Integration Server message.

[C#, C++]

```
HRESULT ValidateAndRedeemTicket(
  IUnknown*  punkMessage,
  BSTR  bstrApplicationName,
  LONG  lFlags,
  BSTR*  pbstrExternalUserName,
);
```

[Visual Basic]

```
Function Ticket.ValidateAndRedeemTicket(
  punkMessage As Object,
  bstrApplicationName As String,
  lFlags As Long,
  pbstrExternalUserName As String
) As String
```

Parameters

punkMessage [C++]
  [in] Specifies the Host Integration Server message.
punkMessage [Visual Basic]
  [in] Specifies the Host Integration Server message.
bstrApplicationName [C++]
  [in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrApplicationName [Visual Basic]
  [in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
lFlags [C++]
  [in] Long integer that specifies the flags set. Use the flag SSO_FLAG_REFRESH to bypass the credential cache.
lFlags [Visual Basic]
  [in] Long that specifies the flags set. Use the flag SSO_FLAG_REFRESH to bypass the credential cache.
pbstrExternalUserName [C++]
  [out] Pointer to a string that specifies the external user name.
pbstrExternalUserName [Visual Basic]
  [out] String that specifies the external user name.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] String array that contains the external credentials.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description

S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

This method validates that the sender identity in the Microsoft Host Integration Server message matches the user identity in the ticket before redeeming the ticket.

Because the credentials are returned in plain text by this method, the caller should be careful to clear (overwrite) them as soon as possible after use.

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an Application Administrator.

Example

[C#]

```
using System;
using System.Runtime.InteropServices;

namespace Microsoft.BizTalk.PublicInterop
{
   // Only include flags that apply to these interfaces
   // See the ssoflags.idl file

   internal enum BTSTicketFlags
   {
      SSO_FLAG_NONE      = 0,
      SSO_FLAG_REFRESH   = 1
   };

   [ComImport]
   [TypeLibType(TypeLibTypeFlags.FCanCreate)]
   [ClassInterface(ClassInterfaceType.None)]
   [Guid("8DA848D0-E703-4043-9AF7-C569AC1F4507")]
   internal class BTSTicket
   {
   }

   [ComImport]
   [InterfaceType(ComInterfaceType.InterfaceIsDual)]
   [Guid("54596C7F-D343-4F20-BF7A-0722C5DA1F7D")]
   [CoClass(typeof(BTSTicket))]
   internal interface IBTSTicket
   {
      string[] ValidateAndRedeemTicket(
         [In, MarshalAs(UnmanagedType.IUnknown)] object message,
         string applicationName,
         int flags,
         out string externalUserName);
   };
}
```

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

IBTSTicket Interface

IBTSTicket Members

ISSOAdmin Interface

The **ISSOAdmin** interface provides administration functions for the Enterprise Single Sign-On (SSO) server database.

> **Note** For information about using this interface within managed code, see ISSOAdmin Interface.

Requirements

Type Library: SSOAdmin 1.0 Type Library (SSOAdmin.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSOAdmin Members

Programming with Enterprise Single Sign-On

ISSOAdmin Members

The following table shows the IISOAdmin members.

Public Methods

Member	Description
CreateApplication	Creates an application in the Single Sign-On (SSO) server database.
CreateFieldInfo	Creates field information for an application.
DeleteApplication	Deletes an application from the SSO server database.
GetApplicationInfo	Gets the application information from the SSO server database.
GetGlobalInfo	Returns the global SSO server configuration information from the SSO server database.
PurgeCacheForApplication	Purges the cached credentials for an application on all SSO servers.
UpdateApplication	Updates the application information in the SSO server database.

See Also

ISSOAdmin Interface

ISSOAdmin Methods

The methods of the **ISSOAdmin** interface are listed in the following table. For a complete list of **ISSOAdmin** interface members, see ISSOAdmin Members.

Public Methods

Method	**Description**
CreateApplication	Creates an application in the Single Sign-On (SSO) server database.
CreateFieldInfo	Creates field information for an application.
DeleteApplication	Deletes an application from the SSO server database.
GetApplicationInfo	Gets the application information from the SSO server database.
GetGlobalInfo	Returns the global SSO server configuration information from the SSO server database.
PurgeCacheForApplication	Purges the cached credentials for an application on all SSO servers.
UpdateApplication	Updates the application information in the SSO server database.

See Also

ISSOAdmin Interface

ISSOAdmin.CreateApplication Method

The **CreateApplication** method creates an application in the Enterprise Single Sign-On (SSO) server database.

C++

```
HRESULT CreateApplication(
  BSTR  bstrApplicationName,
  BSTR  bstrDescription,
  BSTR  bstrContactInfo,
  BSTR  bstrUserGroupName,
  BSTR  bstrAdminGroupName,
  LONG  lFlags,
  LONG  lNumFields
);
```

[Visual Basic]

```
Sub CreateApplication(
  bstrApplicationName As String,
  bstrDescription As String,
  bstrContactInfo As String,
  bstrUserGroupName As String,
  bstrAdminGroupName As String,
  lFlags As Long,
  lNumFields As Long
)
```

Parameters

bstrApplicationName [C++]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

bstrApplicationName [Visual Basic]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

bstrDescription [C++]
[in] String that specifies the description for the application. This parameter can be NULL, an empty string, or contain spaces.

bstrDescription [Visual Basic]
[in] String that specifies the description for the application. This parameter can be NULL, an empty string, or contain spaces.

bstrContactInfo [C++]
[in] String that specifies the contact information for this application. This parameter can be NULL, an empty string, or contain spaces.

bstrContactInfo [Visual Basic]
[in] String that specifies the contact information for this application. This parameter can be NULL, an empty string, or contain spaces.

bstrUserGroupName [C++]
[in] String that specifies the application users group name. This parameter must contain a valid global group.

bstrUserGroupName [Visual Basic]
[in] String that specifies the application users group name. This parameter must contain a valid global group.

bstrAdminGroupName [C++]
[in] String that specifies the Application Administrator group name. This parameter must contain a valid global group.

bstrAdminGroupName [Visual Basic]
[in] String that specifies the Application Administrator group name. This parameter must contain a valid global group.

lFlags [C++]
[in] Long integer that specifies whether the application is a group application. If a group application is required, specify SSO_FLAG_APP_USES_GROUP_MAPPING.

lFlags [Visual Basic]
[in] Long integer that specifies whether the application is a group application. If a group application is required, specify SSO_FLAG_APP_USES_GROUP_MAPPING.

lNumFields [C++]
[in] Long integer that specifies the number of fields that will be added for this application. The minimum value is 1 (one external user ID). An application can have no credential fields.
lNumFields [Visual Basic]
[in] Long integer that specifies the number of fields that will be added for this application. The minimum value is 1 (one external user ID). An application can have no credential fields.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

An application is always created as disabled.

After the field information is added by using the **CreateFieldInfo** method, then the application can be enabled by using the **UpdateApplication** method. The number of fields added by **CreateFieldInfo** must match the number of fields specified by the *numFields* parameter. The *numFields* value cannot be changed after the application is created.

To access this method, you must be an SSO Administrator or an SSO Affiliate Administrator.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

Programming with Enterprise Single Sign-On

ISSOAdmin Interface

ISSOAdmin Members

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ISSOAdmin.CreateFieldInfo Method

The **CreateFieldInfo** method creates field information for an application.

C++

```
HRESULT CreateFieldInfo(
  BSTR  bstrApplicationName,
  BSTR  bstrLabel,
  LONG  lFlags
);
```

[Visual Basic]

```
Sub CreateFieldInfo(
  bstrApplicationName As String,
  bstrLabel As String,
  lFlags As Long
)
```

Parameters

bstrApplicationName [C++]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrApplicationName [Visual Basic]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrLabel [C++]
[in] String that specifies the label value. This parameter cannot be NULL or an empty string.
bstrLabel [Visual Basic]
[in] String that specifies the label value. This parameter cannot be NULL or an empty string.
lFlags [C++]
[in] Long integer specifies whether the field is masked. If a field must be masked when displayed in the user interface, specify SSO_FLAG_FIELD_INFO_MASK. The flag parameter will be ignored for the first (user ID) field, as it will not be masked.
lFlags [Visual Basic]
[in] Long integer specifies whether the field is masked. If a field must be masked when displayed in the user interface, specify SSO_FLAG_FIELD_INFO_MASK. The flag parameter will be ignored for the first (user ID) field, as it will not be masked.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

The application must exist before its field information can be created. The number of fields added must equal the *numFields* value specified when the application was created, otherwise the application will be disabled at run time.

Although the external user ID is not considered to be an external credential, it requires a field to describe how it will be displayed by the user interface. The first field created will be considered as the field that describes the external user ID. A minimum of one field is required, and typically at least two fields should be specified to provide credentials. An application can have no credentials.

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an SSO Application Administrator.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

Programming with Enterprise Single Sign-On

ISSOAdmin Interface

ISSOAdmin Members

ISSOAdmin.DeleteApplication Method

The **DeleteApplication** method deletes an application from the Enterprise Single Sign-On (SSO) server database.

C++

```
HRESULT DeleteApplication(
  BSTR  bstrApplicationName
);
```

[Visual Basic]

```
Sub DeleteApplication(
  bstrApplicationName As String
)
```

Parameters

bstrApplicationName [C++]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

bstrApplicationName [Visual Basic]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

Return Value

[C++].This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic].Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
S_FALSE	The application was not found.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

All fields, mappings, and external credentials associated with this application are deleted.

To access this method, you must be an SSO Administrator or an SSO Affiliate Administrator.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

Programming with Enterprise Single Sign-On

ISSOAdmin Interface

ISSOAdmin Members

ISSOAdmin.GetApplicationInfo Method

The **GetApplicationInfo** method gets the application information from the Enterprise Single Sign-On (SSO) server database.

C++

```
HRESULT GetApplicationInfo(
  BSTR  bstrApplicationName,
  BSTR*  pbstrDescription,
  BSTR*  pbstrContactInfo,
  BSTR*  pbstrUserGroupName,
  BSTR*  pbstrAdminGroupName,
  LONG*  plFlags,
  LONG*  plNumFields
);
```

[Visual Basic]

```
Function GetApplicationInfo(
  bstrApplicationName As String,
  pbstrDescription As String,
  pbstrContactInfo As String,
  pbstrUserGroupName As String,
  pbstrAdminGroupName As String,
  plFlags As Long
) As Long
```

Parameters

bstrApplicationName [C++]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

bstrApplicationName [Visual Basic]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

pbstrDescription [C++]
[out] Pointer to a string that receives the description for the application.

pbstrDescription [Visual Basic]
[out] String that receives the description for the application.

pbstrContactInfo [C++]
[out] Pointer to a string that receives the contact information for the application.

pbstrContactInfo [Visual Basic]
[out] String that receives the contact information for the application.

pbstrUserGroupName [C++]
[out] Pointer to a string that receives the application user group name.

pbstrUserGroupName [Visual Basic]
[out] String that receives the application user group name.

pbstrAdminGroupName [C++]
[out] Pointer to a string that receives the Application Administrator group name.

pbstrAdminGroupName [Visual Basic]
[out] String that receives the Application Administrator group name.

plFlags [C++]
[out] Pointer to a long integer that receives the flags currently set for the application.

plFlags [Visual Basic]
[out] Long that receives the flags currently set for the application.

plNumFields [C++]
[out] Pointer to a long integer that receives the number of fields associated with the application.

Return Value

[C++].This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic].This method returns a Long that receives the number of fields associated with the application.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an SSO Application Administrator.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

Programming with Enterprise Single Sign-On

ISSOAdmin Interface

ISSOAdmin Members

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ISSOAdmin.GetGlobalInfo Method

The **GetGlobalInfo** method gets the global Enterprise Single Sign-On (SSO) configuration information from the Enterprise Single Sign-On server database.

C++

```
HRESULT GetGlobalInfo(
  LONG*  plFlags,
  LONG*  plAuditAppDeleteMax,
  LONG*  plAuditMappingDeleteMax,
  LONG*  plAuditNtpLookupMax,
  LONG*  plAuditXpLookupMax,
  LONG*  plTicketTimeout,
  LONG*  plCredCacheTimeout,
  BSTR*  pbstrSecretServer,
  BSTR*  pbstrSSOAdminGroup,
  BSTR*  pbstrAffiliateAppMgrGroup
);
```

[Visual Basic]

```
Function GetGlobalInfo(
  plFlags As Long,
  plAuditAppDeleteMax As Long,
  plAuditMappingDeleteMax As Long,
  plAuditNtpLookupMax As Long,
  plAuditXpLookupMax As Long,
  plTicketTimeout As Long,
  plCredCacheTimeout As Long,
  pbstrSecretServer As String,
  pbstrSSOAdminGroup As String
) As String
```

Parameters

plFlags [C++]
  [out] Pointer to a long integer that receives the global flags.
plFlags [Visual Basic]
  [out] Long that receives the global flags.
plAuditAppDeleteMax [C++]
  [out] Pointer to a long integer that receives the current size of the AuditAppDelete table.
plAuditAppDeleteMax [Visual Basic]
  [out] Long integer that receives the current size of the AuditAppDelete table.
plAuditMappingDeleteMax [C++]
  [out] Pointer to a long integer that receives the current size of the AuditMappingDelete table.
plAuditMappingDeleteMax [Visual Basic]
  [out] Long that receives the current size of the AuditMappingDelete table.
plAuditNtpLookupMax [C++]
  [out] Pointer to a long integer that receives the current size of the AuditNtpLookup table.
plAuditNtpLookupMax [Visual Basic]
  [out] Long that receives the current size of the AuditNtpLookup table.
plAuditXpLookupMax [C++]
  [out] Pointer to a long integer that receives the current size of the AuditXpLookup table.
plAuditXpLookupMax [Visual Basic]
  [out] Long that receives the current size of the AuditXpLookup table.
plTicketTimeout [C++]
  [out] Pointer to a long integer that receives the current ticket time-out value in minutes.
plTicketTimeout [Visual Basic]
  [out] Long that receives the current ticket time-out value in minutes.
plCredCacheTimeout [C++]
  [out] Pointer to a long integer that receives the current credential cache time-out value in minutes.

plCredCacheTimeout [Visual Basic]
[out] Long that receives the current credential cache time-out value in minutes.
pbstrSecretServer [C++]
[out] Pointer to a string that receives the current secret server computer name.
pbstrSecretServer [Visual Basic]
[out] String that receives the current secret server computer name.
pbstrSSOAdminGroup [C++]
[out] Pointer to a string that receives the current SSO server Administrator group name.
pbstrSSOAdminGroup [Visual Basic]
[out] String that receives the current SSO server Administrator group name.
pbstrAffiliateAppMgrGroup [C++]
[out] Pointer to a string that receives the current SSO server Affiliate Administrator group name.

Return Value

[C++].This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic].This method returns a String that receives the current SSO server Affiliate Administrator group name.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

To access this method, you must be an SSO Administrator.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

Programming with Enterprise Single Sign-On

ISSOAdmin Interface

ISSOAdmin Members

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOAdmin.PurgeCacheForApplication Method

The **PurgeCacheForApplication** method purges the cached credentials for an application on all Enterprise Single Sign-On (SSO) servers.

C++

```
HRESULT PurgeCacheForApplication(
  BSTR  bstrApplicationName
);
```

[Visual Basic]

```
Sub PurgeCacheForApplication(
  bstrApplicationName As String
)
```

Parameters

bstrApplicationName [C++]

[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

bstrApplicationName [Visual Basic]

[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

There may be a short time delay while this operation is applied to all SSO servers.

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an Application Administrator.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

Programming with Enterprise Single Sign-On

ISSOAdmin Interface

ISSOAdmin Members

ISSOAdmin.UpdateApplication Method

The **UpdateApplication** method updates the application information in the Enterprise Single Sign-On (SSO) server database.

C++

```
HRESULT UpdateApplication(
  BSTR  bstrApplicationName,
  BSTR  bstrDescription,
  BSTR  bstrContactInfo,
  BSTR  bstrUserGroupName,
  BSTR  bstrAdminGroupName,
  LONG  lFlags,
  LONG  lFlagMask
);
```

[Visual Basic]

```
Function UpdateApplication(
  bstrApplicationName As String,
  bstrDescription As String,
  bstrContactInfo As String,
  bstrUserGroupName As String,
  bstrAdminGroupName As String,
  lFlags As Long
)
```

Parameters

bstrApplicationName [C++]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

bstrApplicationName [Visual Basic]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

bstrDescription [C++]
[in] String that specifies the description of the application.

bstrDescription [Visual Basic]
[in] String that specifies the description of the application.

bstrContactInfo [C++]
[in] String that specifies the contact information for this application.

bstrContactInfo [Visual Basic]
[in] String that specifies the contact information for this application.

bstrUserGroupName [C++]
[in] String that specifies the Application Users group name. This must be a valid global group.

bstrUserGroupName [Visual Basic]
[in] String that specifies the Application Users group name. This must be a valid global group.

bstrAdminGroupName [C++]
[in] String that specifies the Application Administrator group name. This must be a valid global group. If running as an Application Administrator, this parameter will be ignored.

bstrAdminGroupName [Visual Basic]
[in] String that specifies the Application Administrator group name. This must be a valid global group. If running as an Application Administrator, this parameter will be ignored.

lFlags [C++]
[in] Integer that specifies whether the application is enabled. To enable the application, set the SSO_FLAG_ENABLED flag.

lFlags [Visual Basic]
[in] Integer that specifies whether the application is enabled. To enable the application, set the SSO_FLAG_ENABLED flag.

lFlagMask [C++]
[in] To change the flag value, set this mask to the flag that you need to change. For example, to enable or disable Enterprise SSO, set this flag to SSO_FLAG_ENABLED. The *flagMask* parameter indicates which flag you want to change, while the *flags*

parameter indicates the new value of that flag.

lFlagMask [Visual Basic]

[in] To change the flag value, set this mask to the flag that you need to change. For example, to enable or disable Enterprise SSO, set this flag to SSO_FLAG_ENABLED. The *flagMask* parameter indicates which flag you want to change, while the *flags* parameter indicates the new value of that flag.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an Application Administrator.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

Programming with Enterprise Single Sign-On

ISSOAdmin Interface

ISSOAdmin Members

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOConfigStore Interface

The **ISSOConfigStore** interface provides administration functions for the Enterprise Single Sign-On (SSO) config store.

> **Note** For information about using this interface within managed code, see ISSOConfigStore Interface.

Requirements

Type Library: SSOConfigStore 1.0 Type Library (SSOConfigStore.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSOConfigStore Members.

Programming with Enterprise Single Sign-On

ISSOConfigStore Members

The following table shows the ISSOConfigStore members.

Public Methods

Member	Description
DeleteConfigInfo	Delete the configuration information from the config store.
GetConfigInfo	Get the configuration information from the config store.
SetConfigInfo	Sets the configuration information in the config store.

See Also

ISSOConfigStore Interface

Programming with Enterprise Single Sign-On

ISSOConfigStore Methods

The methods of the **ISSOConfigStore** interface are listed in the following table. For a complete list of **ISSOConfigStore** interface members, see ISSOConfigStore Members.

Public Methods

Method	Description
DeleteConfigInfo	Deletes the configuration information from the config store.
GetConfigInfo	Gets the configuration information from the config store.
SetConfigInfo	Sets the configuration information in the config store.

See Also

ISSOConfigStore Interface

Programming with Enterprise Single Sign-On

ISSOConfigStore::DeleteConfigInfo

The **DeleteConfigInfo** method deletes the configuration information from the config store.

C++

```
HRESULT DeleteConfigInfo(
  BSTR  bstrApplication,
  BSTR  bstrIdentifier,
);
```

VB

```
ConfigStore.DeleteConfigInfo(
  bstrApplication As BSTR,
  bstrIdentifier As BSTR,
)
```

Parameters

bstrApplication
[in] String containing the external application name.
bstrApplication [Visual Basic]
[in] String containing the external application name.
bstrIdentifier [C++]
[in] String containing the identifier for the config info. This will typically be a GUID string.
bstrIdentifier [Visual Basic]
[in] String containing the identifier for the config info. This will typically be a GUID string.

Return Values

[C++] This method does not return a value.

[Visual Basic] The method returns an **HRESULT**. Possible values include, but are not limited to, those in the following table.

Return code	Description
S_OK	The config info was successfully returned from the config store.
S_FALSE	The config info did not already exist.
E_ACCESSDENIED	Access denied.
E_INVALIDARG	Invalid argument.

Remarks

If the config info specified by the parameters does not already exist in the config store, this method will return S_FALSE.

If the *bstrSSOServer* parameter is NULL, the Single Sign-On (SSO) server location is obtained from the registry. If the server location is not available in the registry, the local computer is used.

Example

C++

```
ConfigStore.DeleteConfigInfo(bstrApplication, bstrIdentifier)
```

See Also

ISSOConfigStore Interface

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOConfigStore::GetConfigInfo

The **GetConfigInfo** method gets the configuration information from the config store.

C++

```
HRESULT GetConfigInfo(
  BSTR  bstrApplication,
  BSTR  bstrIdentifier,
  LONG  lFlags,
  IPropertyBag*  ppbConfigInfo
);
```

VB

```
ConfigStore.GetConfigInfo(
  bstrApplication As BSTR,
  bstrIdentifier As BSTR,
  lFlags As LONG,
  ppbConfigInfo As IPropertyBag
)
```

Parameters

bstrApplication
  [in] String containing the Single Sign-On (SSO) server. This property is optional.
bstrApplication [Visual Basic]
  [in] String containing the SSO server. This property is optional.
bstrIdentifier [C++]
  [in] String containing the identifier for the config info. This string is typically a GUID string.
bstrIdentifier [Visual Basic]
  [in] String containing the identifier for the config info. This string is typically a GUID string.
lFlags [C++]
  [in] Long integer containing the flags.
lFlags [Visual Basic]
  [in] Long integer containing the flags.
ppbConfigInfo [C++]
  [in] Pointer to an empty property bag that is populated with the config info as name/value pairs.
ppbConfigInfo [Visual Basic]
  [in] Pointer to an empty property bag that is populated with the config info as name/value pairs.

Return Values

[C++] This method does not return a value.

[Visual Basic] The method returns an **HRESULT**. Possible values include, but are not limited to, those in the following table.

Return code	Description
S_OK	The config info was successfully returned from the config store.
E_ACCESSDENIED	Access denied.
E_INVALIDARG	Invalid argument.

Remarks

This method can be executed either in admin or run-time (lookup) mode. The caller specifies SSO_FLAG_LOOKUP if the run-time (lookup) mode is required. The default mode is admin mode.

In admin mode, masked properties are not returned. Instead, the property is missing. Unmasked properties are returned. Admin mode can specify any SSO server, not just the local computer.

In run-time mode, all properties, including masked properties, are returned. Because run-time mode only uses the SSO server on the current computer, the *bstrSSOServer* parameter will be ignored.

If the *bstrSSOServer* parameter is NULL, the SSO server location is obtained from the registry. (This applies to admin mode only. Run-time mode always uses the local computer.) If the server location is not available in the registry, the local computer is used.

To get the config info, this method is provided with an empty property bag that is populated with the properties. This allows the Microsoft® Host Integration Server 2004 implementation of the property bag to be used, which can handle the type conversion from BSTRs to the actual variant types based on a format convention specific to Host Integration Server 2004. The property values will be XML tags for Host Integration Server 2004.

Example Code

C++

```
ConfigStore.GetConfigInfo(bstrApplication, bstrIdentifier, lFlags, ppbConfigInfo)
```

See Also

ISSOConfigStore Interface

ISSOConfigStore::SetConfigInfo

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOConfigStore::SetConfigInfo

The **SetConfigInf**o method sets the configuration information in the config store.

C++

```
HRESULT SetConfigInfo(
  BSTR  bstrApplication,
  BSTR  bstrIdentifier,
  IPropertyBag*  ppbConfigInfo
);
```

[Visual Basic]

```
ConfigStore.SetConfigInfo(
  bstrApplication As BSTR,
  bstrIdentifier As BSTR,
  ppbConfigInfo As IPropertyBag
)
```

Parameters

bstrApplication [C++]
  [in] String containing the external application name.
bstrApplication [Visual Basic]
  [in] String containing the external application name.
bstrIdentifier [C++]
  [in] String containing the identifier for the config info. This string will typically be a GUID.
bstrIdentifier [Visual Basic]
  [in] String containing the identifier for the config info. This string will typically be a GUID.
ppbConfigInfo [C++]
  [in] Contains a pointer to a property bag containing the config info as name/value pairs.
ppbConfigInfo [Visual Basic]
  [in] Contains a pointer to a property bag containing the config info as name/value pairs.

Return Values

[C++] This method does not return a value.

[Visual Basic] The method returns an **HRESULT**. Possible values include, but are not limited to, those in the following table.

Return code	Description
S_OK	The config info was successfully stored in the config store.
E_ACCESSDENIED	Access denied.
E_INVALIDARG	Invalid argument.

Remarks

This method can be used for originally creating the config info or for updating the config info.

If the config info does not already exist, all properties of the config info, as defined by the field info for the specified application, must be provided.

If the config info does already exist, a property within the config info can be missing. Only properties that are provided will be updated. At least one property must be provided.

Note that due to the use of the Single Sign-On (SSO) store, the first property cannot be masked.

If the ***bstrSSOServer*** parameter is NULL, the SSO server location is obtained from the registry. If not available in the registry, the local computer will be used.

Example

```
ConfigStore.SetConfigInfo(bstrApplication, bstrIdentifier, ppbConfigInfo)
```

See Also

ISSOConfigStore::GetConfigInfo

ISSOConfigStore Interface

Programming with Enterprise Single Sign-On

ISSOLookup1 Interface

The **ISSOLookup1** interface provides a lookup for user credentials associated with an application.

> **Note** For information about using this interface within managed code, see ISSOLookup1 Interface.

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSOLookup1 Members

Programming with Enterprise Single Sign-On

ISSOLookup1 Members

The following table shows the ISSOLookup1 member.

Public Methods

Member	Description
GetCredentials	Retrieves the user credentials for an application.

See Also

ISSOLookup1 Interface

Programming with Enterprise Single Sign-On

ISSOLookup1 Methods

The method of the **ISSOLookup1** interface is listed in the following table. For a complete list of **ISSOLookup1** interface members, see ISSOLookup1 Members.

Public Methods

Method	Description
GetCredentials	Retrieves the user credentials for an application.

See Also

ISSOLookup1 Interface

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOLookup1.GetCredentials Method

The **GetCredentials** method retrieves the user credentials for an application.

C++

```
HRESULT GetCredentials(
  BSTR  bstrApplicationName,
  LONG  lFlags,
  BSTR*  pbstrExternalUserName,
  SAFEARRAY  credentials
);
```

[Visual Basic]

```
Function GetCredentials(
  bstrApplicationName As String,
  lFlags As Long,
  pbstrExternalUserName As String
) As String
```

Parameters

bstrApplicationName [C++]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrApplicationName [Visual Basic]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
lFlags [C++]
[in] Long integer that specifies the flags to set. Using the SSO_FLAG_REFRESH indicates that the credential cache should be bypassed.
lFlags [Visual Basic]
[in] Long that specifies the flags to set. Using the SSO_FLAG_REFRESH indicates that the credential cache should be bypassed.
pbstrExternalUserName [C++]
[out] Pointer to a string that receives the external user name.
pbstrExternalUserName [Visual Basic]
[out] String that receives the external user name.
credentials [C++]
[out] String array that receives the credentials.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] String array that receives the credentials.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global Err object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

To access this method, you must be an Application User. You can only retrieve your own credential.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSOLookup1 Interface

ISSOLookup1 Members

Programming with Enterprise Single Sign-On

ISSOLookup2 Interface

The **ISSOLookup2** interface provides a lookup for user credentials associated with an application.

> **Note** For information about using this interface within managed code, see ISSOLookup2 Interface.

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003

See Also

ISSOLookup2 Members

Programming with Enterprise Single Sign-On

ISSOLookup2 Members

The following table shows the ISSOLookup1 members.

Public Methods

Member	Description
GetCredentials	Retrieves the user credentials for an application.
LogonExternalUser	Logs on an external user.

See Also

ISSOLookup2 Interface

Programming with Enterprise Single Sign-On

ISSOLookup2 Methods

The methods of the **ISSOLookup2** interface are listed in the following table. For a complete list of **ISSOLookup2** interface members, see ISSOLookup2 Members.

Public Methods

Method	Description
GetCredentials	Retrieves the user credentials for an application.
LogonExternalUser	Logs on an external user.

See Also

ISSOLookup2 Interface

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOLookup2.GetCredentials Method

The **GetCredentials** method retrieves the user credentials for an application.

C++

```
HRESULT GetCredentials(
  BSTR  bstrApplicationName,
  LONG  lFlags,
  BSTR*  pbstrExternalUserName,
  SAFEARRAY  credentials
);
```

[Visual Basic]

```
Function GetCredentials(
  bstrApplicationName As String,
  lFlags As Long,
  pbstrExternalUserName As String
) As String
```

Parameters

bstrApplicationName [C++]
  [in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrApplicationName [Visual Basic]
  [in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
lFlags [C++]
  [in] Long integer that specifies the flags to set. Using the SSO_FLAG_REFRESH indicates that the credential cache should be bypassed.
lFlags [Visual Basic]
  [in] Long that specifies the flags to set. Using the SSO_FLAG_REFRESH indicates that the credential cache should be bypassed.
pbstrExternalUserName [C++]
  [out] Pointer to a string that receives the external user name.
pbstrExternalUserName [Visual Basic]
  [out] String that receives the external user name.
credentials [C++]
  [out] String array that receives the credentials.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] String array that receives the credentials.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global Err object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

To access this method, you must be an Application User. You can only retrieve your own credential.

Requirements

Platforms: Microsoft® Windows Server™ 2003

See Also

ISSOLookup2 Interface

ISSOLookup2 Members

Programming with Enterprise Single Sign-On

ISSOLookup2.LogonExternalUser Method

The **LogonExternalUser** method logs on an external user.

C++

```
Int GetCredentials(
  BSTR  bstrApplicationName,
  BSTR  bstrUserName
  LONG  lFlags,
  Array  ppsaCredentials,
);
```

[Visual Basic]

```
Function GetCredentials(
  bstrApplicationName As String,
  bstrUserName As String
  lFlags As Long,
  ppsaCredentials As String
) As Integer
```

Parameters

bstrApplicationName [C++]
  [in] String that specified the name of the application to log on to.
bstrApplicationName [Visual Basic]
  [in] String that specified the name of the application to log on to.
bstrUserName [C++]
  [in] String that specified the name of the external user to log on.
bstrUserName [Visual Basic]
  [in] String that specified the name of the external user to log on.
lFlags [C++]
  [in] Long integer that specifies the flags to set.
lFlags [Visual Basic]
  [in] Long integer that specifies the flags to set.
ppsaCredentials [C++]
  Array that holds the credentials of the user.
ppsaCredentials [Visual Basic]
  Array that holds the credentials of the user.

Return Value

[C++] A windows handle.

[Visual Basic] A windows handle.

Requirements

Platforms: Microsoft® Windows Server™ 2003,

See Also

ISSOLookup2 Interface

ISSOLookup2 Members

Programming with Enterprise Single Sign-On

ISSOMapper Interface

The **ISSOMapper** interface creates mappings between users and applications.

> **Note** For information about using this interface within managed code, see ISSOMapper Interface.

Requirements

Type Library: SSOMapper 1.0 Type Library (SSOMapper.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSOMapper Members

Programming with Enterprise Single Sign-On

ISSOMapper Members

The following table shows the ISSOMapper members.

Public Methods

Member	Description
GetApplications	Retrieves the available applications for a Microsoft® Windows® user.
GetFieldInfo	Retrieves the field information for an application.
GetMappingsForExternalUser	Retrieves the mappings for an external user.
GetMappingsForWindowsUser	Retrieves the mappings for a Microsoft Windows user.
SetExternalCredentials	Stores a set of external credentials in the Single Sign-On (SSO) server database.
SetWindowsPassword	Sets the Microsoft Windows password. This method is not currently implemented.

See Also

ISSOMapper Interface

Programming with Enterprise Single Sign-On

ISSOMapper Methods

The methods of the **ISSOMapper** interface are listed in the following table. For a complete list of **ISSOMapper** interface members, see ISSOMapper Members.

Public Methods

Method	Description
GetApplications	Retrieves the available applications for a Microsoft® Windows® user.
GetFieldInfo	Retrieves the field information for an application.
GetMappingsForExternalUser	Retrieves the mappings for an external user.
GetMappingsForWindowsUser	Retrieves the mappings for a Microsoft Windows user.
SetExternalCredentials	Stores a set of external credentials in the Enterprise Single Sign-On (SSO) server database.
SetWindowsPassword	Sets the Microsoft Windows password. This method is not currently implemented.

See Also

ISSOMapper Interface

Programming with Enterprise Single Sign-On

ISSOMapper.GetApplications Method

The **GetApplications** method retrieves the available applications for a Microsoft Windows user.

C++

```
HRESULT GetApplications(
  SAFEARRAY  applications,
  SAFEARRAY  descriptions,
  SAFEARRAY  contactInfo
);
```

[Visual Basic]

```
Sub GetApplications(
  applications As String,
  descriptions As String,
  contactInfo As String
)
```

Parameters

applications [C++]
[out] String array that returns the application name.
applications [Visual Basic]
[out] String array that returns the application name.
descriptions [C++]
[out] String array that returns a description for the application.
descriptions [Visual Basic]
[out] String array that returns a description for the application.
contactInfo [C++]
[out] String array that returns the contact information for the application.
contactInfo [Visual Basic]
[out] String array that returns the contact information for the application.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface

Programming with Enterprise Single Sign-On

ISSOMapper.GetFieldInfo Method

The **GetFieldInfo** method retrieves the field information for an application.

C++

```
HRESULT GetFieldInfo(
  BSTR  bstrApplicationName,
  SAFEARRAY  labels,
  SAFEARRAY  flags
);
```

[Visual Basic]

```
Sub GetFieldInfo(
  bstrApplicationName As String,
  labels As String
  flags As Long
)
```

Parameters

bstrApplicationName [C++]
  [in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrApplicationName [Visual Basic]
  [in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
labels [C++]
  [out] String array that returns the field labels.
labels [Visual Basic]
  [out] String array that returns the field labels.
flags [C++]
  [out] Long integer array that returns the field flags.
flags [Visual Basic]
  [out] Long array that returns the field flags.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_FAIL	The application is disabled.
E_INVALIDARG	An invalid parameter was detected.

Remarks

The field information will only be returned if the application is currently enabled. An application cannot be enabled unless its field information is complete.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface

ISSOMapper Members

Programming with Enterprise Single Sign-On

ISSOMapper.GetMappingsForExternalUser Method

The **GetMappingsForExternalUser** method retrieves the mappings for an external user.

C++

```
HRESULT GetMappingsForExternalUser(
  BSTR  bstrApplicationName,
  BSTR  bstrExternalUserName,
  SAFEARRAY  mappings
);
```

[Visual Basic]

```
Function GetMappingsForExternalUser(
  bstrApplicationName As String,
  bstrExternalUserName As String
) As Variant
```

Parameters

bstrApplicationName [C++]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrApplicationName [Visual Basic]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrExternalUserName [C++]
[in] String that specifies the external user name. This value can contain spaces. If a NULL value is specified for this parameter, all mappings are returned for the specified application.
bstrExternalUserName [Visual Basic]
[in] String that specifies the external user name. This value can contain spaces. If a NULL value is specified for this parameter, all mappings are returned for the specified application.
mappings [C++]
[out] Object array that contains the mappings as **ISSOMapping** objects.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Variant array that contains the mappings as **ISSOMapping** objects.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface

ISSOMapper Members

Programming with Enterprise Single Sign-On

ISSOMapper.GetMappingsForWindowsUser Method

The **GetMappingsForWindowsUser** method retrieves the mappings for a Microsoft Windows user.

C++

```
HRESULT GetMappingsForWindowsUser(
  BSTR  bstrWindowsDomainName,
  BSTR  bstrWindowsUserName,
  BSTR  bstrApplicationName,
  SAFEARRAY  mappings
);
```

[Visual Basic]

```
Function GetMappingsForWindowsUser(
  bstrWindowsDomainName As String,
  bstrWindowsUserName As String,
  bstrApplicationName As String
) As Variant
```

Parameters

bstrWindowsDomainName [C++]
[in] String that specifies the Microsoft Windows domain name. This parameter is optional, but if it is specified, the *windowsUserName* parameter must also be specified. If this parameter is not specified, the current user context is used.
bstrWindowsDomainName [Visual Basic]
[in] String that specifies the Microsoft Windows domain name. This parameter is optional, but if it is specified, the *windowsUserName* parameter must also be specified. If this parameter is not specified, the current user context is used.
bstrWindowsUserName [C++]
[in] String that specifies the Microsoft Windows domain name. This parameter is optional, but if it is specified, the *windowsUserName* parameter must also be specified. If this parameter is not specified, the current user context is used.
bstrWindowsUserName [Visual Basic]
[in] String that specifies the Microsoft Windows domain name. This parameter is optional, but if it is specified, the *windowsUserName* parameter must also be specified. If this parameter is not specified, the current user context is used.
bstrApplicationName [C++]
[in] String that specifies the external application name. If this parameter is specified, only one mapping is returned if it exists. If this parameter is NULL, all mappings for the specified user are returned. This parameter is optional.
bstrApplicationName [Visual Basic]
[in] String that specifies the external application name. If this parameter is specified, only one mapping is returned if it exists. If this parameter is NULL, all mappings for the specified user are returned. This parameter is optional.
mappings [C++]
[out] Object array that contains the mappings as **ISSOMapping** objects.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Variant array that contains the mappings as **ISSOMapping** objects.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

An Application Administrator must specify the *bstrApplicationName* value.

Users described as Application User can only access their own mappings. They cannot access the mappings for another user.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface

ISSOMapper Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to
http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapper.SetExternalCredentials Method

The **SetExternalCredentials** method stores a set of external credentials in the Enterprise Single Sign-On (SSO) server database.

C++

```
HRESULT SetExternalCredentials(
  BSTR  bstrApplicationName,
  BSTR  bstrExternalUserName,
  SAFEARRAY  externalCredentials
);
```

[Visual Basic]

```
Sub SetExternalCredentials(
  bstrApplicationName As String,
  bstrExternalUserName As String,
  externalCredentials As String
)
```

Parameters

bstrApplicationName [C++]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

bstrApplicationName [Visual Basic]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

bstrExternalUserName [C++]
[in] String that specifies the external user name.

bstrExternalUserName [Visual Basic]
[in] String that specifies the external user name.

externalCredentials [C++]
[in] String array that specifies the external credentials to be stored.

externalCredentials [Visual Basic]
[in] String array that specifies the external credentials to be stored.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

Users described as Application User can only set their own credentials. Also, the number of external credentials provided must match the number of fields expected by the external application.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface

ISSOMapper Members

Programming with Enterprise Single Sign-On

ISSOMapper.SetWindowsPassword Method

The **SetWindowsPassword** method sets the Microsoft Windows password. This method is not currently implemented.

C++

```
HRESULT SetWindowsPassword(
  BSTR  bstrWindowsPassword
);
```

[Visual Basic]

```
Sub SetWindowsPassword(
  bstrWindowsPassword As String
)
```

Parameters

bstrWindowsPassword [C++]
  [in] String that specifies the Windows password.
bstrWindowsPassword [Visual Basic]
  [in] String that specifies the Windows password.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
E_NOTIMPL	The method is not implemented.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface

ISSOMapper Members

Programming with Enterprise Single Sign-On

ISSOMapping Interface

The **ISSOMapping** interface manages the state of a mapping instance.

> **Note** For information about using this interface within managed code, see ISSOMapping Interface.

Requirements

Type Library: SSOMapper 1.0 Type Library (SSOMapper.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSOMapping Members

Programming with Enterprise Single Sign-On

ISSOMapping Members

The following tables show the **ISSOMapper** members.

Public Properties

Property	Description
ApplicationName	Specifies the name of the application.
ExternalUserName	Specifies the external (non-Microsoft® Windows®) user name.
Flags	Reserved for internal use only.
WindowsDomainName	Specifies the Microsoft Windows domain name.
WindowsUserName	Specifies the Microsoft Windows user name.

Public Methods

Method	Description
Create	Creates the mapping.
Delete	Deletes the mapping.
Disable	Disables the mapping.
Enable	Enables the mapping.

See Also

ISSOMapping Interface

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping Properties

The properties of the **ISSOMapping** interface are listed in the following table. For a complete list of **ISSOMapping** interface members, see ISSOMapping Members.

Public Properties

Property	Description
ApplicationName	Specifies the name of the application.
ExternalUserName	Specifies the external (non-Microsoft® Windows®) user name.
Flags	Reserved for internal use only.
WindowsDomainName	Specifies the Microsoft Windows domain name.
WindowsUserName	Specifies the Microsoft Windows user name.

See Also

ISSOMapping Interface

Programming with Enterprise Single Sign-On

ISSOMapping.ApplicationName Property

The **ApplicationName** property specifies the name of the application.

Get method:

C++

```
HRESULT ISSOMapping::get_ApplicationName(
  BSTR* ApplicationName
);
```

Put method:

VB

```
HRESULT ISSOMapping::put_ApplicationName(
  BSTR ApplicationName
);
```

```
Property ApplicationName() As String
```

Parameters

ApplicationName [C++]
  [in] When putting the property, a string that contains the application name.
  [out, retval] When getting the property, a string used to return the application name.

[Visual Basic] None.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface

ISSOMapping Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.ExternalUserName Property

The **ExternalUserName** property specifies the external (non-Microsoft Windows) user name.

Get method:

C++

```
HRESULT ISSOMapping::get_ExternalUserName(
  BSTR* ExternalUserName
);
```

Put method:

VB

```
HRESULT ISSOMapping::put_ExternalUserName(
  BSTR ExternalUserName
);
```

```
Property ExternalUserName() As String
```

Parameters

ExternalUserName [C++]
[in] When putting the property, a string that contains the external user name.
[out, retval] When getting the property, a string used to return the external user name.

[Visual Basic] None.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface

ISSOMapping Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.Flags Property

The **Flags** property is reserved for internal use only.

Get method:

C++

```
HRESULT ISSOMapping::get_Flags(
  BSTR* Flags
);
```

Put method:

VB

```
HRESULT ISSOMapping::put_Flags(
  BSTR Flags
);
```

```
Property Flags() As String
```

Parameters

Flags [C++]
  [in] When putting the property, a string that contains the flag value.
  [out, retval] When getting the property, a string used to return the flag value.

[Visual Basic] None.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface

ISSOMapping Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.WindowsDomainName Property

The **WindowsDomainName** property specifies the Microsoft Windows domain name.

Get method:

C++

```
HRESULT ISSOMapping::get_WindowsDomainName(
  BSTR* WindowsDomainName
);
```

Put method:

VB

```
HRESULT ISSOMapping::put_WindowsDomainName(
  BSTR WindowsDomainName
);
```

```
Property WindowsDomainName() As String
```

Parameters

WindowsDomainName [C++]
  [in] When putting the property, a string that contains the Windows domain name.
  [out, retval] When getting the property, a string used to return the Windows domain name.

[Visual Basic] None.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface

ISSOMapping Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.WindowsUserName Property

The **WindowsUserName** property specifies the Microsoft Windows user name.

Get method:

C++

```
HRESULT ISSOMapping::get_WindowsUserName(
  BSTR* WindowsUserName
);
```

Put method:

VB

```
HRESULT ISSOMapping::put_WindowsUserName(
  BSTR WindowsUserName
);
```

```
Property WindowsUserName() As String
```

Parameters

WindowsUserName [C++]
[in] When putting the property, a string that contains the Windows user name.
[out, retval] When getting the property, a string used to return the Windows user name.

[Visual Basic] None.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface

ISSOMapping Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping Methods

The methods of the **ISSOMapping** interface are listed in the following table. For a complete list of **ISSOMapping** interface members, see ISSOMapping Members.

Public Methods

Method	Description
Create	Creates the mapping.
Delete	Deletes the mapping.
Disable	Disables the mapping.
Enable	Enables the mapping.

See Also

ISSOMapping Interface

Programming with Enterprise Single Sign-On

ISSOMapping.Create Method

The **Create** method creates the mapping.

C++

```
HRESULT Create(
  LONG  lFlags
);
```

[Visual Basic]

```
Sub Create(
  lFlags As Long
)
```

Parameters

lFlags [C++]
  For the current release, *lFlags* can be set to SSO_FLAG_REFRESH only.
lFlags [Visual Basic]
  For the current release, *lFlags* can be set to SSO_FLAG_REFRESH only.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface

ISSOMapping Members

Programming with Enterprise Single Sign-On

ISSOMapping.Delete Method

The **Delete** method deletes the mapping.

C++

```
HRESULT Delete();
```

[Visual Basic]

```
Sub Delete()
```

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

After the mapping has been deleted, the mapping object can no longer be used and should be released.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface

ISSOMapping Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.Disable Method

The **Disable** method disables the mapping.

C++

```
HRESULT Disable();
```

[Visual Basic]

```
Sub Disable()
```

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface

ISSOMapping Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.Enable Method

The **Enable** method enables the mapping.

C++

```
HRESULT Enable(
  LONG  lFlags
);
```

[Visual Basic]

```
Sub Enable(
  lFlags As Long
)
```

Parameters

lFlags [C++]
Not currently implemented.
lFlags [Visual Basic]
Not currently implemented.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic]Not applicable.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the **Number** property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface

ISSOMapping Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSONotification Interface

The **ISSONotification** interface handles password changes to and from the client and server.

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSONotification Members

Programming with Enterprise Single Sign-On

ISSONotification Members

The following table shows the **ISSONotification** members.

Public Methods

Member	Description
InitializeAdapter	Initializes the password sync adapter to the ENTSSO system.
SendNotification	Sends a notification, such as a password change, from the adapter to the ENTSSO system.
ReceiveNotification	Receives a notification from the ENTSSO system, such as password changes.
ShutdownAdapter	Indicates that the password sync adapter is shutting down.

See Also

ISSONotification Interface

Programming with Enterprise Single Sign-On

ISSONotification Methods

The method of the **ISSONotification** interface is listed in the following table. For a complete list of **ISSONotification** interface members, see ISSONotification Members.

Public Methods

Member	Description
InitializeAdapter	Initializes the password sync adapter to the ENTSSO system.
SendNotification	Sends a notification, such as a password change, from the adapter to the ENTSSO system.
ReceiveNotification	Receives a notification from the ENTSSO system, such as password changes.
ShutdownAdapter	Indicates that the password sync adapter is shutting down.

See Also

ISSONotification Interface

Programming with Enterprise Single Sign-On

ISSONotification.InitializeAdapter Method

Initializes the password sync adapter to the ENTSSO system.

C++

```
HRESULT InitializeAdapter(
  BSTR  bstrAdapterName,
  ULONG  ulFlags,
  ULONGLONG*  phNotifyEvent,
  GUID  pguidTrackingId
);
```

Parameters

bstrAdapterName [C++]
[in] The unique adapter name.
ulFlags [C++]
[in] A bitwise combination of the SSO_NOTIFICATION_FLAG values.
phNotifyEvent [C++]
[out] When this method returns, contains an event handle created by PS Helper. You should cast the return value to a HANDLE on return, as MIDL does not support the HANDLE data type. This parameter can be NULL if the event handle is not required by the adapter.
pguidTrackingId [C++]
[out] When this method returns, contains the tracking ID generated by ENTSSO. The tracking ID is used for auditing purposes. This parameter can be NULL if the tracking ID is not required by the adapter.

Return Value

[C++] This method returns an HRESULT indicating whether it completed correctly. For more information, see the Error Values section.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

Value	Description
S_OK	The initialization was successful.
S_FALSE	The initialization was successful, but was a reconnect. For more information, see the Remarks section.
E_ACCESSDENIED	Access is denied.
ENTSSO_E_NO_SERVER	Could not contact the ENTSSO server. Check that the ENTSSO service is running.

Remarks

Before calling **InitializeAdapter**, you must have entered the relevant adapter name into ENTSSO.

InitializeAdapter should be the first method your adapter calls, because you cannot call any other **ISSONotification** methods before you call **InitializeAdapter**. You should not call **InitializeAdapter** again until after you call **ShutdownAdapter**. Once you shut down the adapter, however, you may call **InitializeAdapter** at any time to reconnect.

InitializeAdapter initiates communication between the PS Helper and the adapter. When your adapter calls **InitializeAdapter**, the PS Helper calls the Enterprise Single Sign-On (ENTSSSO) service over encrypted LRPC. Using the adapter name, the ENTSSO service grants or denies access based on the access account that was defined for the current adapter.

You must have started the ENTSSO service before calling **InitializeAdapter**. PS Helper cannot automatically start ENTSSO because the adapter process might not be running with sufficient privileges to start a service. Therefore, your adapter must initiate all communication between the adapter and ENTSSO.

PS Helper first establishes a connection with the ENTSSO service, and then creates a named event. PS Helper then passes the named event to the ENTSSO service. ENTSSO uses the event signal to the PS Helper when a notification arrives for the adapter. ENTSSO returns the event to the adapter so that the adapter can wait on the event, or else ignore the event and allow PS Helper to wait instead. This gives more flexibility to the adapter for the adapter threading model. The event is valid for the adapter until ENTSSO completes the processing initiated by a call to **ShutdownAdapter**.

The ENTSSO service accepts the initial remote procedure call (RPC) call from the PS Helper if ENTSSO is running. ENTSSO then performs an access check. If ENTSSO is unable to access the database to obtain the adapter configuration information, then ENTSSO returns an E_ACCESSDENIED event. If ENTSSO has the adapter configuration information, but cannot currently contact the database, then ENTSSO continues to accept password change notifications and buffers the notifications locally and encrypt the notifications in a local temporary file.

InitializeAdapter also returns E_ACCESSDENIED if the adapter is deleted or disabled.

For all errors, more detailed information will be available in the Windows Event Log.

InitializeAdapter is single-threaded. All other threads calling **InitializeAdapter** are blocked until **InitializeAdapter** has completed. It is also synchronized with the **ShutdownAdapter** method.

It is possible that the adapter process terminates before you can issue a **ShutdownAdapter**. In this case, and if ENTSSO receives another **InitializeAdapter** before ENTSSO receives a corresponding **ShutdownAdapter**, ENTSSO treats the second **ShutdownAdapter** call as a reconnect. In this case, ENTSSO cleans up and invalidates the existing event, and creates a new handle. ENTSSO also completes any pending **ReceiveNotifications** for the old event handle with a shutdown notification.

In the case of a reconnect, a new tracking ID is returned from the **InitializeAdapter**. ENTSSO returns a new tracking ID because the tracking ID returned from **InitializeAdapter** can be considered a session ID. Further, ENTSSO reissues any pending (but unconfirmed) notifications to the adapter.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSONotification Interface

ISSONotification Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSONotification.SendNotification Method

Sends a notification, such as a password change, from the adapter to the ENTSSO system.

C++

```
HRESULT SendNotification(
  BSTR  bstrAdapterName,
  SSendNotification  SendNotification,
  GUID  pguidTrackingId
);
```

Parameters

bstrAdapterName [C++]
[in] The unique adapter name.
SendNotification [C++]
[in] The notification to send to ENTSSO.
pguidTrackingId [C++]
[out] When this method returns, contains the tracking ID generated by ENTSSO. You can use the tracking ID for auditing purposes or to correlate request responses. May be NULL.

Return Value

[C++] This method returns an HRESULT indicating whether it completed correctly. For more information, see the Error Values section.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

Value	Description
S_OK	The method was successful.
E_ACCESSDENIED	Access is denied.
ENTSSO_E_NO_SERVER	Could not contact the ENTSSO server. Check that the ENTSSO service is running.
ENTSSO_E_WRONG_STATE	This method has been called in the wrong state.
ENTSSO_E_INVALID_NOTIFICATION	Invalid notification type.

Remarks

You can use **SendNotification** to send password changes and other notifications to the ENTSSO system.

If **SendNotification** returns S_OK, this does not mean that a password change was completed on the destination system. Instead, receiving an S_OK means ENTSSO has accepted and eventually will complete your request.

A password change from an external system can have several consequences:

- If a partial password sync is configured, then the SSO database might be updated, if a current mapping exists for the external account.
- If a full password sync is configured, then the password change might also be made to a Windows account.

If the external account has no current mapping in the SSO database, the password change might have no effect.

The password change complete notification is issued when the password change is considered complete from the ENTSSO point-of-view, which as discussed above, could mean different things. In some cases, it could mean no change was done, that only the SSO database was updated, or that the Windows password was changed.

Note that password change complete notifications sent back to the adapter are not completely reliable. Under some error conditions, Single Sign-On may never actually receives the requested notifications.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSONotification Interface

ISSONotification Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSONotification.ReceiveNotification Method

Receives a notification from the ENTSSO system, such as password changes.

C++

```
HRESULT ReceiveNotification(
  BSTR  bstrAdapterName,
  ULONG  ulNotificationFlagsIn,
  SReceiveNotification*  pReceiveNotification,
  GUID  pguidTrackingId
);
```

Parameters

bstrAdapterName [C++]
[in] The unique adapter name.
ulNotificationFlagsIn [C++]
[in] The notification flags to control this notification, from the SSO_NOTIFICATION_FLAG enumeration.
pReceiveNotification [C++]
[in] Pointer for the received notification.
pguidTrackingId [C++]
[out] The tracking ID. The ENTSSO system will generate a tracking ID and return it to the caller. The tracking ID is used for auditing purposes and can also be used by the adapter to correlate responses to requests. This parameter can be NULL if the tracking ID is not required by the adapter.

Return Value

[C++] This method returns an HRESULT indicating whether it completed correctly. For more information, see the Error Values section.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

Value	**Description**
S_OK	The method was successful.
E_ACCESSDENIED	Access is denied.
ENTSSO_E_NO_SERVER	Could not contact the ENTSSO server. Check that the ENTSSO service is running.
ENTSSO_E_NO_NOTIFICATIONS	There are no notifications to be received.
ENTSSO_E_WRONG_STATE	This method has been called in the wrong state.

Remarks

You can use **ReceiveNotification** to receive both password changes and other notifications from the ENTSSO system.

You may call **ReceiveNotification** with or without a WAIT flag. If you specify the WAIT flag, **ReceiveNotification** blocks until a notification is available. Doing so enables you to determine if you want to dedicate a thread for receiving notifications from the ENTSSO service, or whether you want to use the event handle returned from **InitializeAdapter** to perform your own waits, shared with other events.

If **ReceiveNotification** is waiting when you call ShutdownAdapter, then **ReceiveNotification** returns a SHUTDOWN notification as the last notification. The SHUTDOWN notification preempts any other pending notifications.

It is possible that multiple threads could be calling **ReceiveNotification** for the same adapter name. In this case, the request is single-threaded at the ENTSSO service, and only one **ReceiveNotification** completes with valid information. The threads complete with either the next notification or NONE. The reason is that each of these threads waits for the same event.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSONotification Interface

ISSONotification Members

Programming with Enterprise Single Sign-On

ISSONotification.ShutdownAdapter Method

Indicates that the password sync adapter is shutting down.

C++

```
HRESULT ShutDownAdapter(
  BSTR  bstrAdapterName,
  GUID  pguidTrackingId
);
```

Parameters

bstrAdapterName [C++]
[in] The unique adapter name.
pguidTrackingId [C++]
[out] When this method returns, contains the tracking ID. The tracking ID is the same tracking ID that ENTSSO returns in the initialization process, which you can use for auditing purposes. May be NULL.

Return Value

[C++] This method returns an HRESULT indicating whether it completed correctly. For more information, see the Error Values section.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

Value	Description
S_OK	The shutdown was successful.
E_ACCESSDENIED	Access is denied.
ENTSSO_E_NO_SERVER	Could not contact the ENTSSO server. Check that the ENTSSO service is running.
ENTSSO_E_WRONG_STATE	This method has been called in the wrong state.

Remarks

ShutdownAdapter should be the last method you call. You may call neither SendNotification nor ReceiveNotification after you call **ShutdownAdapter.** The only method you may call afterward is InitializeAdapter, which initializes a new session.

Calls to **SendNotification** or **ReceiveNotification** that are in progress (on other threads) when you call **ShutdownAdapter** may receive ENTSSO_E_WRONG_STATE, although one thread calling **ReceiveNotification** receives the SHUTDOWN_COMPLETE notification.

ShutdownAdapter is single-threaded. ENTSSO blocks all other threads calling **ShutdownAdapter** until **ShutdownAdapter** has completed. **ShutdownAdapter** is also synchronized with the **InitializeAdapter** method.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSONotification Interface

ISSONotification Members

Programming with Enterprise Single Sign-On

ISSOTicket Interface

The **ISSPTicket** interface issues and redeems Enterprise Single Sign-On (SSO) server tickets.

> **Note** For information about using this interface within managed code, see ISSOTicket Interface.

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSOTicket Members

Programming with Enterprise Single Sign-On

ISSOTicket Members

The following table shows the **ISSOTicket** members.

Public Methods

Member	Description
IssueTicket	Issues an Enterprise Single Sign-On (SSO) server ticket for authenticating a user on an application.
RedeemTicket	Redeems an SSO server ticket that was previously issued with the **IssueTicket** method.

See Also

ISSOTicket Interface

Programming with Enterprise Single Sign-On

ISSOTicket Methods

The methods of the **ISSOTicket** interface are listed in the following table. For a complete list of **ISSOTicket** interface members, see ISSOTicket Members.

Public Methods

Method	**Description**
IssueTicket	Issues an Enterprise Single Sign-On (SSO) server ticket for authenticating a user on an application.
RedeemTicket	Redeems an SSO server ticket that was previously issued with the **IssueTicket** method.

See Also

ISSOTicket Interface

Programming with Enterprise Single Sign-On

ISSOTicket.IssueTicket Method

The **IssueTicket** method issues an Enterprise Single Sign-On (SSO) server ticket for authenticating a user on an application.

C++

```
HRESULT IssueTicket(
  LONG  lFlags,
  BSTR*  pbstrTicket
);
```

[Visual Basic]

```
Function IssueTicket(
  lFlags As Long
) As String
```

Parameters

lFlags [C++]
  [in] This parameter is ignored in the current release.
lFlags [Visual Basic]
  [in] This parameter is ignored in the current release.
pbstrTicket [C++]
  [out] Pointer to a string that receives the ticket. This is a Base64-encoded value for use in XML documents.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] String that receives the issued ticket value. This is a Base64-encoded value for use in XML documents.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

To access this method, you must be an Application User. You can only issue a ticket for yourself.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOTicket Interface

ISSOTicket Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOTicket.RedeemTicket Method

The **RedeemTicket** method redeems an Enterprise Single Sign-On (SSO) server ticket that was previously issued with the **IssueTicket** method.

C++

```
HRESULT RedeemTicket(
  BSTR  bstrApplicationName,
  BSTR  bstrTicket,
  LONG  lFlags,
  BSTR*  pbstrExternalUserName,
  SAFEARRAY  BSTR
);
```

[Visual Basic]

```
Function RedeemTicket(
  bstrApplicationName As String,
  bstrTicket As String,
  lFlags As Long,
  pbstrExternalUserName As String
) As String
```

Parameters

bstrApplicationName [C++]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrApplicationName [Visual Basic]
[in] String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.
bstrTicket [C++]
[in] String that specifies the ticket value obtained from the **IssueTicket** method.
bstrTicket [Visual Basic]
[in] String that specifies the ticket value obtained from the **IssueTicket** method.
lFlags [C++]
[in] Long integer that specifies the flags to set. Use the flag SSO_FLAG_REFRESH to indicate that the credential cache should be bypassed.
lFlags [Visual Basic]
[in] Long that specifies the flags to set. Use the flag SSO_FLAG_REFRESH to indicate that the credential cache should be bypassed.
pbstrExternalUserName [C++]
[out] Pointer to a string that receives the external user name associated with the ticket.
pbstrExternalUserName [Visual Basic]
[out] Pointer to a string that receives the external user name associated with the ticket.
BSTR [C++]
[out] String that receives the external credentials associated with the ticket. If there are no credentials, the size of the returned array is zero.

Return Value

[C++] This method returns an HRESULT indicating whether it completed successfully. For more details, see the Error Values section.

[Visual Basic] String array that returns the external credentials associated with the ticket. If there are no credentials, the size of the returned array is zero.

Error Values

[C++] This method returns an HRESULT containing one of the values in the following table.

[Visual Basic] This method indicates errors by setting the Number property of the global **Err** object to one of the values in the following table.

Value	Description
S_OK	The method succeeded.
E_ACCESSDENIED	Access is denied to the caller.
E_INVALIDARG	An invalid parameter was detected.

Remarks

Because the credentials are returned in plain text by this method, the caller should be careful to clear (overwrite) them as soon as possible after use.

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an Application Administrator.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOTicket Interface

ISSOTicket Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SAdapter Structure

Describes an adapter.

C++

```
public: __value struct SAdapter
```

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

SAdapter Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SAdapter Members

The following table shows the **SAdapter** members.

Public Fields

Field	Description
bstrAdapterName	String containing the adapter name.

See Also

SAdapter Structure

Programming with Enterprise Single Sign-On

SAdapter Fields

The fields of the **SAdapter** interface is listed in the following table. For a complete list of **SExternal** interface members, see SAdapter Members.

Public Fields

Field	Description
bstrAdapterName	String containing the adapter name.

See Also

SAdapter Structure

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SAdapter.bstrAdapterName Field

String containing the adapter name.

C++

```
public: BSTR bstrAdapterName;
```

Remarks

You must free the string after use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SAdapter Structure

SAdapter Members

Programming with Enterprise Single Sign-On

SAdapterInGroup Structure

Describes the names of one or more adapters in a group.

C++

```
public: __value struct SAdapterInGroup
```

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

SAdapterInGroup Members

Single Sign-On Programmer's Guide

SAdapterInGroup Members

The following table shows the **SAdapterInGroup** members.

Public Fields

Field	Description
psaAdapters	Pointer to a SafeArray of adapter names in the group.

See Also

SAdapterInGroup Structure

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SAdapterInGroup Fields

The fields of the **SAdapterInGroup** interface are listed in the following table. For a complete list of **SExternal** interface members, see SAdapterInGroup Members.

Public Fields

Field	Description
psaAdapters	Pointer to a SafeArray of adapter names in the group.

See Also

SAdapterInGroup Structure

Programming with Enterprise Single Sign-On

SAdapterInGroup.psaAdapters Field

Pointer to a SafeArray of adapter names in the group.

C++

```
public: SAFEARRAY psaAdapters;
```

Remarks

This **SafeArray** must be destroyed after use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SAdapterInGroup Structure

SAdapterInGroup Members

Programming with Enterprise Single Sign-On

SExternalAccount Structure

Describes an external account.

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

SExternalAccount Members

Programming with Enterprise Single Sign-On

SExternalAccount Members

The following table shows the **SExternal** members.

Public Fields

Field	Description
bstrExternalAccount	A string describing the external account.

See Also

SExternalAccount Members

Programming with Enterprise Single Sign-On

SExternalAccount Fields

The fields of the **SExternalAccount** interface are listed in the following table. For a complete list of **SExternal** interface members, see SExternalAccount Members.

Public Fields

Field	Description
bstrExternalAccount	A string describing the external account.

See Also

SExternalAccount Structure

Programming with Enterprise Single Sign-On

SExternalAccount.bstrExternalAccount Field

A string describing the external account.

C++

```
public: BSTR bstrExternalAccount;
```

Remarks

BSTR must be freed after use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SExternalAccount Structure

SExternalAccount Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SPasswordChange Structure

Describes change to a password.

C++

```
public: __value struct SPasswordChange
```

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

SPasswordChange Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SPasswordChange Members

The following table shows the **SPasswordChange** members.

Public Fields

Field	Description
bstrExternalAccount	A string describing the external account.
psaNewExternalPassword	Pointer to a SafeArray of new external credentials.
psaOldExternalPassword	Pointer to a SafeArray of new external credentials.
ullTimestamp	An integer containing a UTC timestamp in FILETIME format.

See Also

SPasswordChange Structure

Programming with Enterprise Single Sign-On

SPasswordChange Fields

The fields of the **SPasswordChange** interface are listed in the following table. For a complete list of **SExternal** interface members, see SPasswordChange Members

Public Fields

Field	**Description**
bstrExternalAccount	A string describing the external account.
psaNewExternalPassword	A string containing the new external credentials.
psaOldExternalPassword	A string containing the new external credentials.
ullTimeStamp	An integer containing a UTC timestamp in FILETIME format.

See Also

SPasswordChange Structure

Programming with Enterprise Single Sign-On

SPasswordChange.bstrExternalAccount Field

A string describing the external account.

C++

```
public: BSTR bstrExternalAccount;
```

[Visual Basic]

```
Public bstrExternalAccount as String
```

Remarks

BSTR must be freed after use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SPasswordChange Structure

SPasswordChange Members

Programming with Enterprise Single Sign-On

SPasswordChange.psaNewExternalPassword Field

A string containing the new external credentials.

C++

```
public: BSTR psaNewExternalCredentials;
```

Remarks

Must be freed after use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SPasswordChange Structure

SPasswordChange Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SPasswordChange.psaOldExternalPassword Field

A string containing the new external credentials.

C++

```
public: BSTR psaOldExternalCredentials;
```

Remarks

Can be NULL. Must be freed after use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SPasswordChange Structure

SPasswordChange Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SPasswordChange.ullTimeStamp Field

An integer containing a UTC timestamp in FILETIME format.

C++

```
public: ULONGLONG ullTimeStamp;
```

Remarks

If zero, then Enterprise Single Sign-On (ENTSSO) uses the current time.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SPasswordChange Structure

SPasswordChange Members

Programming with Enterprise Single Sign-On

SPasswordChangeComplete Structure

Describes when a change to a password has been completed.

C++

```
public: __value struct SPasswordChangeComplete
```

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

SPasswordChangeComplete Members

Programming with Enterprise Single Sign-On

SPasswordChangeComplete Members

The following table shows the **SPasswordChangeComplete** members.

Public Fields

Field	Description
guidTrackingId	A GUID containing the tracking ID from the original PASSWORD_CHANGE.
ullErrorCode	An integer containing an error code.
bstrErrorMessage	A string containing an error message.

See Also

SPasswordChangeComplete Structure

Programming with Enterprise Single Sign-On

SPasswordChangeComplete Fields

The fields of the **SPasswordChangeComplete** interface is listed in the following table. For a complete list of **SExternal** interface members, see SPasswordChangeComplete Members.

Public Fields

Field	**Description**
guidTrackingId	A GUID containing the tracking ID from the original PASSWORD_CHANGE.
ullErrorCode	An integer containing an error code.
bstrErrorMessage	A string containing an error message.

See Also

SPasswordChangeComplete Structure

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SPasswordChangeComplete.guidTrackingId Field

A GUID containing the tracking ID from the original PASSWORD_CHANGE.

C++

```
public: GUID guidTrackingId;
```

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SPasswordChangeComplete Structure

SPasswordChangeComplete Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SPasswordChangeComplete.ullErrorCode Field

An integer containing an error code.

C++

```
public: ULONGLONG ullErrorCode;
```

Remarks

The string must be freed after use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SPasswordChangeComplete Structure

SPasswordChangeComplete Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SPasswordChangeComplete.bstrErrorMessage Field

A string containing an error message.

C++

```
public: BSTR bstrErrorMessage;
```

Remarks

Can be NULL. BSTR must be freed after use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SPasswordChangeComplete Structure

SPasswordChangeComplete Members

Programming with Enterprise Single Sign-On

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

SSO_NOTIFICATION_TYPE Enumeration

Specifies the different notification types used for Enterprise Single Sign-On (SSO).

VB

```
<Serializable>
Public Enum SSO_NOTIFICATION_FLAG
[C#]
[Serializable]
public enum SSO_NOTIFICATION_FLAG
[C++]
[Serializable]
__value public enum SSO_NOTIFICATION_FLAG
[JScript]
public
   Serializable
enum SSO_NOTIFICATION_FLAG
```

Members

Member Name	Value	Description
SSO_NOTIFICATION_TYPE_NONE	0x00000000	No notifications are pending. This notification type is supported by group adapters. It is not necessary to confirm this notification.
SSO_NOTIFICATION_TYPE_SHUTDOWN	0x00000001	The ENTSSO service requires the adapter to shutdown. The adapter should respond by calling ISSONotification.ShutdownAdapter Method. This notification type is supported by group adapters. It indicates that the group adapter only should shut down. Each individual adapter that is part of the adapter group gets its own SHUTDOWN notification. It is not necessary to confirm this notification.
SSO_NOTIFICATION_TYPE_SHUTDOWN_COMPLETE	0x00000002	The ENTSSO service has processed the **ShutdownAdapter** method. This is the last notification that is received by the adapter using the current event handle. This notification type is supported by group adapters. It is not necessary to confirm this notification.

SSO_NOTIFICATION_TYPE_PASSWORD_CHANGE	0x00000003	A password has changed. When sending a password change from an adapter to ENTSSO, the password change is considered to be accepted, and durable, on return from the notification to ENTSSO through SendNotification. That does not indicate that the password change is complete, but rather that it has been accepted, is durable, and is likely to be accomplished. Under some error conditions queues could fill up, in which case older password changes could be discarded. In general, you should perform more recent password changes than older ones. An adapter should make password changes received through ReceiveNotification, The adapter should make that change durable or effect the change immediately. The adapter should then call **SendNotification** with PASSWORD_CHANGE_COMPLETE for that password change to delete it from the database queue. This notification type is not supported by group adapters. An adapter must confirm this notification. It is optional for ENTSSO to confirm this notification.
SSO_NOTIFICATION_TYPE_PASSWORD_CHANGE_COMPLETE	0x00000004	The ENTSSO service completed the password change. Note that the definition of complete may vary depending on what is configured. You can use the tracking ID to correlate the original request with the response. This notification type is not supported by group adapters. It is not necessary to confirm this notification.
SSO_NOTIFICATION_TYPE_PASSWORD_EXPIRED	0x00000005	The password for an account has expired. For ENTSSO, this causes the stored password for this account to be flagged as **expired**. This notification type is not supported by group adapters. It is necessary for an adapter to confirm this notification. It is optional for ENTSSO to confirm this notification.
SSO_NOTIFICATION_TYPE_STATUS_REQUEST	0x00000006	An inquiry regarding the status of the adapter or ENTSSO service, or as a response. If the ENTSSO service detects that a password sync adapter has not sent any password changes for some time, it may send a STATUS notification to that adapter as a "keep alive". The adapter should respond with a STATUS_ONLINE or STATUS_OFFLINE notification. This notification type is supported by group adapters. It applies only for the status of the group adapter, not for the adapters within the adapter group. It is not necessary to confirm this notification.
SSO_NOTIFICATION_TYPE_STATUS_ONLINE	0x00000007	The status of an adapter or ENTSSO service is online. If the ENTSSO service detects that a password sync adapter has not sent any password changes for some time, it may send a STATUS notification to that adapter as a "keep alive". If online, the adapter should respond with a STATUS_ONLINE. If the adapter detects that it is offline, it can send these notifications unsolicited. This notification type is supported by group adapters. It applies only for the status of the group adapter, not for the adapters within the adapter group. It is not necessary to confirm this notification.

SSO_NOTIFICATION_TYPE_STATUS_OFFLINE	0x00000008	The adapter or ENTSSO service is offline. If the ENTSSO service detects that a password sync adapter has not sent any password changes for some time, it may send a STATUS notification to that adapter as a "keep alive". If your adapter is offline, it should respond with a STATUS_OFFLINE notification. If the adapter detects that it is offline, it can send these notifications unsolicited. This notification type is supported by group adapters. It applies only for the status of the group adapter, not for the adapters within the adapter group. It is not necessary to confirm this notification.
SSO_NOTIFICATION_TYPE_ADAPTERS_IN_GROUP	0x00010000	An adapter is contained within a specified adapter group. It is one of the first notifications received by a group adapter after initialization. The adapter names are contained within the "new external credentials array" parameter. If there are a very large number of adapters in this adapter group, it is possible that this notification is received by the group adapter more than once with the remaining adapter names. This notification type is only issued to group adapters. It is not necessary to confirm this notification.
SSO_NOTIFICATION_TYPE_ADD_ADAPTER	0x00010001	An adapter has been added to the adapter group. The adapter name that has been added is contained within the "notification string" parameter. This notification type is only issued to group adapters. It is not necessary to confirm this notification.
SSO_NOTIFICATION_TYPE_DELETE_ADAPTER	0x00010002	An adapter has been deleted from the adapter group. The adapter name that has been deleted is contained within the "notification string" parameter. This notification type is only issued to group adapters. It is not necessary to confirm this notification.

Remarks

There is no online or offline notification for adapters to the group adapter. This is because control of the individual adapters is handled by each adapter itself.

In general, the notifications that require confirmation are those that are durable in the database queue. The other notifications are control and status information which are transient. Notifications that require confirmation have one of the confirm flags set.

There is no notification to or from the adapter about enabled or disabled status. This is because the enable and disable is handled by the enable and disable of the underlying configuration store application. Thus, when the adapter is disabled by an administrator, the adapter receives access denied messages from all calls to ENTSSO.

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

Programming with Enterprise Single Sign-On

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SSO_NOTIFICATION_FLAG Enumeration

Specifies the different types of flags used for Enterprise Single Sign-On (SSO).

VB

```
<Serializable>
Public Enum SSO_NOTIFICATION_FLAG
[C#]
[Serializable]
public enum SSO_NOTIFICATION_FLAG
[C++]
[Serializable]
__value public enum SSO_NOTIFICATION_FLAG
[JScript]
public
   Serializable
enum SSO_NOTIFICATION_FLAG
```

Remarks

The following table describes the possible values for the notification flags.

Members

Member Name	Value	Description
SSO_NOTIFICATION_FLAG_NONE	0x00000000	Null value.
SSO_NOTIFICATION_FLAG_ADMIN_CHANGE	0x00000001	The password change was a result of an administrator action.
SSO_NOTIFICATION_FLAG_CONFIRM_POSITIVE	0x00000002	A notification is required when the password change is complete.
SSO_NOTIFICATION_FLAG_CONFIRM_NEGATIVE	0x00000004	A notification is required when the password change is complete.
SSO_NOTIFICATION_FLAG_TEST	0x00000008	The current notification is a test request.
SSO_NOTIFICATION_FLAG_AUDIT	0x00000010	The current request requires auditing.
SSO_NOTIFICATION_FLAG_WINDOWS	0x00000020	Reserved for internal use.
SSO_NOTIFICATION_FLAG_WAIT	0x00000040	**ReceiveNotification** should block and wait until a notification is available.

Requirements

Type Library: SSOPSHelper 1.0 Type Library (SSOPSHelper.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows XP Professional, Windows 2000

See Also

Programming with Enterprise Single Sign-On

SStatus Structure

Describes the current status.

C++

```
public: __value struct SStatus
```

Requirements

Type Library: SSOLookup 1.0 Type Library (SSOLookup.dll)

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

SStatus Members

Programming with Enterprise Single Sign-On

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SStatus Members

The following table shows the **SStatus** members.

Public Fields

Field	Description
ullErrorCode	An integer that contains an error code.
bstrErrorMessage	A string that contains an error message.

See Also

SStatus Members.

Programming with Enterprise Single Sign-On

SStatus Fields

The fields of the **SStatus** interface are listed in the following table. For a complete list of **SExternal** interface members, see SStatus Members.

Public Fields

Field	Description
ullErrorCode	An integer that contains an error code.
bstrErrorMessage	A string that contains an error message.

See Also

SStatus Structure

Programming with Enterprise Single Sign-On

SStatus.ullErrorCode Field

An integer that contains an error code.

C++

```
public: ULONGLONG ullErrorCode;
```

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SStatus Structure

SStatus Members

Programming with Enterprise Single Sign-On

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SStatus.bstrErrorMessage Field

A string that contains an error message.

C++

```
public: BSTR bstrErrorMessage;
```

Remarks

bstrErrorMessage Can be NULL. You must free **bstrEerrorMessage** after every use.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

SStatus Structure

SStatus Members

Programming with Enterprise Single Sign-On

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Microsoft.BizTalk.SSOClient.Interop Namespace

The **Microsoft.BizTalk.SSOClient.Interop** namespace contains Enterprise Single Sign-On (SSO) server classes that manage the mapping of users to applications.

Microsoft.BizTalk.Interop.SSOClient Hierarchy

Interfaces

Interface	Description
ISSOAdmin	Provides administration functions for the Enterprise Single Sign-On (SSO) server database.
ISSOConfigStore	Provides administration functions for the Enterprise Single Sign-On (SSO) configuration store.
ISSOLookup1	Provides a lookup for user credentials associated with an application.
ISSOLookup2	Provides a lookup for user credentials associated with an application.
ISSOMapper	Creates mappings between users and applications.
ISSOMapping	Manages the state of a mapping instance.
ISSOTicket	Issues and redeems Enterprise Single Sign-On (SSO) server tickets.

ISSOAdmin Interface

The **ISSOAdmin** interface provides administration functions for the Enterprise Single Sign-On (SSO) server database.

For a list of all members of this type, see ISSOAdmin Members.

VB

```
<Guid("C177306C-A7A0-49E1-901E-D2BDFCFF4532")>
<InterfaceType(ComInterfaceType.InterfaceIsDual)>
Public Interface ISSOAdmin
[C#]
[Guid("C177306C-A7A0-49E1-901E-D2BDFCFF4532")]
[InterfaceType(ComInterfaceType.InterfaceIsDual)]
public interface ISSOAdmin
[C++]
[Guid("C177306C-A7A0-49E1-901E-D2BDFCFF4532")]
[InterfaceType(ComInterfaceType::InterfaceIsDual)]
public __gc __interface ISSOAdmin
[JScript]
public
   Guid("C177306C-A7A0-49E1-901E-D2BDFCFF4532")
   InterfaceType(ComInterfaceType.InterfaceIsDual)
interface ISSOAdmin
```

Note For information about using this interface within COM-based code, see ISSOAdmin Interface.

Requirements

Namespace: Microsoft.BizTalk.SSOClient.Interop Namespace

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Host Integration Server SSOClient Interop (in Microsoft.BizTalk.Interop.SSOclient.dll)

See Also

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOAdmin Members

Public Methods

Member	Description
CreateApplication	Creates an application in the Single Sign-On (SSO) server database.
CreateFieldInfo	Creates field information for an application.
DeleteApplication	Deletes an application from the SSO server database.
GetApplicationInfo	Gets the application information from the SSO server database.
GetGlobalInfo	Returns the global SSO server configuration information from the SSO server database.
PurgeCacheForApplication	Purges the cached credentials for an application on all SSO servers.
UpdateApplication	Updates the application information in the SSO server database.
UpdateGlobalInfo	Updates the global SSO server configuration information in the SSO server database.

See Also

ISSOAdmin Interface

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOAdmin Methods

The methods of the **ISSOAdmin** interface are listed in the following table. For a complete list of **ISSOAdmin** interface members, see ISSOAdmin Members.

Public Methods

Method	Description
CreateApplication	Creates an application in the Single Sign-On (SSO) server database.
CreateFieldInfo	Creates field information for an application.
DeleteApplication	Deletes an application from the SSO server database.
GetApplicationInfo	Gets the application information from the SSO server database.
GetGlobalInfo	Returns the global SSO server configuration information from the SSO server database.
PurgeCacheForApplication	Purges the cached credentials for an application on all SSO servers.
UpdateApplication	Updates the application information in the SSO server database.
UpdateGlobalInfo	Updates the global SSO server configuration information in the SSO server database.

See Also

ISSOAdmin Interface

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOAdmin.CreateApplication Method

The **CreateApplication** method creates an application in the Enterprise Single Sign-On (SSO) server database.

VB

```
Sub CreateApplication( _
   ByVal applicationName As String, _
   ByVal description As String, _
   ByVal contactInfo As String, _
   ByVal userGroupName As String, _
   ByVal adminGroupName As String, _
   ByVal flags As Integer, _
   ByVal numFields As Integer _
)
[C#]
void CreateApplication(
   string applicationName,
   string description,
   string contactInfo,
   string userGroupName,
   string adminGroupName,
   int flags,
   int numFields
);
[C++]
void CreateApplication(
   String* applicationName,
   String* description,
   String* contactInfo,
   String* userGroupName,
   String* adminGroupName,
   int flags,
   int numFields
);
[JScript]
function CreateApplication(
   applicationName : String,
   description : String,
   contactInfo : String,
   userGroupName : String,
   adminGroupName : String,
   flags : int,
   numFields : int
);
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case is preserved. For example, ABC, abc, and AbC are considered to be the same application.

description
String that specifies the description for the application. This parameter can be NULL, an empty string, or contain spaces.

contactInfo
String that specifies the contact information for this application. This parameter can be NULL, an empty string, or contain spaces.

userGroupName
String that specifies the Application Users group name. This parameter must contain a valid global group.

adminGroupName
String that specifies the Application Administrator group name. This parameter must contain a valid global group.

flags
Integer that specifies whether the application is a group application or not. If a group application is required, specify SSO_FLAG_APP_USES_GROUP_MAPPING, as described in Enterprise Single Sign-On Flags.

numFields

Integer that specifies the number of fields that are added for this application. The minimum value is 1 (one external user ID). An application can have no credential fields.

Return Value

None

Remarks

An application is always created as disabled.

After the field information is added by using the CreateFieldInfo method, the application can be enabled by using the UpdateApplication method. The number of fields added by **CreateFieldInfo** must match the number of fields specified by the *numFields* parameter. The *numFields* value cannot be changed after the application is created.

To access this method, you must be an SSO Administrator or an SSO Affiliate Administrator.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOAdmin Interface

ISSOAdmin Members

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOAdmin.CreateFieldInfo Method

The **CreateFieldInfo** method creates field information for an application.

VB

```
Sub CreateFieldInfo( _
   ByVal applicationName As String, _
   ByVal label As String, _
   ByVal flags As Integer _
)
[C#]
void CreateFieldInfo(
   string applicationName,
   string label,
   int flags
);
[C++]
void CreateFieldInfo(
   String* applicationName,
   String* label,
   int flags
);
[JScript]
function CreateFieldInfo(
   applicationName : String,
   label : String,
   flags : int
);
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case is preserved. For example, ABC, abc, and AbC are considered to be the same application.

label
String that specifies the label value. This parameter cannot be NULL or an empty string.

flags
Integer that specifies whether the field is masked. If a field must be masked when displayed in the user interface, specify SSO_FLAG_FIELD_INFO_MASK, as described in Enterprise Single Sign-On Flags. The flag parameter is ignored for the first (user ID) field, because it will not be masked.

Remarks

The application must exist before its field information can be created. The number of fields added must equal the *numFields* value specified when the application was created; otherwise the application will be disabled at run time.

Although the external user ID is not considered to be an external credential, it requires a field to describe how it will be displayed by the user interface. The first field created is considered the field that describes the external user ID. A minimum of one field is required, and typically at least two fields should be specified to provide credentials. An application can have no credentials.

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an SSO Application Administrator.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOAdmin Interface

ISSOAdmin Members

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOAdmin.DeleteApplication Method

The **DeleteApplication** method deletes an application from the Enterprise Single Sign-On (SSO) server database.

VB

```
Sub DeleteApplication( _
   ByVal applicationName As String _
)
[C#]
void DeleteApplication(
   string applicationName
);
[C++]
void DeleteApplication(
   String* applicationName
);
[JScript]
function DeleteApplication(
   applicationName : String
);
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case is preserved. For example, ABC, abc, and AbC are considered to be the same application.

Remarks

All fields, mappings, and external credentials associated with this application are deleted.

To access this method, you must be an SSO Administrator or an SSO Affiliate Administrator.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOAdmin Interface

Programming with Enterprise Single Sign-On

ISSOAdmin Members

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOAdmin.GetApplicationInfo Method

The **GetApplicationInfo** method gets the application information from the Enterprise Single Sign-On (SSO) server database.

VB

```
Sub GetApplicationInfo( _
   ByVal applicationName As String, _
   <Out()> ByRef description As String, _
   <Out()> ByRef contactInfo As String, _
   <Out()> ByRef userGroupName As String, _
   <Out()> ByRef adminGroupName As String, _
   <Out()> ByRef flags As Integer, _
   <Out()> ByRef numFields As Integer _
)
[C#]
void GetApplicationInfo(
   string applicationName,
   out string description,
   out string contactInfo,
   out string userGroupName,
   out string adminGroupName,
   out int flags,
   out int numFields
);
[C++]
void GetApplicationInfo(
   String* applicationName,
   [
   Out
] String** description,
   [
   Out
] String** contactInfo,
   [
   Out
] String** userGroupName,
   [
   Out
] String** adminGroupName,
   [
   Out
] int* flags,
   [
   Out
] int* numFields
);
[JScript]
function GetApplicationInfo(
   applicationName : String,
   description : String,
   contactInfo : String,
   userGroupName : String,
   adminGroupName : String,
   flags : int,
   numFields : int
);
```

Parameters

applicationName

String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case is preserved. For example, ABC, abc, and AbC are considered to be the same application.

description

String that receives the current description for the application.

contactInfo
String that receives the current contact information for the application.
userGroupName
String that receives the current Application User group name for the application.
adminGroupName
String that receives the current Application Administrator group name for the application.
flags
Integer that receives the flags currently set for the application, as described in Enterprise Single Sign-On Flags.
numFields
Integer that receives the current number of fields associated with the application.

Remarks

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an SSO Application Administrator.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOAdmin Interface

Programming with Enterprise Single Sign-On

ISSOAdmin Members

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOAdmin.GetGlobalInfo Method

The **GetGlobalInfo** method returns the global Enterprise Single Sign-On (SSO) configuration information from the SSO server database.

VB

```
Sub GetGlobalInfo( _
   <Out()> ByRef flags As Integer, _
   <Out()> ByRef auditAppDeleteMax As Integer, _
   <Out()> ByRef auditMappingDeleteMax As Integer, _
   <Out()> ByRef auditNtpLookupMax As Integer, _
   <Out()> ByRef auditXpLookupMax As Integer, _
   <Out()> ByRef ticketTimeout As Integer, _
   <Out()> ByRef credCacheTimeout As Integer, _
   <Out()> ByRef secretServer As String, _
   <Out()> ByRef SSOAdminGroup As String, _
   <Out()> ByRef affiliateAppMgrGroup As String _
)
[C#]
void GetGlobalInfo(
   out int flags,
   out int auditAppDeleteMax,
   out int auditMappingDeleteMax,
   out int auditNtpLookupMax,
   out int auditXpLookupMax,
   out int ticketTimeout,
   out int credCacheTimeout,
   out string secretServer,
   out string SSOAdminGroup,
   out string affiliateAppMgrGroup
);
[C++]
void GetGlobalInfo(
   [
   Out
] int* flags,
   [
   Out
] int* auditAppDeleteMax,
   [
   Out
] int* auditMappingDeleteMax,
   [
   Out
] int* auditNtpLookupMax,
   [
   Out
] int* auditXpLookupMax,
   [
   Out
] int* ticketTimeout,
   [
   Out
] int* credCacheTimeout,
   [
   Out
] String** secretServer,
   [
   Out
] String** SSOAdminGroup,
   [
   Out
] String** affiliateAppMgrGroup
);
[JScript]
function GetGlobalInfo(
    flags : int,
    auditAppDeleteMax : int,
    auditMappingDeleteMax : int,
    auditNtpLookupMax : int,
    auditXpLookupMax : int,
    ticketTimeout : int,
    credCacheTimeout : int,
    secretServer : String,
    SSOAdminGroup : String,
    affiliateAppMgrGroup : String
);
```

Parameters

flags
Integer that receives one or more of the global Enterprise Single Sign-On Flags.
auditAppDeleteMax
Integer that receives the current size of the AuditAppDelete table.
auditMappingDeleteMax
Integer that receives the current size of the AuditMappingDelete table.
auditNtpLookupMax
Integer that receives the current size of the AuditNtpLookup table.
auditXpLookupMax
Integer that receives the current size of the AuditXpLookup table.
ticketTimeout
Integer that receives the current ticket time-out value in minutes.
credCacheTimeout
Integer that receives the current credential cache time-out value in minutes.
secretServer
String that receives the current secret server computer name.
SSOAdminGroup
String that receives the current SSO server Administrator group name.
affiliateAppMgrGroup
String that receives the current SSO server Affiliate Administrator group name.

Remarks

To access this method, you must be an SSO Administrator.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOAdmin Interface

Programming with Enterprise Single Sign-On

ISSOAdmin Members

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOAdmin.PurgeCacheForApplication Method

The **PurgeCacheForApplication** method purges the cached credentials for an application on all Enterprise Single Sign-On (SSO) servers.

VB

```
Sub PurgeCacheForApplication( _
   ByVal applicationName As String _
)
[C#]
void PurgeCacheForApplication(
   string applicationName
);
[C++]
void PurgeCacheForApplication(
   String* applicationName
);
[JScript]
function PurgeCacheForApplication(
   applicationName : String
);
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case is preserved. For example, ABC, abc, and AbC are considered to be the same application.

Remarks

There may be a short time delay while this operation is applied to all SSO servers.

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an Application Administrator.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOAdmin Interface

Programming with Enterprise Single Sign-On

ISSOAdmin Members

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOAdmin.UpdateApplication Method

The **UpdateApplication** method updates the application information in the Enterprise Single Sign-On (SSO) server database.

VB

```
Sub UpdateApplication( _
   ByVal applicationName As String, _
   ByVal description As String, _
   ByVal contactInfo As String, _
   ByVal userGroupName As String, _
   ByVal adminGroupName As String, _
   ByVal flags As Integer, _
   ByVal flagMask As Integer _
)
[C#]
void UpdateApplication(
   string applicationName,
   string description,
   string contactInfo,
   string userGroupName,
   string adminGroupName,
   int flags,
   int flagMask
);
[C++]
void UpdateApplication(
   String* applicationName,
   String* description,
   String* contactInfo,
   String* userGroupName,
   String* adminGroupName,
   int flags,
   int flagMask
);
[JScript]
function UpdateApplication(
   applicationName : String,
   description : String,
   contactInfo : String,
   userGroupName : String,
   adminGroupName : String,
   flags : int,
   flagMask : int
);
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case is preserved. For example, ABC, abc, and AbC are considered to be the same application.

description
String that specifies the description of the application. This is an optional parameter.

contactInfo
String that specifies the contact information for this application. This is an optional parameter.

userGroupName
String that specifies the Application Users group name. This is an optional parameter. If specified, this must be a valid global group.

adminGroupName
String that specifies the Application Administrator group name. This is an optional parameter. If specified, this must be a valid global group. If running as an Application Administrator, this parameter will be ignored.

flags
Integer that specifies whether the application is enabled. To enable the application, set the SSO_FLAG_ENABLED flag as described in Enterprise Single Sign-On Flags.

flagMask

To change the flag value, set this mask to the flag that you need to change. For example, to enable or disable Enterprise SSO, set this flag to SSO_FLAG_ENABLED. The *flagMask* parameter indicates which flag you want to change, while the *flags* parameter indicates the new value of that flag.

Remarks

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an Application Administrator

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOAdmin Interface

Programming with Enterprise Single Sign-On

ISSOAdmin Members

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOAdmin.UpdateGlobalInfo Method

The **UpdateGlobalInfo** method updates the global Enterprise Single Sign-On (SSO) server configuration information in the SSO server database.

VB

```
Sub UpdateGlobalInfo( _
   ByVal flags As Integer, _
   ByVal flagMask As Integer, _
   ByRef auditAppDeleteMax As Integer, _
   ByRef auditMappingDeleteMax As Integer, _
   ByRef auditNtpLookupMax As Integer, _
   ByRef auditXpLookupMax As Integer, _
   ByRef ticketTimeout As Integer, _
   ByRef credCacheTimeout As Integer, _
   ByVal secretServer As String, _
   ByVal SSOAdminGroup As String, _
   ByVal affiliateAppMgrGroup As String _
)
[C#]
void UpdateGlobalInfo(
   int flags,
   int flagMask,
   ref int auditAppDeleteMax,
   ref int auditMappingDeleteMax,
   ref int auditNtpLookupMax,
   ref int auditXpLookupMax,
   ref int ticketTimeout,
   ref int credCacheTimeout,
   string secretServer,
   string SSOAdminGroup,
   string affiliateAppMgrGroup
);
[C++]
void UpdateGlobalInfo(
   int flags,
   int flagMask,
   int* auditAppDeleteMax,
   int* auditMappingDeleteMax,
   int* auditNtpLookupMax,
   int* auditXpLookupMax,
   int* ticketTimeout,
   int* credCacheTimeout,
   String* secretServer,
   String* SSOAdminGroup,
   String* affiliateAppMgrGroup
);
[JScript]
function UpdateGlobalInfo(
   flags : int,
   flagMask : int,
   auditAppDeleteMax : int,
   auditMappingDeleteMax : int,
   auditNtpLookupMax : int,
   auditXpLookupMax : int,
   ticketTimeout : int,
   credCacheTimeout : int,
   secretServer : String,
   SSOAdminGroup : String,
   affiliateAppMgrGroup : String
);
```

Parameters

flags

Integer that specifies the global flags used to enable and disable the SSO server system. The only flag supported for the current release is SSO_FLAG_ENABLED, as described in Enterprise Single Sign-On Flags. This indicates that the SSO server system should be enabled. Clear this flag to disable SSO server. Other informational flags may be set by the system (when the flags are read). The global flags override the application-level flags, and the application-level flags override the mapping-level flags. When the database is created, the global information is initially marked as disabled.

flagMask

To change the flag value, set this mask to the flag that you need to change. For example, to enable or disable Enterprise SSO, set this flag to SSO_FLAG_ENABLED. The *flagMask* parameter indicates which flag you want to change, while the *flags* parameter indicates the new value of that flag.

auditAppDeleteMax

Integer that specifies the required size of the AuditAppDelete table. This value must be nonzero.

auditMappingDeleteMax

Integer that specifies the required size of the AuditMappingDelete table. This value must be nonzero.

auditNtpLookupMax

Integer that specifies the required size of the AuditNtpLookup table. This value must be nonzero.

auditXpLookupMax

Integer that specifies the required size of the AuditXpLookup table. This value must be nonzero.

ticketTimeout

Integer that specifies the required ticket time-out value in minutes. This value must be nonzero. The ticket time-out only applies to creating new tickets.

credCacheTimeout

Integer that specifies the required credential cache time-out value in minutes. This value must be nonzero. The credential cache time-out only applies when putting new credentials into the cache. Existing credentials in the cache are affected by this method.

secretServer

String that specifies the required secret server computer name. This name is not validated. If this value is incorrect, the SSO servers are unable to find the secret server. Changing the secret server can only be done when the SSO server system is disabled. It can be disabled in the same call. If the secret server is changed, the SSO servers almost immediately goes to this new server for secret information. However, if an SSO server is already running on that computer, it must be stopped and restarted before it starts the secret service. The old secret server continues to run until that SSO server is shut down manually.

SSOAdminGroup

String that specifies the required SSO server Administrator group name. This must be a valid global group name. Changing the SSO server Administrator group can only be done when the SSO server system is disabled. It can be disabled in the same call. The global information will be updated, and the permissions of the SQL Server database changed. If the SSO server administrator group is changed, all SSO servers could be denied access to the SSO server database.

affiliateAppMgrGroup

String that specifies the required SSO server Affiliate Administrator group name. This must be a valid global group name.

Remarks

All parameters are optional. If NULL is passed for a particular parameter, its value is not updated.

To access this method, you must be an SSO Administrator.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOAdmin Interface

Programming with Enterprise Single Sign-On

ISSOAdmin Members

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOConfigStore Interface

The **ISSOConfigStore** interface provides administration functions for the Enterprise Single Sign-On (SSO) configuration store.

For a list of all members of this type, see ISSOConfigStore Members.

VB

```
<Guid("846B1755-EFF2-43E3-89D6-B216E6B57507")>
<InterfaceType(ComInterfaceType.InterfaceIsDual)>
Public Interface ISSOConfigStore
[C#]
[Guid("846B1755-EFF2-43E3-89D6-B216E6B57507")]
[InterfaceType(ComInterfaceType.InterfaceIsDual)]
public interface ISSOConfigStore
[C++]
[Guid("846B1755-EFF2-43E3-89D6-B216E6B57507")]
[InterfaceType(ComInterfaceType::InterfaceIsDual)]
public __gc __interface ISSOConfigStore
[JScript]
public
   Guid("846B1755-EFF2-43E3-89D6-B216E6B57507")
   InterfaceType(ComInterfaceType.InterfaceIsDual)
interface ISSOConfigStore
```

Requirements

Namespace: Microsoft.BizTalk.SSOClient.Interop Namespace

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Microsoft.BizTalk.Interop.Ssoclient (in Microsoft.BizTalk.Interop.Ssoclient.dll)

See Also

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOConfigStore Members

The following table shows the **ISSOConfigStore** members.

Public Methods

Member	Description
DeleteConfigInfo	Deletes the configuration information from the configuration store.
GetConfigInfo	Gets the configuration information from the configuration store.
SetConfigInfo	Sets the configuration information in the configuration store.

See Also

ISSOConfigStore Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOConfigStore Methods

The methods of the **ISSOConfigStore** interface are listed in the following table. For a complete list of **ISSOConfigStore** interface members, see ISSOConfigStore Members.

Public Methods

Method	Description
DeleteConfigInfo	Deletes the configuration information from the configuration store.
GetConfigInfo	Gets the configuration information from the configuration store.
SetConfigInfo	Sets the configuration information in the configuration store.

See Also

ISSOConfigStore Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOConfigStore.DeleteConfigInfo Method

The **DeleteConfigInfo** method deletes the configuration information from the configuration store.

VB

```
Sub DeleteConfigInfo( _
   ByVal applicationName As String, _
   ByVal identifier As String _
)
[C#]
void DeleteConfigInfo(
   string applicationName,
   string identifier
);
[C++]
void DeleteConfigInfo(
   String* applicationName,
   String* identifier
);
[JScript]
function DeleteConfigInfo(
   applicationName : String,
   identifier : String
);
```

Parameters

applicationName
Contains the external application name.
identifier
Contains the identifier for the configuration info. This will typically be a GUID string.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

ISSOConfigStore Interface

ISSOConfigStore Members

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOConfigStore.GetConfigInfo Method

The **GetConfigInfo** method gets the configuration information from the configuration store.

VB

```
Sub GetConfigInfo( _
   ByVal applicationName As String, _
   ByVal identifier As String, _
   ByVal flags As Integer, _
   ByVal properties As IPropertyBag _
)
[C#]
void GetConfigInfo(
   string applicationName,
   string identifier,
   int flags,
   IPropertyBag properties
);
[C++]
void GetConfigInfo(
   String* applicationName,
   String* identifier,
   int flags,
   IPropertyBag* properties
);
[JScript]
function GetConfigInfo(
   applicationName : String,
   identifier : String,
   flags : int,
   properties : IPropertyBag
);
```

Parameters

applicationName
Contains the external application name.
identifier
Contains the identifier for the configuration info. This string is typically a GUID.
flags
A long integer containing the flags.
properties
A pointer to an empty **IPropertyBag**. The property bag is then populated with name/value pairs by Enterprise Single Sign-On.

Remarks

This method can be executed either in admin or run-time (lookup) mode. The caller specifies SSO_FLAG_LOOKUP if the run-time (lookup) mode is required. The default mode is admin mode.

In admin mode, masked properties are not returned. Instead, the property is missing. Unmasked properties are returned. Admin mode can specify any SSO server, not just the local computer.

To get the configuration info, this method is provided with an empty property bag that is populated with the properties. This allows the Host Integration Server 2004 implementation of the property bag to be used, which can handle the type conversion from BSTRs to the actual variant types based on a format convention specific to BizTalk Server 2004. The property values are XML tags for Host Integration Server 2004.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

ISSOConfigStore Interface

ISSOConfigStore Members

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOConfigStore.SetConfigInfo Method

The **SetConfigInfo** method sets the configuration information in the configuration store.

VB

```
Sub SetConfigInfo( _
   ByVal applicationName As String, _
   ByVal identifier As String, _
   ByVal properties As IPropertyBag _
)
[C#]
void SetConfigInfo(
   string applicationName,
   string identifier,
   IPropertyBag properties
);
[C++]
void SetConfigInfo(
   String* applicationName,
   String* identifier,
   IPropertyBag* properties
);
[JScript]
function SetConfigInfo(
   applicationName : String,
   identifier : String,
   properties : IPropertyBag
);
```

Parameters

applicationName
  Contains the external application name.
identifier
  Contains the identifier for the configuration info. This string will typically be a GUID.
properties
  A pointer to an **IPropertyBag** containing the configuration info as name/value pairs. Enterprise Single Sign-On reads properties from this property bag.

Remarks

This method can be used for originally creating the configuration info or for updating the configuration info.

If the configuration info does not already exist, all properties of the configuration info, as defined by the field info for the specified application, must be provided.

If the configuration info does already exist, and if a property is set to VT_NULL, it retains its existing value. If it is set to any other new value (including VT_EMPTY), it is updated. If it is missing from the property bag, it is set to VT_EMPTY

Note that due to the use of the SSO store, the first property cannot be masked.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

.NET Framework Security:

- Full trust for the immediate caller. This member cannot be used by partially trusted code.

See Also

ISSOConfigStore Interface

ISSOConfigStore Members

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOLookup1 Interface

The **ISSOLookup1** interface provides a lookup for user credentials associated with an application.

For a list of all members of this type, see ISSOLookup1 Members.

VB

```
<Guid("66E51591-90D4-4E75-A47A-6CC0B20B0C04")>
<InterfaceType(ComInterfaceType.InterfaceIsDual)>
Public Interface ISSOLookup1
[C#]
[Guid("66E51591-90D4-4E75-A47A-6CC0B20B0C04")]
[InterfaceType(ComInterfaceType.InterfaceIsDual)]
public interface ISSOLookup1
[C++]
[Guid("66E51591-90D4-4E75-A47A-6CC0B20B0C04")]
[InterfaceType(ComInterfaceType::InterfaceIsDual)]
public __gc __interface ISSOLookup1
[JScript]
public
   Guid("66E51591-90D4-4E75-A47A-6CC0B20B0C04")
   InterfaceType(ComInterfaceType.InterfaceIsDual)
interface ISSOLookup1
```

> **Note** For information about using this interface within COM-based code, see ISSOLookup1 Interface.

Requirements

Namespace: Microsoft.BizTalk.SSOClient.Interop Namespace

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: interop.ssolookuplib (in ssolookuplib.dll)

See Also

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOLookup1 Members

The following table shows the **ISSOLookup1** members.

Public Methods

Member	Description
GetCredentials	Retrieves the user credentials for an application.

See Also

ISSOLookup1 Interface Programming with Enterprise Single Sign-On Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOLookup1 Methods

The methods of the **ISSOLookup1** interface are listed in the following table. For a complete list of **ISSOLookup1** interface members, see ISSOLookup1 Members.

Public Methods

Method	Description
GetCredentials	Retrieves the user credentials for an application.

See Also

ISSOLookup1 Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOLookup1.GetCredentials Method

The **GetCredentials** method retrieves the user credentials for an application.

VB

```
Function GetCredentials( _
   ByVal applicationName As String, _
   ByVal flags As Integer, _
   <Out()> ByRef externalUserName As String _
) As String()
[C#]
string[] GetCredentials(
   string applicationName,
   int flags,
   out string externalUserName
);
[C++]
String* GetCredentials(
   String* applicationName,
   int flags,
   [
   Out
] String** externalUserName
)  __gc[];
[JScript]
function GetCredentials(
   applicationName : String,
   flags : int,
   externalUserName : String
) : String[];
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case is preserved. For example, ABC, abc, and AbC are considered to be the same application.

flags
Integer that specifies whether the credential cache should be bypassed. Using the Enterprise Single Sign-On Flags indicates that the credential cache should be bypassed.

externalUserName
String that receives the external user name.

Return Value

String array that receives the credentials.

Remarks

To access this method, you must be an Application User. You can only retrieve your own credential.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOLookup1 Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

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http://go.microsoft.com/fwlink/?linkid=29507.

ISSOLookup2 Interface

The **ISSOLookup1** interface provides a lookup for user credentials associated with an application.

For a list of all members of this type, see ISSOLookup2 Members.

VB

```
<Guid("F71C4670-9D6D-4c7d-97F5-CB2156F6208C")>
<InterfaceType(ComInterfaceType.InterfaceIsDual)>
Public Interface ISSOLookup2
[C#]
[Guid("F71C4670-9D6D-4c7d-97F5-CB2156F6208C")]
[InterfaceType(ComInterfaceType.InterfaceIsDual)]
public interface ISSOLookup2
[C++]
[Guid("F71C4670-9D6D-4c7d-97F5-CB2156F6208C")]
[InterfaceType(ComInterfaceType.InterfaceIsDual)]
public __gc __interface ISSOLookup2
[JScript]
public
   Guid("F71C4670-9D6D-4c7d-97F5-CB2156F6208C")
   InterfaceType(ComInterfaceType.InterfaceIsDual)
interface ISSOLookup2
```

> **Note** For information about using this interface within COM-based code, see ISSOLookup2 Interface.

Requirements

Namespace: Microsoft.BizTalk.SSOClient.Interop Namespace

Platforms: Microsoft® Windows Server™ 2003

Assembly: interop.ssolookuplib (in ssolookuplib.dll)

See Also

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOLookup2 Members

The following table shows the **ISSOLookup2** members.

Public Methods

Member	Description
GetCredentials	Retrieves the user credentials for an application.
LogonExternalUser	Logs on an external user.

See Also

ISSOLookup2 Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOLookup2 Methods

The methods of the **ISSOLookup2** interface are listed in the following table. For a complete list of **ISSOLookup2** interface members, see ISSOLookup2 Members.

Public Methods

Member	Description
GetCredentials	Retrieves the user credentials for an application.
LogonExternalUser	Logs on an external user.

See Also

ISSOLookup2 Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOLookup2.GetCredentials Method

The **GetCredentials** method retrieves the user credentials for an application.

VB

```
Function GetCredentials( _
   ByVal applicationName As String, _
   ByVal flags As Integer, _
   <Out()> ByRef externalUserName As String _
) As String()
[C#]
string[] GetCredentials(
   string applicationName,
   int flags,
   out string externalUserName
);
[C++]
String* GetCredentials(
   String* applicationName,
   int flags,
   [
   Out
] String** externalUserName
)  __gc[];
[JScript]
function GetCredentials(
   applicationName : String,
   flags : int,
   externalUserName : String
) : String[];
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

flags
Integer that specifies whether the credential cache should be bypassed. Using the Enterprise Single Sign-On Flags indicates that the credential cache should be bypassed.

externalUserName
String that receives the external user name.

Return Value

String array that receives the credentials.

Remarks

To access this method, you must be an Application User. You can only retrieve your own credential.

Requirements

Platforms: Microsoft Windows Server 2003

See Also

ISSOLookup2 Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOLookup2.LogonExternalUser Method

The **LogonExternalUser** method logs on an external user.

VB

```
Function GetCredentials( _
   bstrapplicationName As String,
   bstrUserName As String,
   flags As Integer,
   ppsaCredentials As Array
) As Integer
[C#]
int GetCredentials(
   string bstrapplicationName,
   string bstrUserName,
   int flags,
   array ppsaCredentials
);
[C++]
int GetCredentials(
   string bstrapplicationName,
   string bstrUserName,
   int flags,
   array ppsaCredentials
)  __gc[];
[JScript]
function GetCredentials(
   bstrapplicationName : String,
   bstrUserName : String,
   flags : int,
   ppsaCredentials : array
) : int;
```

Parameters

bstrapplicationName
  Contains the name of the application to log on to.
bstrUserName
  Contains the name of the user that is attempting to log on.
flags
  Flags to set.
ppsaCredentials
  Array containing the credentials of the user.

Return Value

Integer containing a Windows handle.

Requirements

Platforms: Microsoft Windows Server 2003

See Also

ISSOLookup2 Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOTicket Interface

The **ISSOTicket** interface issues and redeems Enterprise Single Sign-On (SSO) server tickets.

For a list of all members of this type, see ISSOTicket Members.

VB

```
<Guid("77437865-7472-46A8-9269-431F143E6A27")>
<InterfaceType(ComInterfaceType.InterfaceIsDual)>
Public Interface ISSOTicket
[C#]
[Guid("77437865-7472-46A8-9269-431F143E6A27")]
[InterfaceType(ComInterfaceType.InterfaceIsDual)]
public interface ISSOTicket
[C++]
[Guid("77437865-7472-46A8-9269-431F143E6A27")]
[InterfaceType(ComInterfaceType::InterfaceIsDual)]
public __gc __interface ISSOTicket
[JScript]
public
   Guid("77437865-7472-46A8-9269-431F143E6A27")
   InterfaceType(ComInterfaceType.InterfaceIsDual)
interface ISSOTicket
```

Note For information about using this interface within COM-based code, see ISSOTicket Interface.

Requirements

Namespace: Microsoft.BizTalk.SSOClient.Interop Namespace

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Enterprise SSOClient Interop (in Microsoft.BizTalk.Interop.SSOClient.dll)

See Also

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

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ISSOTicket Members

The following table shows the **ISSOTicket** members.

Public Methods

Member	Description
IssueTicket	Issues an Enterprise Single Sign-On (SSO) server ticket for authenticating a user on an application.
RedeemTicket	Redeems an SSO server ticket that was previously issued with the **IssueTicket** method.

See Also

ISSOTicket Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOTicket Methods

The methods of the **ISSOTicket** interface are listed in the following table. For a complete list of **ISSOTicket** interface members, see ISSOTicket Members.

Public Methods

Method	**Description**
IssueTicket	Issues an Enterprise Single Sign-On (SSO) server ticket for authenticating a user on an application.
RedeemTicket	Redeems an SSO server ticket that was previously issued with the IssueTicket method.

See Also

ISSOTicket Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOTicket.IssueTicket Method

The **IssueTicket** method issues an Enterprise Single Sign-On (SSO) server ticket for authenticating a user on an application.

VB

```
Function IssueTicket( _
   ByVal flags As Integer _
) As String
[C#]
string IssueTicket(
   int flags
);
[C++]
String* IssueTicket(
   int flags
);
[JScript]
function IssueTicket(
   flags : int
) : String;
```

Parameters

flags
  This parameter is ignored in the current release.

Return Value

String that receives the issued ticket value. This is a Base64-encoded value for use in XML documents.

Remarks

To access this method, you must be an Application User. You can only issue a ticket for yourself.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOTicket Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOTicket.RedeemTicket Method

The **RedeemTicket** method redeems an Enterprise Single Sign-On (SSO) server ticket that was previously issued with the IssueTicket method.

VB

```
Function RedeemTicket( _
   ByVal applicationName As String, _
   ByVal ticket As String, _
   ByVal flags As Integer, _
   <Out()> ByRef externalUserName As String _
) As String()
[C#]
string[] RedeemTicket(
   string applicationName,
   string ticket,
   int flags,
   out string externalUserName
);
[C++]
String* RedeemTicket(
   String* applicationName,
   String* ticket,
   int flags,
   [
   Out
] String** externalUserName
)  __gc[];
[JScript]
function RedeemTicket(
   applicationName : String,
   ticket : String,
   flags : int,
   externalUserName : String
) : String[];
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case is preserved. For example, ABC, abc, and AbC are considered to be the same application.

ticket
String that specifies the ticket value obtained from the **IssueTicket** method.

flags
Integer that specifies whether the credential cache should be bypassed. Use the flag SSO_FLAG_REFRESH, as described in Enterprise Single Sign-On Flags, to indicate that the credential cache should be bypassed.

externalUserName
String that returns the external user name associated with the ticket.

Return Value

String array that returns the external credentials associated with the ticket. If there are no credentials, the size of the returned array is zero.

Remarks

Because the credentials are returned in plain text by this method, the caller should be careful to clear (overwrite) them as soon as possible after use.

To access this method, you must be an SSO Administrator, SSO Affiliate Administrator, or an Application Administrator.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOTicket Interface

Programming with Enterprise Single Sign-On

Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapper Interface

The **ISSOMapper** interface creates mappings between users and applications.

For a list of all members of this type, see ISSOMapper Members.

VB

```
<Guid("A146E1CC-043D-4D33-9B82-16392AD36E7D")>
<InterfaceType(ComInterfaceType.InterfaceIsDual)>
Public Interface ISSOMapper
[C#]
[Guid("A146E1CC-043D-4D33-9B82-16392AD36E7D")]
[InterfaceType(ComInterfaceType.InterfaceIsDual)]
public interface ISSOMapper
[C++]
[Guid("A146E1CC-043D-4D33-9B82-16392AD36E7D")]
[InterfaceType(ComInterfaceType::InterfaceIsDual)]
public __gc __interface ISSOMapper
[JScript]
public
   Guid("A146E1CC-043D-4D33-9B82-16392AD36E7D")
   InterfaceType(ComInterfaceType.InterfaceIsDual)
interface ISSOMapper
```

> **Note** For information about using this interface within COM-based code, see ISSOMapper Interface.

Requirements

Namespace: Microsoft.BizTalk.SSOClient.Interop Namespace

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Enterprise SSOClient Interop (in Microsoft.BizTalk.Interop.SSOClient.dll)

See Also

Programming with Enterprise Single Sign-On Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapper Members

The following table shows the **ISSOMapper** members.

Public Methods

Member	Description
GetApplications	Retrieves the available applications for a Microsoft® Windows® user.
GetFieldInfo	Retrieves the field information for an application.
GetMappingsForExternalUser	Retrieves the mappings for an external user.
GetMappingsForWindowsUser	Retrieves the mappings for a Microsoft Windows user.
SetExternalCredentials	Stores a set of external credentials in the Single Sign-On server database.
SetWindowsPassword	Sets the Microsoft Windows password. This method is not currently implemented.

See Also

ISSOMapper Interface Programming with Enterprise Single Sign-On Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapper Methods

The methods of the **ISSOMapper** interface are listed in the following table. For a complete list of **ISSOMapper** interface members, see ISSOMapper Members.

Public Methods

Method	Description
GetApplications	Retrieves the available applications for a Microsoft® Windows® user.
GetFieldInfo	Retrieves the field information for an application.
GetMappingsForExternalUser	Retrieves the mappings for an external user.
GetMappingsForWindowsUser	Retrieves the mappings for a Microsoft Windows user.
SetExternalCredentials	Stores a set of external credentials in the Single Sign-On server database.
SetWindowsPassword	Sets the Microsoft Windows password. This method is not currently implemented.

See Also

ISSOMapper Interface Programming with Enterprise Single Sign-On Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapper.GetApplications Method

The **GetApplications** method retrieves the available applications for a Microsoft Windows user.

VB

```
Sub GetApplications( _
   <Out()> ByRef applications() As String, _
   <Out()> ByRef descriptions() As String, _
   <Out()> ByRef contactInfo() As String _
)
[C#]
void GetApplications(
   out string[] applications,
   out string[] descriptions,
   out string[] contactInfo
);
[C++]
void GetApplications(
   [
   Out
] String* applications __gc[],
   [
   Out
] String* descriptions __gc[],
   [
   Out
] String* contactInfo __gc[]
);
[JScript]
function GetApplications(
   applications : String[],
   descriptions : String[],
   contactInfo : String[]
);
```

Parameters

applications
String array that returns the application name.

descriptions
String array that returns a description of the application.

contactInfo
String array that returns the contact information for the application.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface ISSOMapper Members Programming with Enterprise Single Sign-On
Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapper.GetFieldInfo Method

The **GetFieldInfo** method retrieves the field information for an application.

VB

```
Sub GetFieldInfo( _
   ByVal applicationName As String, _
   <Out()> ByRef labels() As String, _
   <Out()> ByRef flags() As Integer _
)
[C#]
void GetFieldInfo(
   string applicationName,
   out string[] labels,
   out int[] flags
);
[C++]
void GetFieldInfo(
   String* applicationName,
   [
   Out
] String* labels __gc[],
   [
   Out
] int* flags __gc[]
);
[JScript]
function GetFieldInfo(
   applicationName : String,
   labels : String[],
   flags : int[]
);
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case is preserved. For example, ABC, abc, and AbC are considered to be the same application.

labels
String array that returns the field labels.

flags
Integer array that returns the field flags, as described in Enterprise Single Sign-On Flags.

Remarks

The field information will only be returned if the application is currently enabled. An application cannot be enabled unless its field information is complete.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface ISSOMapper Members Programming with Enterprise Single Sign-On
Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapper.GetMappingsForExternalUser Method

The **GetMappingsForExternalUser** method retrieves the mappings for an external user.

VB

```
Function GetMappingsForExternalUser( _
   ByVal applicationName As String, _
   ByVal externalUserName As String _
) As Object()
[C#]
object[] GetMappingsForExternalUser(
   string applicationName,
   string externalUserName
);
[C++]
Object* GetMappingsForExternalUser(
   String* applicationName,
   String* externalUserName
)  __gc[];
[JScript]
function GetMappingsForExternalUser(
   applicationName : String,
   externalUserName : String
) : Object[];
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

externalUserName
The external user name. This value can contain spaces. If a NULL value is specified for this parameter, all mappings are returned for the specified application.

Return Value

Object array that contains the mappings as ISSOMapping Interface objects.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface ISSOMapper Members Programming with Enterprise Single Sign-On
Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapper.GetMappingsForWindowsUser Method

The **GetMappingsForWindowsUser** method retrieves the mappings for a Microsoft Windows user.

VB

```
Function GetMappingsForWindowsUser( _
   ByVal windowsDomainName As String, _
   ByVal windowsUserName As String, _
   ByVal applicationName As String _
) As Object()
[C#]
object[] GetMappingsForWindowsUser(
   string windowsDomainName,
   string windowsUserName,
   string applicationName
);
[C++]
Object* GetMappingsForWindowsUser(
   String* windowsDomainName,
   String* windowsUserName,
   String* applicationName
)  __gc[];
[JScript]
function GetMappingsForWindowsUser(
   windowsDomainName : String,
   windowsUserName : String,
   applicationName : String
) : Object[];
```

Parameters

windowsDomainName
  String that specifies the Microsoft Windows domain name. This parameter is optional, but if it is specified, the *windowsUserName* parameter must also be specified. If this parameter is not specified, the current user context is used.

windowsUserName
  String that specifies the Microsoft Windows user name. This parameter is optional, but if it is specified, the *windowsDomainName* parameter must also be specified. If this parameter is not specified, the current user context is used.

applicationName
  String that specifies the external application name. If this parameter is specified, only one mapping is returned if it exists. If this parameter is NULL, all mappings for the specified user are returned. This parameter is optional.

Return Value

Object array that contains the mappings as ISSOMapping Interface objects.

Remarks

An Application Administrator must specify the *applicationName* value.

Application Users can only access their own mappings. They cannot access the mappings for another user.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface ISSOMapper Members Programming with Enterprise Single Sign-On
Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapper.SetExternalCredentials Method

The **SetExternalCredentials** method stores a set of external credentials in the Enterprise Single Sign-On (SSO) server database.

VB

```
Sub SetExternalCredentials( _
   ByVal applicationName As String, _
   ByVal externalUserName As String, _
   ByVal externalCredentials() As String _
)
[C#]
void SetExternalCredentials(
   string applicationName,
   string externalUserName,
   string[] externalCredentials
);
[C++]
void SetExternalCredentials(
   String* applicationName,
   String* externalUserName,
   String* externalCredentials __gc[]
);
[JScript]
function SetExternalCredentials(
   applicationName : String,
   externalUserName : String,
   externalCredentials : String[]
);
```

Parameters

applicationName
String that specifies the application name. This parameter cannot be NULL, an empty string, or contain spaces. Application names are not case-sensitive, but case will be preserved. For example, ABC, abc, and AbC are considered to be the same application.

externalUserName
String that specifies the external user name.

externalCredentials
String array that specifies the external credentials to be stored.

Remarks

Application Users can only set their own credentials. Also, the number of external credentials provided must match the number of fields expected by the external application.

Requirements

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface ISSOMapper Members Programming with Enterprise Single Sign-On Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapper.SetWindowsPassword Method

The **SetWindowsPassword** method sets the Microsoft Windows password. This method is not currently implemented.

VB

```
Sub SetWindowsPassword( _
   ByVal windowsPassword As String _
)
[C#]
void SetWindowsPassword(
   string windowsPassword
);
[C++]
void SetWindowsPassword(
   String* windowsPassword
);
[JScript]
function SetWindowsPassword(
   windowsPassword : String
);
```

Parameters

windowsPassword
String that specifies the Windows password.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapper Interface ISSOMapper Members Programming with Enterprise Single Sign-On Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping Interface

The **ISSOMapping** interface manages the state of a mapping instance.

For a list of all members of this type, see ISSOMapping Members.

VB

```
<Guid("CB6B05A8-B806-43CC-B441-9E5B5EFB881C")>
<InterfaceType(ComInterfaceType.InterfaceIsDual)>
Public Interface ISSOMapping
[C#]
[Guid("CB6B05A8-B806-43CC-B441-9E5B5EFB881C")]
[InterfaceType(ComInterfaceType.InterfaceIsDual)]
public interface ISSOMapping
[C++]
[Guid("CB6B05A8-B806-43CC-B441-9E5B5EFB881C")]
[InterfaceType(ComInterfaceType::InterfaceIsDual)]
public __gc __interface ISSOMapping
[JScript]
public
   Guid("CB6B05A8-B806-43CC-B441-9E5B5EFB881C")
   InterfaceType(ComInterfaceType.InterfaceIsDual)
interface ISSOMapping
```

Note For information about using this interface within COM-based code, see ISSOMapping Interface.

Requirements

Namespace: Microsoft.BizTalk.SSOClient.Interop Namespace

Platforms: Microsoft® Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

Assembly: Enterprise SSOClient Interop (in Microsoft.Biztalk.Interop.SSOClient.dll)

See Also

Programming with Enterprise Single Sign-On Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping Members

The following tables show the **ISSOMapping** members.

Public Properties

Property	Description
ApplicationName	Specifies the name of the application.
ExternalUserName	Specifies the external (non-Microsoft® Windows®) user name.
Flags	Reserved for internal use only.
WindowsDomainName	Specifies the Microsoft Windows domain name.
WindowsUserName	Specifies the Microsoft Windows user name.

Public Methods

Method	Description
Create	Creates the mapping.
Delete	Deletes the mapping.
Disable	Disables the mapping.
Enable	Enables the mapping.

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapping Properties

The properties of the **ISSOMapping** interface are listed in the following table. For a complete list of **ISSOMapping** interface members, see ISSOMapping Members.

Public Properties

Property	**Description**
ApplicationName	Specifies the name of the application.
ExternalUserName	Specifies the external (non-Microsoft® Windows®) user name.
Flags	Reserved for internal use only.
WindowsDomainName	Specifies the Microsoft Windows domain name.
WindowsUserName	Specifies the Microsoft Windows user name.

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapping.ApplicationName Property

The **ApplicationName** property specifies the name of the application.

VB

```
Property ApplicationName As String
[C#]
string ApplicationName {get; set;}
[C++]
String* get_ApplicationName();
void set_ApplicationName(String*);
[JScript]
abstract function get ApplicationName() : String;
public abstract function set ApplicationName(String);
```

Property Value

The name of the application.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On ISSOMapping Members Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapping.ExternalUserName Property

The **ExternalUserName** property specifies the external (non-Microsoft Windows) user name.

VB

```
Property ExternalUserName As String
[C#]
string ExternalUserName {get; set;}
[C++]
String* get_ExternalUserName();
void set_ExternalUserName(String*);
[JScript]
abstract function get ExternalUserName() : String;
public abstract function set ExternalUserName(String);
```

Property Value

The name of the external user.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On ISSOMapping Members
Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapping.Flags Property

The **Flags** property is reserved for internal use only.

VB

```
Property Flags As Integer
[C#]
int Flags {get; set;}
[C++]
int get_Flags();
void set_Flags(int);
[JScript]
abstract function get Flags() : int;
public abstract function set Flags(int);
```

Property Value

Reserved for internal use only.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On ISSOMapping Members Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.WindowsDomainName Property

The **WindowsDomainName** property specifies the Microsoft Windows domain name.

VB

```
Property WindowsDomainName As String
[C#]
string WindowsDomainName {get; set;}
[C++]
String* get_WindowsDomainName();
void set_WindowsDomainName(String*);
[JScript]
abstract function get WindowsDomainName() : String;
public abstract function set WindowsDomainName(String);
```

Property Value

The Microsoft Windows domain name.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On ISSOMapping Members Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.WindowsUserName Property

The **WindowsUserName** property specifies the Microsoft Windows user name.

VB

```
Property WindowsUserName As String
[C#]
string WindowsUserName {get; set;}
[C++]
String* get_WindowsUserName();
void set_WindowsUserName(String*);
[JScript]
abstract function get WindowsUserName() : String;
public abstract function set WindowsUserName(String);
```

Property Value

The Microsoft Windows user name.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On ISSOMapping Members Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping Methods

The methods of the **ISSOMapping** interface are listed in the following table. For a complete list of **ISSOMapping** interface members, see ISSOMapping Members.

Public Methods

Method	Description
Create	Creates the mapping.
Delete	Deletes the mapping.
Disable	Disables the mapping.
Enable	Enables the mapping.

See Also

ISSOMapping Interface Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapping.Create Method

The **Create** method creates the mapping.

VB

```
Sub Create( _
   ByVal flags As Integer _
)
[C#]
void Create(
   int flags
);
[C++]
void Create(
   int flags
);
[JScript]
function Create(
   flags : int
);
```

Parameters

flags
For the current release, flags can be set to SSO_FLAG_ENABLED only.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On ISSOMapping Members Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.Delete Method

The **Delete** method deletes the mapping.

VB

```
Sub Delete()
[C#]
void Delete();
[C++]
void Delete();
[JScript]
function Delete();
```

Remarks

After the mapping has been deleted, the mapping object can no longer be used and should be released.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On ISSOMapping Members
Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ISSOMapping.Disable Method

The **Disable** method disables the mapping.

VB

```
Sub Disable()
[C#]
void Disable();
[C++]
void Disable();
[JScript]
function Disable();
```

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On ISSOMapping Members Microsoft.BizTalk.SSOClient.Interop Namespace

ISSOMapping.Enable Method

The **Enable** method enables the mapping.

VB

```
Sub Enable( _
   ByVal flags As Integer _
)
[C#]
void Enable(
   int flags
);
[C++]
void Enable(
   int flags
);
[JScript]
function Enable(
   flags : int
);
```

Parameters

flags
Not currently implemented.

Requirements

Platforms: Microsoft Windows Server 2003, Windows XP Professional, Windows 2000 Server

See Also

ISSOMapping Interface Programming with Enterprise Single Sign-On ISSOMapping Members Microsoft.BizTalk.SSOClient.Interop Namespace

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Enterprise Single Sign-On Flags

The following flags are used with the Microsoft® Host Integration Server Enterprise Single Sign-On (SSO) methods.

Common flags

Member name	Value
SSO_FLAG_NONE	0x00000000
SSO_FLAG_REFRESH	0x00000001
SSO_FLAG_ENABLED	0x00000002
SSO_FLAG_SSO_WINDOWS_TO_EXTERNAL	0x00000004
SSO_FLAG_SSO_EXTERNAL_TO_WINDOWS	0x00000008
SSO_FLAG_SSO_VERIFY_EXTERNAL_CREDS	0x00000010
SSO_FLAG_ALLOW_TICKETS	0x00000020
SSO_FLAG_VALIDATE_TICKETS	0x00000040

Password synchronization flags

Member name	Value
SSO_FLAG_PARTIAL_SYNC_FROM_WINDOWS_TO_DB	0x00000100
SSO_FLAG_PARTIAL_SYNC_FROM_EXTERNAL_TO_DB	0x00000200
SSO_FLAG_FULL_SYNC_FROM_WINDOWS_TO_EXTERNAL	0x00000400
SSO_FLAG_FULL_SYNC_FROM_EXTERNAL_TO_WINDOWS	0x00000800
SSO_FLAG_SYNC_VERIFY_EXTERNAL_CREDS	0x00001000

Application flags

Member name	Value
SSO_FLAG_APP_USES_GROUP_MAPPING	0x00010000
SSO_FLAG_APP_EXTERNAL_NAME_SAME	0x00020000

Mapping flags

Member name	Value
SSO_FLAG_MAPPING_REQUIRES_WINDOWS_PASSWORD	0x01000000
SSO_FLAG_MAPPING_REQUIRES_EXTERNAL_CREDS	0x02000000
SSO_FLAG_MAPPING_ENABLE_AUDIT	0x04000000

Field information flags

Member name	Value
SSO_FLAG_FIELD_INFO_MASK	0x10000000
SSO_FLAG_FIELD_INFO_SYNC	0x20000000

Requirements

Platforms: Microsoft Windows Server™ 2003, Windows® XP Professional, Windows 2000 Server

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Samples

This section of Microsoft® Host Integration Server 2004 Help provides information for the samples contained in the Host Integration Server 2004 SDK.

This section contains:

- Transaction Integrator Samples
- Data Integration Samples
- Network Integration Samples
- Administration and Management Samples
- Messaging Samples

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Transaction Integrator Samples

This section provides information about the sample applications that implement the Transaction Integrator.

For general information about programming for Transaction Integrator, see the Transaction Integrator Programmer's Guide section of the SDK.

For API references and other technical information about Transaction Integrator, see the Transaction Integrator Programmer's Reference section in the SDK.

This section contains:

- Transaction Integrator Tutorials
- Sample Programs for Transaction Integrator

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Transaction Integrator Tutorials

Transaction Integrator (TI) includes tutorials to teach you more about Windows®-initiated processing (WIP) and host-initiated processing (HIP). All tutorials are based on the Cedar Bank .NET sample application, described in Sample Programs for Transaction Integrator. Besides these tutorials, you can also learn more about HIP and WIP by building both the COM and .NET sample applications, using the readme files in the installation directory:

- To learn more about HIP, follow the tutorial for building the HIP server programs for either CICS or OS/400. The tutorials are designed as Visual Studio® .NET 2003 solutions. Alternately, you can open the sample and begin viewing the code, starting with the solution located at <*installdir*>\Program Files\Microsoft Host Integration Server 2004\SDK\Samples\AppInt\HostInitiated\Cedarbank Tutorial HIP Solution.sln. Additional information is located in the **Read me first** project. Text files in this project provide a high-level overview about configuring the end-to-end Cedar Bank scenarios for COM and .NET using SNA and TCP.
- To learn more about WIP, follow the tutorial for building the CICS WIP server programs. The tutorials are designed as a Visual Studio .NET solution. Alternately, you can open the sample and begin viewing the code, starting with the solution located at <*installdir*>:\Program Files\Microsoft Host Integration Server 2004\SDK\Samples\AppInt\HostInitiated\Cedarbank Tutorial WIP Solution.sln. Additional information is located in the **Read me first** project. Text files in this project provide a high-level overview about configuring the end-to-end Cedar Bank scenarios for COM and .NET using SNA and TCP.

This section contains:

- Windows-Initiated Processing Tutorials
- Host-Initiated Processing Tutorials

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Windows-Initiated Processing Tutorials

The following tutorials are designed to help you work your way through the Cedar Bank Windows-Initiated Processing (WIP) sample, and are based off of the .NET readme files located in <*installdir*>\Program Files\Microsoft Host Integration Server 2004\SDK\Samples\AppInt\WindowsInitated. Note that although the Cedar Bank COM code is still available in the SDK, these tutorials focus on the .NET versions of the samples. Also note that not all of the Remote Environments (RE) available were made into tutorials. However, many of the procedures for setting up the REs in these tutorials will be the same for all mainframe environments.

This section contains:

- Windows-Initiated Processing Tutorial: CICS Client (Using .NET)
- Windows-Initiated Processing Tutorial: WIP Web Service Client to OS/400 Server (Using .NET)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Windows-Initiated Processing Tutorial: CICS Client (Using .NET)

In this tutorial, you learn how to compile and link COBOL server applications, configure a CICS WIP application, and execute an Host Integration Server 2004 client application.

This section contains:

- CICS Client (Using .NET) Module 1: Compiling and Linking the Server Application
- CICS Client (Using .NET) Module 2: Configuring a WIP Application
- CICS Client (Using .NET) Module 3: Executing Your Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CICS Client (Using .NET) Module 1: Compiling and Linking the Server Application

In this module, you upload, compile, and link the tutorial COBOL files and maps. The following instructions describe the location of the necessary files and their associated linkage control editor statements. For more information about compiling and linking mainframe applications, consult your mainframe documentation or administrator.

In order to perform this module, you must first determine what type of programming model you are intending to use. Your choices are SNA CICS, SNA CICS Link, TCP CICS concurrent, and TCP CICS MsLink.

This module contains four steps:

1. Compiling and Linking the SNA CICS Mainframe Program
2. Compiling and Linking the SNA CICS Link Mainframe Program
3. Compiling and Linking the TCP CICS Concurrent Mainframe Program
4. Compiling and Linking the TCP CICS MsLink Mainframe Program

Compiling and Linking the SNA CICS Mainframe Program

The following procedure provides information you use to compile and link an SNA CICS mainframe program, and assumes that your system uses the CICS LU 6.2 User Data programming model. The CICS LU 6.2 User Data model provides direct invocations and data exchanges between the transaction integrator and the server TP.

To compile and link an SNA CICS mainframe program

1. Compile and link the CICS Cedar Bank tutorial for SNA CICS using the code located in the following directory:

   <*installdir*>:\SDK\Samples\AppInt\WindowsInitiated\SNA CICS\cdrbnk.cbl

   <*installdir*>:\SDK\Samples\AppInt\WindowsInitiated\SNA CICS\gtacct62.cbl

2. Define the CICS HIP Cedar Bank tutorial for SNA CICS using the following syntax:

   ```
   CEDA DEF PROG(CDRBNK62) GROUP(HISSAMP) LANG(COBOL)
   CEDA DEF PROG(GTACCCT62) GROUP(HISSAMP) LANG(COBOL)
   ```

3. Install the HISSAMP group using the following syntax:

   ```
   CEDA INSTALL GROUP(HISSAMP)
   ```

Once you have finished compiling and linking the mainframe programs, you can configure your Windows client to run the client WIP application.

See Also

CICS Client (using .NET) Module 2: Configuring a WIP Application

Compiling and Linking the SNA CICS Link Mainframe Program

The following procedure provides information for compiling an SNA CICS Link mainframe program, and assumes that your system uses the CICS LU6.2 Link programming model. CICS LU6.2 Link is one of the most straightforward programming models available for Host Integration Server, and enables the client application to make calls directly to the CICS application.

To compile and link an SNA CICS Link mainframe program

1. Compile and link the CICS Cedar Bank tutorial for SNA CICS Link using the code located in the following directory:

   <*installdir*>\SDK\Samples\AppInt\WindowsInitiated\SNA CICS Link\cdrbnk.cbl

   <*installdir*>\SDK\Samples\AppInt\WindowsInitiated\SNA CICS Link\Getaccts.cbl

2. Define the CICS HIP Cedar Bank tutorial for SNA CICS Link using the following syntax:

```
CEDA DEF PROG(GETACCTS) GROUP(HISSAMP) LANG(COBOL)
CEDA DEF PROG(CEDRBANK) GROUP(HISSAMP) LANG(COBOL)
```

3. Install the HISSAMP group using the following syntax:

```
CEDA INSTALL GROUP(HISSAMP)
```

After you have finished compiling and linking the mainframe programs, you can configure your Windows client to run the client WIP application.

See Also

CICS Client (using .NET) Module 2: Configuring a WIP Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Compiling and Linking the TCP CICS Concurrent Mainframe Program

The following procedure describes information necessary to compile and link a TCP CICS Concurrent mainframe program. The procedure assumes that you are running a TCP Transaction Request Link programming model. The TCP Transaction Request Link model allows data and parameters to be based between Transaction Integrator (TI) and the server transaction program (TP) through COMMAREA. The model also allows a Concurrent Server to link to a CICS DPL program.

To compile and link a TCP/IP CICS Concurrent mainframe program

1. Compile and link the TCP CICS Cedar Bank tutorial for TCP CICS using code located in the following directory:

   <*installdir*>\SDK\Samples\AppInt\WindowsInitiated\TCP CICS\tcpcdrbk.cbl

   <*installdir*>\SDK\Samples\AppInt\WindowsInitiated\TCP CICS\tcpcgtac.cbl

2. Define the CICS HIP Cedar Bank tutorial for SNA CICS Link using the following syntax:

   ```
   CEDA DEF PROG(TCPCDRBK) GROUP(HISSAMP) LANG(COBOL)
   CEDA DEF PROG(TCPCGTAC) GROUP(HISSAMP) LANG(COBOL)
   ```

3. Define the transaction IDs to CICS using the following syntax:

   ```
   CEDA DEF TRANS(TCCB) PROG(TCPCDRBK) GROUP(HISAMP)
   CEDA DEF TRANS(TCCB) PROG(TCPCGTAC) GROUP(HISAMP)
   ```

4. Install the HISSAMP group using the following syntax:

   ```
   CEDA INSTALL GROUP(HISSAMP)
   ```

5. Define the Standard Listener using the following information:

   ```
   EZAC DEF LISTENER
   TranID: CSKL
   Format: Standard
   Port: {choose a port number}
   Immediate: Yes
   MinMsgL: 4 {based on Tutorial Transaction IDs of MSCS, TCCB and TCGA)
   TranTrn: No
   TranUsr: No
   ```

6. Define the Enhanced Listener using the following information:

   ```
   EZAC DEF LISTENER
   TranID: CSKM
   Format: Enhanced
   Port: {choose a port number}
   Immediate: Yes
   CSTranID: MSCS or TCCB, or TCGA
   CSSTType: KC
   CSDelay: 0
   MsgLength: 35
   PeekData: No
   MsgFormat: EBCDIC
   ```

After you finish compiling and linking the mainframe programs, you can configure your Windows client to run the client WIP application.

See Also

CICS Client (using .NET) Module 2: Configuring a WIP Application

Compiling and Linking the TCP CICS MsLink Mainframe Program

The following procedure describes how to compile and link a TCP/IP CICS MsLink mainframe program. The procedure assumes that your system uses the TCP Enhanced Listener Message Link (ELM) programming model. The TCP ELM Link model allows data and parameters to be passed between the transaction integrator (TI) and the server transaction program (TP) using the COMMAREA. The model also allows a Concurrent Server to link into a CICS DPL program. The enhanced Listener was introduced in CICS Transaction Server version 1.4, and its architecture increases the efficiency of the CICS TCP/IP environment by eliminating the TRM and TRM Reply sequence.

To compile and link a TCP/IP CICS MsLink mainframe program

1. Compile and link the CICS Cedar Bank tutorial for SNA CICS using code located in the following directory:

   <*installdir*>\SDK\Samples\AppInt\WindowsInitiated\TCP CICS MsLink\cdrbnk.cbl

   <*installdir*>\SDK\Samples\AppInt\WindowsInitiated\TCP CICS MsLink\Getaccts.cbl

   <*installdir*>\SDK\Samples\AppInt\WindowsInitiated\TCP CICS MsLink\mscmtics.cbl

2. Define the CICS HIP Cedar Bank tutorial for SNA CICS Link using the following syntax:

```
CEDA DEF PROG(GETACCTS) GROUP(HISSAMP) LANG(COBOL)
CEDA DEF PROG(CEDRBANK) GROUP(HISSAMP) LANG(COBOL)
CEDA DEF PROG(MSCMTICS) GROUP(HISSAMP) LANG(COBOL)
```

3. Define the transaction IDs to CICS using the following command:

```
CEDA DEF TRANS(MSCS) PROG(MSCMTICS) GROUP(HISAMP)
```

4. Install the HISSAMP group using the following syntax:

```
CEDA INSTALL GROUP(HISSAMP)
```

5. Define the Standard Listener using the following information:

```
EZAC DEF LISTENER
TranID: CSKL
Format: Standard
Port: {choose a port number}
Immediate: Yes
MinMsgL: 4 {based on Tutorial Transaction IDs of MSCS, TCCB and TCGA)
TranTrn: No
TranUsr: No
```

6. Define the Enhanced Listener using the following information:

```
EZAC DEF LISTENER
TranID: CSKM
Format: Enhanced
Port: {choose a port number}
Immediate: Yes
CSTranID: MSCS or TCCB, or TCGA
CSSTType: KC
CSDelay: 0
MsgLength: 35
PeekData: No
MsgFormat: EBCDIC
```

Once you have finished compiling and linking the mainframe programs, you can configure your Windows client to run the client

WIP application.

See Also

CICS Client (Using .NET) Module 2: Configuring a WIP Application

CICS Client (Using .NET) Module 2: Configuring a WIP Application

After you have compiled and linked your mainframe program, you must make sure that you have Internet Information Services (IIS) installed on your client, and you must also configure your WIP application. You will use IIS later to provide Network and remote access connectivity. Similarly, Host Integration Server uses the information provided in the WIP configuration to access both the remote mainframe configuration and the local client application.

This module contains eight steps:

1. Making sure you have Internet Information Service Installed
2. Creating a Virtual Directory
3. Checking that ASP.NET is Enabled
4. Enabling ASP.NET
5. Adding ASP.NET Accounts to Host Integration Server 2004 Local Users and Groups
6. Defining a Remote Environment for CICS
7. Defining a WIP Object for CICS
8. Debugging WIP Object Creation

Making sure you have Internet Information Service Installed

One of the necessary prerequisites for this sample is that the Internet Information Service (IIS) must be installed and enabled. IIS provides the capabilities to create virtual directories. Later in this tutorial, you will use virtual directories to manage the sample application. Therefore, you need to use the Control Panel and your rights as an administrator to ensure that IIS is available for you to use.

To install and enable IIS

1. Click **Start**, point to **Settings**, and then click **Control Panel**.
2. On the **Control Panel**, click **Add or Remove Programs**.
3. In the **Add or Remove Programs** dialog box, click **Add/Remove Windows Components**.
4. On the **Components** box on the **Windows Component Wizard**, see if the **Internet Information Services (IIS)** box is checked. If not, check the box and continue with installation. If the box is checked, close the **Windows Component Wizard**.

Now that you have installed (or confirmed installation of) IIS, you can create a virtual directory for your application to use.

See Also

Creating a Virtual Directory

Creating a Virtual Directory

After you have confirmed that IIS has been installed on your system, you must create a virtual directory for your tutorial application to use. A virtual directory is a tool used by IIS to consolidate and protect Web sites and other application that run over TCP/IP. Later in this tutorial, you will use the virtual directory to hold your CICS client application and to set Windows security protocols. In this step, however, you simply create the virtual directory with the Virtual Directory Creation Wizard, which you access through the Microsoft Management Console (MMC) and IIS.

To create a virtual directory

1. On the Desktop, right-click **My Computer**, then click on **Manage**.
2. On the **Computer Management** console, expand **Services and Applications**, then expand **Internet Information Services**, right-click **Default Web Site**, point to **New**, and click on **Virtual Directory**.
3. On the **Virtual Directory Creation Wizard**, click **Next**.
4. Under **Alias** on the **Virtual Directory Alias** page, type **Cedar Bank .NET Tutorial**, then click **Next**.
5. Under **Directory** on the **Web Site Content Directory** wizard page, type **<*installdir*>\SDK\Samples\AppInt\WindowsInitiated\TI Host**, then click **Next**.
6. On the **Access Permissions** page, click **Next**.
7. On the **Windows Component Wizard** page, click **Finish**. The wizard now creates a virtual directory for your application to use.

Now that you have created a virtual directory, you use the management console to check if you have ASP.NET enabled on your computer.

See Also

Checking that ASP.NET is Enabled

Checking that ASP.NET is Enabled

The client application for this tutorial uses ASP.NET technology to send and receive information to the mainframe application. Therefore, after you create the virtual directory, you must check to see if ASP.NET is enabled on your system. You can check to see if ASP.NET is enabled through the Computer Management console.

To check that ASP.NET is enabled

1. On the **Computer Management** console, expand **Default Web Site**, then right-click on **Cedar Bank .NET Tutorial**, then click **Properties**.
2. Under **Application Settings** on the **Virtual Directory** tab of the **Cedar Bank .NET Tutorial Properties** dialog box, click **Configuration**.
3. On the **App Mappings** tab on the **Application Configuration** dialog box, in the **Application Mappings** pane, check for the **.rem** value in the **Extensions** column. If .rem appears, your system is enabled for ASP.NET. If .rem is not in the list, you must enable your system for ASP.NET.
4. Click **Cancel**.
5. On the **Cedar Bank .NET Tutorial Properties** dialog box, click **Cancel**.
6. On the **Computer Management** console, click **Close**.

If you determine that ASP.NET is not enabled on your computer, you need to enable it. Otherwise, you can continue on with compiling and executing the tutorial.

See Also

Enabling ASP.NET

Adding ASP.NET Accounts to Host Integration Server 2004 Local Users and Groups

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Enabling ASP.NET

As with many distributed applications, the sample application for this tutorial uses ASP.NET to send to and receive information from the mainframe. Therefore, if ASP.NET is not enabled for your system, you must enable it in order to properly run this sample. The following procedure describes how you can enable ASP.NET from the command line.

To enable ASP.NET

1. Click **Start**, and then click **Run**.
2. In the **Run** dialog box, in the **Open** box, type **cmd**, and then press ENTER.
3. On the command line, change the directory to the following location:

   ```
   %Windows%\Microsoft.NET\Framework\v1.1.4322
   ```

4. Enter the following command on the command line:

   ```
   aspnet_regiis.exe -i
   ```

   This enables ASP.NET on your computer.

5. Close the command line box.

After you enable ASP.NET, you must then add ASP.NET accounts to your Host Integration Server local users and groups.

See Also

Adding ASP.NET Accounts to Host Integration Server 2004 Local Users and Groups

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Adding ASP.NET Accounts to Host Integration Server 2004 Local Users and Groups

The client application for this tutorial uses ASP.NET technologies to access Host Integration Server 2004. Therefore, your final step in setting up ASP.NET for this sample is to set the ASP.NET accounts for Host Integration Server 2004 Local Users and Groups. The following procedure describes how you can set ASP.NET accounts from the Microsoft Management Console (MMC).

To set the ASP.NET accounts for Host Integration Server 2004 Local Users and Groups

1. On the desktop, right-click **My Computer** and click **Manage**.
2. On the **Management Console**, expand **Users and Groups** and click **Groups**.
3. Double-click **HIS Administrators**.
4. On the **HIS Administrators Properties** dialog box, click **Add**.
5. Under the **Name** list on the **Select Users or Groups** dialog box, click **ASP.NET** and then click **OK**.
6. On the **Select Users or Groups** dialog box, click **Cancel**.
7. On the **HIS Administrators Properties** dialog box, click **Apply**, and then click **Close**.
8. Double-click **HIS Runtime Users**.
9. On the **HIS Runtime Users Properties** dialog box, click **Add**.
10. Under the **Name** list on the **Select Users or Groups** dialog box, click **ASP.NET** and then click **OK**.
11. On the **Select Users or Groups** dialog box, click **Cancel**.
12. On the **HIS Runtime Users Properties** dialog box, click **Apply**, and then click **Close**.
13. On the **Select Users or Groups** dialog box, click **Cancel**.
14. On the **Computer Management** console, click **Close**.

Now that you have successfully set up ASP.NET on your client, you can begin defining the Remote Environment (RE) this sample will connect to.

See Also

Defining a Remote Environment for CICS

Defining a Remote Environment for CICS

In order to access a remote environment such as a mainframe, you must first define the remote environment to Host Integration Server 2004. The following procedure uses the TI Manager, and is the first time in this tutorial that you use a tool specific to Host Integration Server 2004. The TI Manager is an MMC snap-in you use to configure end-points, associate resources with requests, and define security and access rules for Host Integration Server 2004. For now, you will use TI Manager to define a remote environment. A remote environment is a collection of properties that describe a region on the mainframe. Host Integration Server 2004 uses this information to properly access the specific resources necessary for a given application. In the case of this tutorial, the remote environment describes the region of the mainframe that hosts the CICS Cedar Bank mainframe application, which you compiled and installed earlier. For more information, see Transaction Integrator Manager Help.

To define the remote environment to Host Integration Server

1. Click **Start**, point to **Programs**, point to **Microsoft Host Integration Server 2004**, and then click **TI Manager**.
2. On the TI MMC console, expand Windows Initiated Processing, right-click **Remote Environments**, select **New**, and then click **Remote Environment**.
3. On the **Welcome to the New Remove Environment Wizard** page, click **Next**.
4. Under **Name** on the **Configure a New Remote Environment** page, type **CICS WIP Environment**.
5. Under **Vendor**, select **Microsoft**.
6. Under **Network type**, select the network type you choose to use with this tutorial, and then click **Next**.
7. Under **Target host** on the **Configure Host Environment and Programming Model** page, select **CICS**.
8. Under **Programming model**, select the programming model you choose to use with this tutorial, and then click **Next**.
9. Under **IP / DNS address** on the **Configure Endpoint TCP/IP** page, type in a valid IP or DNS address of your remote computer where the CICS Cedar Bank server is executed. If you do not know the IP address of your mainframe CICS system, contact the mainframe or CICS system administrator.
10. Under **Port List**, select the port number you used in "Compiling and Linking the TCP CICS Concurrent Mainframe Program" or in "Compiling and Linking the TCP CICS msLink Mainframe Program". If this number is not shown, click **Edit** and add the number as a defined port. If you used some other Setup procedure, you may skip this step.
11. Click **Next**, and then on the **Completing the New Remote Environment Wizard** page, click **Finish**.

After you have defined the remote environment, you define the object that will access that environment from your computer for Host Integration Server 2004.

See Also

Defining a WIP Object for CICS

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Defining a WIP Object for CICS

A Windows-Initiated Processing (WIP) object is an application on your computer that accesses a remote environment. In order to access the remote environment, you must use the TI Manager to define the Cedar Bank client to Host Integration Server 2004. This step is the first time you have encountered a WIP object. However, in context, defining a WIP object is similar to defining a remote environment: where a remote environment represents a mainframe to the client, a WIP object represents the client to the mainframe. Later in the tutorial, Host Integration Server 2004 will use information stored in the WIP object to process information from the client application and pass that information on to the mainframe program. For more information, see Windows-Initiated Processing, The Transaction Integrator Manager Console, and Transaction Integrator Manager Help.

To define the Cedar Bank client to Host Integration Server

1. Click **Start**, point to **Programs**, point to **Microsoft Host Integration Server 2004**, and then click **TI Manager**.
2. On the TI MMC console, expand Windows Initiated Processing, then right-click **Objects**, then select **New**, and then click on **Object**.
3. On the **Welcome to the Object Wizard** page of the **Object Wizard**, click **Next**.
4. On the **Specify or Locate An Object** page, click **Browse**.
5. In the **Open** dialog box, browse to the following location:

   ```
   <drive>:\SDK\Samples\AppInt\WindowsInitiated\All CedarBank Assemblies
   ```

6. In the **Files of Type**, select **TI Metadata File for .NET(*.dll)**, select the .dll file that matches the programming model you chose for this tutorial, and click **Open**.
7. Click **Next**.
8. Under **Virtual directories** on the **Define Environment Characteristics For The .NET Object** page, select **Default Web Site/Cedar Bank .NET Tutorial**, and click **Next**.
9. **Under Remote environments** on the **Define Remote Environment** page, select the remote environment you created for this tutorial in **Defining a Remote Environment**, and then click **Next**.
10. On the **Creation of WIP Objects** page, wait until the wizard has finished creating your object, then click **Next**. If you have errors, consult Debugging WIP Object Creation.
11. On the **Completing the Object Wizard** page, click **Finish**.

Now that you have defined your application as a WIP object, you can compile and execute the Cedar Bank WIP client application. If you were unable to create the object, you may need to debug the process.

See Also

CICS Client (Using .NET) Module 3: Executing Your Application

Debugging WIP Object Creation

Debugging WIP Object Creation

This step is optional.

It may be possible that you are unable to create a WIP object in the virtual directory. One of the possible reasons for this may be due to a Windows® SharePoint® setting. If you have Windows SharePoint installed, consult the following instructions:

To debug WIP object creation

1. Edit the file web.config in <*installdir*>\SDK\Samples\AppInt\WindowsInitiated\TI Host.
2. Between the lines containing <system.web> and </system.web> insert the line:

   ```
   <identity impersonate="false" />
   ```

3. Retry defining the object in Defining a WIP Object for CICS.

See Also

CICS Client (using .NET) Module 3: Executing Your Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

CICS Client (Using .NET) Module 3: Executing Your Application

After you have successfully configured ASP.NET and the Remote Environment, you can now compile, link, and execute the client application.

This module contains two steps:

1. Compiling and Linking the WIP Application
2. Running the WIP Application

Compiling and Linking the WIP Application

The first step in executing the Cedar Bank WIP application is to compile and link the C# code. Because this tutorial is designed for one of several possible mainframe configurations, you must modify the project slightly before you compile the code.

To compile and link the application

1. Click **Start**, point to **Programs**, point to **Microsoft Visual Studio .NET 2003**, and then click **Microsoft Visual Studio .NET 2003**.
2. On the **File** menu, point to **Open**, and then click **Project**.
3. In the **Open Project** dialog box, select the project in the following path and then click **Open**:

   ```
   <drive>\SDK\Samples\AppInt\WindowsInitiated\CedarBank Tutorial WIP Solution.sln
   ```

4. Click **Solutions Explorer** and right-click **CSClient**, then expand **References**, right-click on the name of the .dll file you selected in **Defining a WIP Object**, and click **Remove**.
5. Right-click **References** and then click **Add Reference**.
6. On the **Add Reference** dialog box, click **Browse**.
7. Browse to the physical directory of the **Cedar Bank .NET Tutorial** virtual directory, select the client proxy that matches with the programming model you are using for this tutorial, and click **Open**.
8. Click **OK**.
9. Build the solution.

Now that you have successfully built the solution, you can run the sample application.

See Also

Running the WIP Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Running the WIP Application

Now that you have built the solution, you can run the sample application.

To run the WIP application

1. With the CedarBank Tutorial WIP Solution project open, in Visual Studio, click **Debug**, and then click **Start**.
2. Under **RE Selection** on the **CedarBank C# Sample - Microsoft Host Integration Server** dialog box, select the remote environment for your mainframe.

   The rest of the fields will be filled with the default information for the CedarBank customer name, account number, and PIN number.

3. Click **Edit**, and then click **Context Credentials** to view your current context credentials.
4. If necessary, enter your **User ID** and **Password** on the **Context Credentials** dialog box, and then click **OK**.
5. Click **Connection**, select the connection to use for this session, and then click **OK**.
6. In the **Check Account Balance** section, click **Go** to view the check account balance, or click **Go** in the **Show All Accounts** section to show all current accounts.
7. When finished, click **Done**.

You have now completed the tutorial.

See Also

Windows-Initiated Processing Tutorials

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Windows-Initiated Processing Tutorial: WIP Web Service Client to OS/400 Server (Using .NET)

In this tutorial, you learn how to compile and link COBOL server applications, configure a WIP application for an OS/400 Server, and execute an Host Integration Server 2004 client application.

This section contains:

- OS/400 DBP (Using .NET) Module 1: Compiling and Linking the Server Application
- OS/400 DBP (Using .NET) Module 2: Configuring a WIP Application
- OS/400 DBP (Using .NET) Module 3: Executing your Application

OS/400 DBP (Using .NET) Module 1: Compiling and Linking the Server Application

In this module, you upload, compile, and link the tutorial RPG files. The following instructions describe the location of the necessary files in the SDK and on your mainframe. This information assumes that you have an OS/400 Distributed Program Call (DPC) programming model. The DPC programming model allows most AS/400 application to interact with Transaction Integrator in request-reply fashion (client-initiated only) with minimum modifications. DPC is a documented protocol that supports program-to-program integration on an AS/400, which can be accessed from PC-based applications using the TCP/IP networking protocol. For more information about compiling and linking OS/400 mainframe applications, consult your mainframe documentation or administrator.

To build the OS400 WIP client RPG applications

1. Create a production library on the AS/400 named **APPINT** with the following members:

   QDDSSRC

   QRPGLESRC

2. Transfer or copy the Cedar Bank RPG file to the APPINT library members using the following syntax:

   ```
   FROM<installdir>\SDK\Samples\AppInt\WindowsInitiated\TCP OS400 DPC\Cedrbank.rpg
   ```

   ```
   TO APPINT/QRPGLESRC(CEDRBANK) type *RPGLE
   ```

3. Transfer or copy the Cedar Bank Get Accounts RPG file to the APPINT library members using the following syntax:

   ```
   FROM <installdir>\SDK\Samples\AppInt\WindowsInitiated\TCP OS400 DPC\Getaccts.rpg
   ```

   ```
   TO APPINT/QRPGLESRC(GETACCTS) type *RPGLE
   ```

4. Compile and link all the transferred or copied members. Place the compiled application into APPINT.

Now that you have compiled and linked the mainframe application, you can move on to configuring the WIP application.

See Also

OS/400 DBP (Using .NET) Module 2: Configuring a WIP Application

OS/400 DBP (Using .NET) Module 2: Configuring a WIP Application

After you have compiled and linked your mainframe application, you must make sure that ASP.NET is active on your client, and then configure the WIP application. You will use IIS later to provide network and remote access connectivity. Similarly, Host Integration Server uses the information provided in the WIP configuration to access both the remote mainframe configuration and the local client application.

This module contains eight steps:

1. Making Sure you have Internet Information Service Installed
2. Creating a Virtual Directory
3. Checking that ASP.NET is Enabled
4. Enabling ASP.NET
5. Adding ASP.NET Accounts to Host Integration Server 2004 Local Users and Groups
6. Defining a Remote Environment for AS/400
7. Setting Security for AS/400
8. Defining a WIP Object for AS/400

Making Sure you have Internet Information Service Installed

One of the necessary prerequisites for this sample is that the Internet Information Service (IIS) must be installed and enabled. IIS provides the capabilities to create virtual directories. Later in this tutorial, you will use virtual directories to manage the sample application. Therefore, you need to use the Control Panel and your rights as an administrator to ensure that IIS is available for you to use.

To ensure IIS is installed and enabled

1. Click **Start**, point to **Settings**, and then click **Control Panel**.
2. On the **Control Panel**, click **Add and Remove Programs**.
3. On the **Add and Remove Programs** dialog box, click **Add/Remove Windows Components**.
4. On the **Components** box on the **Windows Component Wizard**, see if the **Internet Information Services (IIS)** box is checked. If not, check the box and continue with installation. If the box is checked, close the **Windows Component Wizard**.

Now that you have installed (or confirmed installation of) IIS, you can create a virtual directory for your tutorial to use.

See Also

Creating a Virtual Directory

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Creating a Virtual Directory

After you have confirmed that IIS has been installed on your system, you must create a virtual directory for your tutorial application to use. A virtual directory is a tool used by IIS to consolidate and protect Web sites and other applications that run over TCP/IP. Later in this tutorial, you will use the virtual directory to hold your client application and to set Windows security protocols. In this step, however, you simply create the virtual directory with the Virtual Directory Creation Wizard, which you access through the Microsoft Management Console (MMC) and IIS.

To create a virtual directory

1. On the Desktop, right-click **My Computer**, then click on **Manage**.
2. On the **Computer Management** console, expand **Services and Applications**, then expand **Internet Information Services**, right-click **Default Web Site**, point to **New**, and click on **Virtual Directory**.
3. On the **Virtual Directory Creation Wizard**, click **Next**.
4. Under **Alias** on the **Virtual Directory Alias** page, type **Cedar Bank .NET Tutorial**, then click **Next**.
5. Under **Directory** on the **Web Site Content Directory** wizard page, type **<*installdir*>\SDK\Samples\AppInt\WindowsInitiated\TI Host**, then click **Next**.
6. On the **Access Permissions** page, click **Next**.
7. On the **Windows Component Wizard** page, click **Finish**. The wizard now creates a virtual directory for your application to use.

Now that you have created a virtual directory, you use the management console to see if you have ASP.NET enabled on your computer.

See Also

Checking that ASP.NET is Enabled

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Checking that ASP.NET is Enabled

The client application for this tutorial uses ASP.NET technology to send to and receive information from the mainframe application. Therefore, after you create the virtual directory, you must check to see if ASP.NET is enabled on your system. You can check to see if ASP.NET is enabled through the Computer Management console.

To check that ASP.NET is enabled

1. On the **Computer Management** console, expand **Default Web Site**, then right-click **Cedar Bank .NET Tutorial**, then click **Properties**.
2. Under **Application Settings** on the **Virtual Directory** tab of the **Cedar Bank .NET Tutorial Properties** dialog box, click **Configuration**.
3. On the **App Mappings** tab on the **Application Configuration** dialog box, in the **Application Mappings** pane, check for the **.rem** value in the **Extensions** column. If .rem appears, your system is enabled for ASP.NET. If .rem is not in the list, you must enable your system for ASP.NET.
4. Click **Cancel**.
5. On the **Cedar Bank .NET Tutorial Properties** dialog box, click **Cancel**.
6. On the **Computer Management** console, click **Close**.

If you determine that ASP.NET is not enabled on your computer, you need to enable it. Otherwise, you can continue compiling and executing the tutorial.

See Also

Enabling ASP.NET

Adding ASP.NET Accounts to Host Integration Server 2004 Local Users and Groups

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Enabling ASP.NET

As with many distributed applications, the sample application for this tutorial uses ASP.NET to send and receive information to the mainframe. Therefore, if ASP.NET is not enabled for your system, you must enable it in order to properly run this sample. The following procedure describes how you can enable ASP.NET from the command line.

To enable ASP.NET

1. Click **Start**, and then click **Run**.
2. In the **Run** dialog box, in the **Open** box, type **cmd**, and then press ENTER.
3. On the command line, change the directory to the following location:

   ```
   %windows%\Microsoft.NET\Framework\v1.1.4322
   ```

4. Enter the following command on the command line:

   ```
   aspnet_regiis.exe -i
   ```

   This enables ASP.NET on your computer.

5. Close the command line box.

After you have enabled ASP.NET, you must then add ASP.NET accounts to your Host Integration Server local users and groups.

See Also

Adding ASP.NET Accounts to Host Integration Server 2004 Local Users and Groups

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Adding ASP.NET Accounts to Host Integration Server 2004 Local Users and Groups

The client application for this tutorial uses ASP.NET technologies to access Host Integration Server 2004. Therefore, your final step in setting up ASP.NET for this sample is to set the ASP.NET accounts for Host Integration Server 2004 Local Users and Groups. The following procedure describes how you can set ASP.NET accounts from the Microsoft Management Console (MMC).

To set the ASP.NET accounts for Host Integration Server 2004 Local Users and Groups

1. On the desktop, right-click **My Computer,** and click **Manage**.
2. On the **Management Console**, expand **Users and Groups**, and click **Groups**.
3. Double-click **HIS Administrators**.
4. On the **HIS Administrators Properties** dialog box, click **Add**.
5. Under the **Name** list on the **Select Users or Groups** dialog box, click **ASP.NET**, and click **OK**.
6. On the **Select Users or Groups** dialog box, click **Cancel**.
7. On the **HIS Administrators Properties** dialog box, click **Apply**, and then click **Close**.
8. Double-click **HIS Runtime Users**.
9. On the **HIS Runtime Users Properties** dialog box, click **Add**.
10. Under the **Name** list on the **Select Users or Groups** dialog box, click **ASP.NET** and click **OK**.
11. On the **Select Users or Groups** dialog box, click **Cancel**.
12. On the **HIS Runtime Users Properties** dialog box, click **Apply**, and then click **Close**.
13. On the **Select Users or Groups** dialog box, click **Cancel**.
14. On the **Computer Management** console, click **Close**.

See Also

Defining a Remote Environment for AS/400

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Defining a Remote Environment for AS/400

In order to access your remote AS/400 mainframe, you must first define the remote environment to Host Integration Server 2004.

The following procedure uses the TI Manager, and is the first time in this tutorial that you use a tool specific to Host Integration Server 2004. The TI Manager is an MMC snap-in you use to configure end-points, associate resources with requests, and define security and access rules for Host Integration Server 2004. For now, you will use TI manager to define a remote environment. A remote environment is a collection of properties that describe a region on the mainframe. Host Integration Server 2004 uses this information to properly access the specific resources necessary for a given application. In the case of this tutorial, the remote environment describes the region of the mainframe that hosts the Cedar Bank mainframe application, which you compiled and installed earlier. For more information, see Transaction Integrator Manager Help.

To define the remote environment to Host Integration Server

1. Click **Start**, point to **Programs**, point to **Microsoft Host Integration Server 2004**, and then click **TI Manager**.
2. On the TI MMC console, expand Windows Initiated Processing, then right-click **Remote Environments**, then select **New**, then click on **Remote Environment**.
3. On the **Welcome to the New Remove Environment Wizard** page of the **New Remote Environment Wizard**, click **Next**.
4. Under **Name** on the **Configure a New Remote Environment** page, type **AS/400 WIP Environment**.
5. Under **Vendor**, select **Microsoft**.
6. Under **Network type**, select the network type for your AS/400 mainframe, and click **Next**.
7. Under **Target host** on the **Configure Host Environment and Programming Model** page, select **OS/400**, then click **Next**.
8. Under **IP / DNS address** on the **Configure Endpoint TCP/IP** page, type in a valid IP or DNS address of the OS/400 mainframe that runs the sample tutorial. If you do not know the IP address of your mainframe system, contact the mainframe or CICS system administrator.
9. Under **Port List**, select 1111. If 1111 is not available, Click **Edit** and define **1111** as a valid port.
10. Click **Next**, then on the **Completing the New Remote Environment Wizard** page, click **Finish**.

After you have defined the remote environment, you can define for Host Integration Server the object that accesses that environment from your computer.

See Also

Setting Security for AS/400

Defining a WIP Object for AS/400

Setting Security for AS/400

This step is necessary only if your AS/400 requires security credentials. For more information about the security requirements of your AS/400, consult your mainframe administrator.

To set security for AS/400

1. On the TI manager screen, expand **Windows Initiated Processing**, expand **Remote Environments**, right-click AS/400 WIP Environment, and then click **Properties**.
2. Select the **Security** tab on the **AS/400 WIP Environment Properties** dialog box, click **Require client provided security**, and then click **OK**.

See Also

Defining a WIP Object for AS/400

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Defining a WIP Object for AS/400

A WIP object is an application on your computer that accesses a remote environment. In order to access the remote environment, you must use the TI Manager to define the Cedar Bank client to Host Integration Server 2004. This step is the first time you have encountered a WIP object. However, in context, defining a WIP object is similar to defining a remote environment: where a remote environment represents a mainframe to the client, a WIP object represents the client to the mainframe. Later in the tutorial, Host Integration Server 2004 will use information stored in the WIP object to process information from the client application and pass that information on to the mainframe program. For more information, see Windows-Initiated Processing, The Transaction Integrator Manager Console, and Transaction Integrator Manager Help.

To define a WIP object for AS/400

1. Click **Start**, point to **Programs**, point to **Microsoft Host Integration Server 2004**, and then click **TI Manager**.
2. On the TI MMC console, expand **Windows Initiated Processing**, then right-click **Objects**, select **New**, and then click **Object**.
3. On the **Welcome to the Object Wizard** page, click **Next**.
4. On the **Specify or Locate An Object** page, click **Browse**.
5. In the **Open** dialog box, browse to the following location:

   ```
   <installdir>\SDK\Samples\AppInt\WindowsInitiated\All CedarBank Assemblies
   ```

6. In the **Files of Type** box, select **TI Metadata File for .Net(*.dll)**, select the .dll file that matches the programming model you chose for this tutorial, and then click **Open**.

   For this tutorial, you most likely use the **OS400_DPC_TCP_CedarBank_NET.DLL** file.

7. Click **Next**.
8. In the **Virtual directories** section, on the **Define Environment Characteristics For The .NET Object** page, select **Default Web Site/Cedar Bank .NET Tutorial**, and then click **Next**.
9. In the **Remote environments** section, on the **Define Remote Environment** page, select **AS/400 WIP Environment**, and then click **Next**.
10. On the **Creation of WIP Objects** page, wait until the wizard has finished creating your object, and then click **Next**.
11. On the **Completing the Object Wizard** page, click **Finish**.

Now that you have defined your application as a WIP object, you can compile and execute the Cedar Bank WIP client application.

See Also

OS/400 DBP (Using .NET) Module 3: Executing your Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

OS/400 DBP (Using .NET) Module 3: Executing your Application

After you have successfully configured ASP.NET and the Remote Environment, you can now compile, link, and execute the client application.

This module contains two steps:

1. Compiling and Linking the OS/400 WIP Application
2. Running the OS/400 WIP Application

Compiling and Linking the OS/400 WIP Application

The first step in executing the Cedar Bank WIP application is to compile and link the C# code. Because this tutorial is designed for one of several possible mainframe configurations, you must modify the project slightly before you compile the code. Note that you can use this project for multiple tutorials.

To compile and link the OS/400 WIP application

1. Click **Start**, point to **Programs**, point to **Microsoft Visual Studio .NET 2003**, and then click **Microsoft Visual Studio .NET 2003**.
2. On the **File** menu, point to **Open**, and then click **Project**.
3. In the **Open Project** dialog box, select the project in the following path, and then click **Open**:

   ```
   <installdir>\SDK\Samples\AppInt\WindowsInitiated\CedarBank Tutorial WIP Solution.sln
   ```

4. Click **Solutions Explorer**, and right-click **CSClient**, expand **References**, right-click on the name of the .dll file you selected in **Defining a WIP Object for AS/400**, and then click **Remove**.

   For this tutorial, you most likely remove the reference to **OS400_DPC_TCP_CedarBank_NET**.

5. Right-click **References**, and then click **Add Reference**.
6. In the **Add Reference** dialog box, click **Browse**.
7. Browse to the physical directory of the **Cedar Bank .NET Tutorial** virtual directory, select the client proxy that matches the programming model you are using for this tutorial, and then click **Open**.

   For this tutorial, you most likely choose the **OS400_DPC_TCP_CedarBank_NET** proxy.

8. Click **OK**.
9. Build the solution.

Now that you have successfully built the solution, you can run the sample application.

See Also

Running the OS/400 WIP Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Running the OS/400 WIP Application

Now that you have built the solution, you can run the sample application.

To run the OS/400 WIP application

1. With the CedarBank Tutorial WIP Solution project open in Visual Studio, click **Debug**, and then click **Start**.
2. In the **RE Selection** section, in the **CedarBank C# Sample - Microsoft Host Integration Server** dialog box, select the remote environment for your mainframe.

   The rest of the fields will be filled with the default information for the CedarBank customer name, account number, and PIN number.

3. Click **Edit**, and then click **Context Credentials** to view your current context credentials.
4. If necessary, enter your **User ID** and **Password** on the **Context Credentials** dialog box, and then click **OK**.
5. Click **Connection**, select the connection to use for this session, and then click **OK**.
6. In the **Check Account Balance** section, click **Go** to view the check account balance, or click **Go** in the **Show All Accounts** section to show all current accounts.
7. When finished, click **Done**.

You have now completed the tutorial.

See Also

Windows-Initiated Processing Tutorials

Host-Initiated Processing Tutorials

The following tutorials are designed to help you work your way through the Cedar Bank Host-Initiated Processing (HIP) sample, and are based off of the .NET readme files located in <*installdir*>\Program Files\Microsoft Host Integration Server 2004\SDK\Samples\AppInt\HostInitated. Note that although the Cedar Bank COM code is still available in the SDK, these tutorials focus on the .NET versions of the samples. Also note that not all of the Remote Environments (RE) available were made into tutorials. However, many of the procedures for setting up the REs in these tutorials will be the same for all mainframe environments.

This section contains:

- Host-Initiated Processing Tutorial: CICS Client (Using .NET)
- Host-Initiated Processing Tutorial: IMS TCP/IP Client (Using .NET)

Host-Initiated Processing Tutorial: CICS Client (Using .NET)

In this tutorial, you learn how to compile and link a Host Source application, configure a new CICS client application, and execute a CICS client program.

This section contains:

- CICS Client (Using .NET) Module 1: Compiling and Linking the Host Source Application
- CICS Client (Using .NET) Module 2: Configuring a HIP Application for a .NET Server
- CICS Client (Using .NET) Module 3: Executing a CICS Client Program to Call a .NET Server

CICS Client (Using .NET) Module 1: Compiling and Linking the Host Source Application

In this module, you compile, link, and configure the mainframe COBOL applications with which your local applications communicate.

This module contains two steps:

1. Compile and Link the Map Definitions and COBOL Applications
2. Define the Programs and Maps to CICS

Compile and Link the Map Definitions and COBOL Applications

The first step is to upload, compile, and link the tutorial COBOL files and maps. The following instructions describe the location of the necessary files and their associated linkage control editor statements. For more information about compiling and linking mainframe applications, consult your mainframe documentation or administrator.

1. Compile and link the CICS TCP Cedar Bank BMS map definition using the associated linkage control editor statements.

   You can find the CICS TCP Cedar Bank BMS map definition in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\CICS\BMSMaps\TCPCedrmap.bms.

   The associated linkage control editor statements are located in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\CICS\LinkControl\TCPCedrmap.lkd

2. Compile and link the CICS Microsoft HIP Link program using the associated linkage control editor statements.

   You can find the CICS Microsoft HIP Link program in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\CICS\COBOLSource\TCPMSHIPLnk.cbl.

   The associated linkage control editor statements are located in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\CICS\LinkControl\TCPMSHIPLnk.lkd.

3. Compile and link the CICS HIP Cedar Bank Client program using the associated linkage control editor statements.

   You can find the CICS HIP Cedar Bank Client program in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\CICS\COBOLSource\TCPCedrclie.cbl.

   The associated linkage editor control statements are located in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\CICS\LinkControl\TCPCedrclie.lkd.

Once you have finished compiling and linking your mainframe COBOL application and map, you must define the program and map to CICS.

See Also

Define the Programs and Maps to CICS

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Define the Programs and Maps to CICS

Once you have compiled and linked the COBOL applications, you must now describe these executed modules to CICS. For more information about defining an application to CICS, consult your mainframe documentation or CICS administrator.

1. Define the CICS HIP Cedar Bank Client as a COBOL program using the following syntax:

   ```
   CEDA DEF PROG(CEDRCLIE) GROUP(HISSAMP) LANG(COBOL)
   ```

2. Define the CICS Microsoft HIP Link as a COBOL program using the following syntax:

   ```
   CEDA DEF PROG(MSHIPLNK) GROUP(HISSAMP) LANG(COBOL)
   ```

3. Define a CICS transaction ID that will be used to execute the HIP client and associate it with the HIP Cedar Bank Client program using the following syntax:

   ```
   CEDA DEF TRANS(CCLI) GROUP(HISSAMP) PROG(CEDRCLIE)
   ```

4. Define the CICS mapset CEDRMAP using the following syntax:

   ```
   CEDA DEF MAPSET(CEDRMAP) GROUP(HISSAMP)
   ```

5. Install the HISSAMP group using the following syntax:

   ```
   CEDA INSTALL GROUP(HISSAMP)
   ```

Once you have successfully compiled, linked, and described the COBOL applications on the mainframe, you can now install and configure the HIP Application on your .NET server.

See Also

CICS Client (Using .NET) Module 2: Configuring a HIP Application for a .NET Server

CICS Client (Using .NET) Module 2: Configuring a HIP Application for a .NET Server

Once you have compiled, linked, and configured the CICS Cedar Bank Client application on your mainframe, you must compile and configure the HIP Cedar Bank server application on your Windows Server 2003. The Host Integration Server 2004 SDK includes the C# sample code for the HIP Cedar Bank server application. This code is fully functional, which you may compile if you so choose. However, for the purpose of this tutorial, you will be using the precompiled assemblies.

This module contains three steps:

1. Start TI Manager
2. Define a New CICS Application
3. Start the CICS Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Start TI Manager

Your first step to configuring a HIP application is to access TI manager.

TI manager is a design-time administrative tool that is hosted inside, and uses the graphical user interface, of the Microsoft Management Console. For the purpose of this tutorial, you will use TI Manager to define and start the CICS application.

To access the TI manager

- Click **Start**, point to **Programs**, point to **Microsoft Host Integration Server 2004**, and then click **TI Manager**.

After you have accessed the TI Manger, you can begin defining a new CICS application.

See Also

Define a New CICS Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Define a New CICS Application

After you have accessed the TI manager, you can use the New Application Deployment Wizard to define a new CICS application. Defining a CICS application means that you inform Host Integration Server 2004 regarding the application itself, your local environment, and host environment. Host Integration Server 2004 will use this information to properly connect your local application to the host application. Note that you could perform many of the tasks in this procedure separately. However, the Application Deployment Wizard enables you to enter all of the necessary data at once. For more information, see New Application Deployment Wizard.

To define a new CICS application

1. On the **TI Manager** MMC console, expand the **Transaction Integrator** node, expand the **Host Initiated Processing** node, and then expand the **Computers** node. The **Computers** folder should display a single computer, the computer to which you are logged on.
2. Right-click your computer name, point to **New**, and then click **Application Deployment Wizard**.
3. On the **Welcome to the Application Deployment Wizard** page, click **Next**.
4. Under **Application** on the **Create an Application** page, type **CedarBank**.
5. Under Comment, type **Cedar Bank HIP Application, created in Module 2 Step 2 of the tutorial**, and then click **Next**.
6. Under **User name** in the **Credentials for Service** dialog box, type the user name that the HIP Application (service credentials) will use.
7. Under **Password**, type the password associated with the user name entered in the earlier step, and then click **Next**.
8. Under **Local environment** on the **Configure a New Local Environment** page, type **CedarBankNETServer**.
9. Under **Network Type**, select **TCP/IP**.
10. Under **Transport class**, select **TCPTransport Class**, and then click **Next**.
11. Under **New port or service name** on the **Configure Local Environment Endpoints** wizard page, type **1112**, then click **Add** to enter this value into the **Defined ports and service names**, and then click **Next**.
12. Under **Host environment** on the **Configure a New Host Environment** page, type **{name of the host where the CICS HIP Client will be executed}**.
13. Under **Data conversion**, select **Transaction Integrator - ConvertPrim for OS/ 390**.
14. Under **Host code page**, select **EBCDIC - US/Canada [37]**.
15. Under **Remote endpoint manager**, type the name of your mainframe, and then click **Next**.
16. Under **Type** on the **Configure Host Environment Default Method Resolution** page, select Type: **Enhanced Listener Message (ELM)**, and Object: **MicrosoftHIS –ELMHandlerMSLink1.1** object, then click **Next**.
17. Under **Security policy** on the **Configure a New Security Policy** page, type **CICS**.
18. Under **Credentials source** used to invoke the server, select **Windows credentials of the HIP application**, then click **Next**.
19. Under **Object** on the **Specify or Locate an Object** page, type **CedarBankNET**.
20. Under **Registered TIMs**, click **Browse** and navigate to the **<drive>:\Program Files\Microsoft Host Integration Server 2004\SDK\Samples\AppInt\HostInitiated\CedarBankTIMs\DotNet** folder, then click **CedarBank_NET.TIM**. Click **Open,** and then click Next.
21. Under **Pick assembly Path**, click **Browse** and navigate to the **<drive>:\Program Files\Microsoft Host Integration Server 2004\SDK\Samples\AppInt\HostInitiated\CedarBankServes\DotNet\CSCedarBank\bin\release** folder, then click **CSCedarBank.dll**. Click **Open,** and then click Next.
22. Under **View** on the **Configure the New View** page, type **CEDRBANK_ELM**.
23. Under **Object methods**, select the check box in the **Include** column for the **CedrBank** method.
24. Under the **Link Program Name** on the **Method Resolution Criteria** dialog box, type **CEDRBANK**, and then click **OK**.
25. On the **Configure the New View** page, click **Next**.
26. On the **Completing the Application Deployment Wizard** page, click **Finish**. The wizard now saves the application definition in the HIP Configuration database.
27. Copy the implementing assemblies from the SDK directory to the default folder in the installation directory. The directory paths are as follows:

```
<installdir>\SDK\Samples\AppInt\HostInitiated\CedarBankServers\DotNet\CSCedarBank\bin\Release
<installdir>\system\HIP Implementing Assemblies
```

In the next step, you start the newly created application and its associated objects.

See Also

Start the CICS Application

Start the CICS Application

In this step you initialize and view the newly created CedarBank application and the associated local environment, host environment, objects, and object views. This step is necessary because, while the previous step sets up Host Integration Server 2004 to run the host application, you have not actually turned the application on. Later in the tutorial, you will access and instruct the host application to make a call to a .NET server. For more information, see Host-Initiated Processing Node.

To view the CedarBank application and associated environments, objects, and object views

1. On the **TI Manager** MMC console, expand the **Transaction Integrator** node, expand the **Host Initiated Processing** node, then expand the **Computers** node, and then expand the name of the computer to which you are logged on. Under your computer name, you should see the newly created application **CedarBank**.
2. Right-click **CedarBank [stopped]**, and then click **Start**. Notice that **[stopped]** changed to **[starting]** and then to **[active]**. You have now initialized the listener service.

You are now set to run the CICS HIP Cedar Bank client.

See Also

CICS Client (using .NET) Module 3: Executing a CICS Client Program to Call a .NET Server

CICS Client (Using .NET) Module 3: Executing a CICS Client Program to Call a .NET Server

After you have started the host application on your local Windows computer, you can execute the CICS HIP Cedar Bank client sample program.

This module contains four steps:

1. Start the 3270 Client Session
2. Execute the CICS Program
3. Re-Execute the CICS Program
4. Log Out of CICS

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Start the 3270 Client Session

In this step, you connect Host Integration Server 3270 Client to the CICS region where the HIP Cedar Bank client is installed. The 3270 Client is a client-side application that provides remote access to a mainframe. Later in this tutorial, you will use the 3270 Client to instruct the CICS application to make a call to a .NET server. For an in-depth discussion of 3270 Client access, see Host Integration Server Concepts for 3270 Client Access. This step assumes you have a TN3270 service currently set up for your system. For more information about setting up and maintaining a TN3270 connection, see TN Service.

To start the 3270 Client session

1. Click **Start**, point to **Programs**, point to **Microsoft Host Integration Server 2004**, point to **Tools**, and then click **3270 Client**.
2. On the **Host Integration Server 3270 Client** menu, click **Session**, and then click **Session Configuration**.
3. Under **Server Name**, type the name of your server.
4. Under **Device**, leave this field blank, and then click **OK**.
5. On the **Host Integration Server 3270 Client** menu, click **Session**, and then click **Connect**. The SSCP screen should appear after a few seconds.
6. On the SSCP screen, type the logon name for the CICS region where the Cedar Bank client was installed, and then click ENTER.

Now that you have started the 3270 Client session, you can execute the CICS program.

See Also

Execute the CICS Program

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Execute the CICS Program

In this step, you execute the CICS program. The CICS program makes a call to a .NET server, which also happens to be your local PC. Once you have successfully instructed the CICS program to call your local PC, you can either finish the tutorial, or re-execute the CICS program.

To execute the CICS program

1. On the EIG CICS banner screen, click the **CLEAR** (pause) key.
2. On the blank screen, type **CCLI**, and then click ENTER. The **Cedar Bank Client for CICS using MS Link** application screen appears.
3. On the CICS client screen, type a valid **HIP Server IP Address**. (This is the IP address of the PC you are working on.) To find the address, start a command window and run IPCONFIG. Doing so displays the current IP address for the PC.
4. Select the HIP Resolution Type to match the defined HIP server application.
5. Under **Port**, type **1112**.
6. Under **HIP Resolution Type**, type **ELM**, and then click ENTER.
7. View the results on the CICS screen, noting the **Account Balance** and **Call duration in milliseconds**.

See Also

Log Out of CICS

Re-Execute the CICS Program

Re-Execute the CICS Program

This step is optional. After running the CICS program, you may choose to re-execute the CICS program in order to observe how different aspects of the tutorial operate. When you are finished, you must log out of the 3270 Client.

To re-execute the CICS program

1. Re-execute the program and show the call duration changes depending on network traffic.
2. Change the HIP server program to return a different Account Balance, and then re-execute the CICS client program.

After you finish executing the CICS program, you must log out.

See Also

Log Out of CICS

Log Out of CICS

The last step in the tutorial is to log out of the 3270 client application. If you do not log out properly, you may accidentally leave a connection to the mainframe open, which will consume system resources and potentially create a security breach.

To log out of CICS

1. On the CICS transaction panel, click **CLEAR** (pause). A blank screen appears.
2. Type **CESF LOGOFF**, and then click ENTER.
3. On the **Host Integration Server 3270 Client** menu bar, click **Session**, then click **Disconnect**, and then close the 3270 Client.

You have now completed this tutorial.

Host-Initiated Processing Tutorial: IMS TCP/IP Client (Using .NET)

In this tutorial, you learn how to compile and link a Host Source application, configure a new IMS client application, and execute an IMS client program.

This section contains:

- IMS TCP/IP Client (using .NET) Module 1: Compiling and Linking the IMS Host Source Application
- IMS TCP/IP Client (using .NET) Module 2: Configuring a HIP Application for a .NET Server
- IMS TCP/IP Client (using .NET) Module 3: Executing a IMS TCP/IP Client Program to Call a .NET Server

IMS TCP/IP Client (Using .NET) Module 1: Compiling and Linking the IMS Host Source Application

In this module, you compile, link, and configure the mainframe COBOL applications with which your local applications communicate.

This module contains three steps:

1. Prepare the Client for TCP/IP
2. Compile and Link the TCP/IP Map Definitions and COBOL Applications
3. Define the Programs and Transactions to IMS

Prepare the Client for TCP/IP

Your first step is to edit the IMS Cedar Client COBOL files so that the application information is specific to your enterprise. Later on in the tutorial, you will upload and compile the COBOL files on your remote mainframe. Therefore, you need to set the information now, so that the COBOL application runs properly.

1. Open the COBOL file located at <installdir>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\IMS\COBOLSource\TCPCEDRCLIE.cbl.
2. Change the TCP/IP address name space from TCPIP to the address name space of your TCP/IP system.

   The TCP/IP address name will be stored in the variable **HOST-TCP-NAME**.

3. Change the IMS Message Processing Region (MPR) job name from MPRCDRBK to the job name of the MPR that will run the Cedar Bank Client.

   The MPR job name will be stored in the variable **ADDRESS-SPACE-NAME**.

4. Save the changes to the IMS Cedar Client COBOL file.

Once you have modified the COBOL files, you can upload, compile, and link the relevant files on your mainframe.

See Also

Compile and Link the TCP/IP Map Definitions and COBOL Applications

Compile and Link the TCP/IP Map Definitions and COBOL Applications

One you have prepared the client, the next step is to upload, compile, and link the tutorial COBOL files and maps to your mainframe. Later on in the tutorial, you will be accessing this COBOL application from your local PC, and instructing the application to access a .NET server.

The following instructions describe the location of the necessary files and their associated linkage control editor statements. For more information about compiling and linking mainframe applications, consult your mainframe documentation or administrator.

1. Compile and link the Cedar Bank IMS MFS map definition.

   You can find the Cedar Bank IMS MFS map definition in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\IMS\MFSMaps\TCPCedrmap.MFS.

2. Compile and link the IMS Microsoft HIP Link program using the associated linkage control editor statements.

   You can find the IMS Microsoft HIP Link program in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\IMS\COBOLSource\TCPMSHIPLnk.cbl.

   The associated linkage control editor statements are located in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\IMS\LinkControl\TCPMSHIPLnk.lkd.

3. Compile and link the IMS HIP Cedar Bank Client program using the associated linkage control editor statements.

   You can find the CICS HIP Cedar Bank Client program in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\IMS\COBOLSource\TCPCedrclie.cbl.

   The associated linkage editor control statements are located in <*installdir*>\SDK\Samples\AppInt\HostInitiated\CedarBankClients\IMS\LinkControl\TCPCedrclie.lkd.

Once you have finished compiling and linking your mainframe COBOL application and map, you must define the program and map to IMS.

See Also

Define the Programs and Transactions to IMS

Define the Programs and Transactions to IMS

Once you have compiled and linked the COBOL applications, you must now describe these executed modules to IMS. For more information about defining an application to IMS, consult your mainframe documentation or IMS administrator.

To define the programs and transactions to IMS

1. Define the IMS HIP Cedar Bank Client and transaction application in the IMS stage 1 generation using the following syntax, substituting the ## for the appropriate class number associated with a specific message processing region:

```
APPLCTN RESIDENT,PSB=CEDRCLIE,PGMTYPE=TP
TRANSACT CODE=CCLI,MODE=SNGL,EDIT=(ULC),
MSGTYPE=(MULTSEG,RESPONSE,##)
```

2. Define the PSB in IMS using the following syntax:

```
PRINT NOGEN
      PCB    TYPE=TP,MODIFY=YES,EXPRESS=YES
      PSBGEN LANG=COBOL,PSBNAME=CEDRCLIE
END
```

Once you have successfully compiled, linked, and described the COBOL applications on the mainframe, you can now build the server.

See Also

IMS TCP/IP Client (using .NET) Module 2: Configuring a HIP Application for a .NET Server

IMS TCP/IP Client (Using .NET) Module 2: Configuring a HIP Application for a .NET Server

Once you have compiled, linked, and configured the CICS Cedar Bank Client application on your mainframe, you must compile and configure the HIP Cedar Bank server application on your Windows Server 2003. The Host Integration Server 2004 SDK includes the C# sample code for the HIP Cedar Bank server application. This code is fully functional, which you may compile if you so choose. However, for the purpose of this tutorial, you will be using the precompiled assemblies.

This module contains three steps:

1. Start TI Manager
2. Define a New IMS Application
3. Start the IMS Application

Start TI Manager

The first step in configuring a HIP application is to start TI Manager.

TI manager is a design-time administrative tool that is hosted inside, and uses the graphical user interface, of the Microsoft Management Console. For the purpose of this tutorial, you will use TI Manager to define and start the CICS application.

To start the TI Manager

- Click the **Start** button, point to **Programs**. Point to **Microsoft Host Integration Server 2004**, and then click **TI Manager**.

You can now use the TI manager to define a new IMS application.

See Also

Define a New IMS Application

Define a New IMS Application

After you have started the TI manager, you can use the Application Deployment Wizard to define a new IMS application. Defining an IMS application means that you inform Host Integration Server 2004 regarding the application itself, your local environment, and the host environment. Host Integration Server 2004 will use this information to properly connect your local application to the host application. Note that you could perform many of the tasks in this procedure separately. However, the Application Deployment Wizard allows you to enter all of the necessary data at once. For more information, see New Application Deployment Wizard.

To define a new IMS application

1. On the **TI Manager** MMC console, expand the **Transaction Integrator** node, then expand the **Host Initiated Processing** node, and then expand the **Computers** node. The **Computers** folder should display a single computer, the computer to which you are logged on.
2. Right-click your computer name, point to **New**, and then click **Application Deployment Wizard**.
3. On the **Welcome to the Application Deployment Wizard** page, click **Next**.
4. Under **Application** on the **Create an Application** page, type **CedarBank**.
5. Under Comment, type **Cedar Bank IMS HIP Application, created in Module 3 Step 2 of the tutorial**, and then click **Next**.
6. Under **User name** in the **Credentials for Service** dialog box, type the user name you want the HIP Application (service credentials) to use.
7. Under **Password**, type the password associated with the user name entered in the prior step, and then click **Next**.
8. Under **Local environment** on the **Configure a New Local Environment** page, type **CedarBankNETServer**.
9. Under **Network Type**, click **TCP/IP**.
10. Under **Transport class**, click **TCPTransport Class**, and then click **Next**.
11. Under **New port or service name** on the **Configure Local Environment Endpoints** page, type **1112**, and then click **Add** to enter this value into the **Defined ports and service names,** and then click **Next**.
12. Under **Host environment** on the **Configure a New Host Environment** page, type **{name of the host where the IMS HIP Client will be executed}**.
13. Under **Data conversion**, select **Transaction Integrator - ConvertPrim for OS 390**.
14. Under **Host code page**, select **EBCDIC - US/Canada [37]**.
15. Under **Remote endpoint manager**, type the name of your mainframe, and then click **Next**.
16. Under **Type** on the **Configure Host Environment Default Method Resolution** wizard page, select Type: **Transaction Request Message (TRM)**, and Object: **MicrosoftHIS –TRMHandlerMSLink1.1 Object**, then click **Next**.
17. Under **Security policy** on the **Configure a New Security Policy** page, type **IMS**.
18. Under **Credentials source** used to invoke the server, select **Windows credentials of the HIP application**, and then click **Next**.
19. Under **Object** on the **Specify or Locate an Object** page, type **CedarBankNET**.
20. Under **Registered TIMs**, click **Browse** and navigate to the **<install drive>:\Program Files\Microsoft Host Integration Server 2004\SDK\Samples\AppInt\HostInitiated\CedarBankTIMs\DotNet** folder, then click on **CedarBank_NET.TIM**, click **Open** and then click **Next**.
21. Under **Pick assembly Path**, click **Browse** and navigate to the **<install drive>:\Program Files\Microsoft Host Integration Server 2004\SDK\Samples\AppInt\HostInitiated\CedarBankServes\DotNet\CSCedarBank\bin\release** folder, click **CSCedarBank.dll**, and click **Open**, and then click **Next**.
22. Under **View** on the **Configure the New View** page, type **CEDRBANK NET**.
23. Under **Object methods**, select the check box in the **Include** column for the **CedrBank** method.
24. Under the **Link Program Name** on the **Method Resolution Criteria** dialog box, type **CEDRBANK**, and then click **OK**.
25. On the **Configure the New View** wizard page, click **Next**.
26. On the **Completing the Application Deployment Wizard** page, click **Finish**. The wizard now saves the application definition in the HIP Configuration database.
27. Copy the implementing assemblies from the SDK directory to the default folder in the installation directory. The directory paths are as follows:

```
<installdir>\SDK\Samples\AppInt\HostInitiated\CedarBankServers\DotNet\CSCedarBank\bin\Rel
ease
<installdir>\system\HIP Implementing Assemblies
```

In the next step, you start the newly created application and its associated objects.

See Also

Start the IMS Application

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Start the IMS Application

In this step, you view the newly created CedarBank application and the associated local environment, host environment, objects, and object views. This step is necessary because, while the previous step sets up Host Integration Server 2004 to run the host application, you have not actually turned the application on. Later in the tutorial, you will access and instruct the host application to make a call to a .NET server. For more information, see Host-Initiated Processing Node.

To start the IMS application

1. On the **TI Manager** MMC console, expand the **Transaction Integrator** node, expand the **Host Initiated Processing** node, then expand the **Computers** node, and then expand the name of the computer to which you are logged on. Under your computer name, you should see the newly created application **CedarBank**.
2. Right-click **CedarBank [stopped]**, and then click **Start**. Notice that **[stopped]** changed to **[starting]** and then to **[active]**. You have now initialized the listener service.

You are now set to run the IMS HIP Cedar Bank client.

See Also

IMS TCP/IP Client (Using .NET) Module 3: Executing a IMS TCP/IP Client Program to Call a .NET Server

IMS TCP/IP Client (Using .NET) Module 3: Executing a IMS TCP/IP Client Program to Call a .NET Server

Now that you have successfully set up your server, you can execute the Client application.

This module contains two steps:

1. Run the Cedar Bank IMS Client
2. Debug the IMS Client

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Run the Cedar Bank IMS Client

You can now run the Cedar Bank IMS Client.

To run the Cedar Bank IMS client

1. Log on to IMS.
2. Type the transaction ID "**CCLI**" and press ENTER. Note there is a space after CCLI.

   The Cedar Bank client data entry screen appears.

3. Set the IP address of the server computer.
4. Set the IP port address defined in the HIP Admin console. Press ENTER.
5. Look for the Account Balance of 47.11
6. Press CLEAR to exit the transaction or ENTER to run the transaction again.

If you had any problems while running the tutorial, you may wish debug your process.

See Also

Debug the IMS Client

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Debug the IMS Client

The following list describes problems that may occur while running the Cedar Bank IMS client and possible solutions to those problems.

- If there is an error, the IMS Cedar Bank client displays error messages at the bottom of the screen.
- Set the **Enable logging** field on the CCLE screen to 'Y' and rerun the transaction by pressing ENTER. This places event log entries in the IMS Regions JES YSYSOUT output data set.
- Turn tracing on for the HIP Service using the TI Manager.
    - In **TI Manager**, right-click on the HIP Application and click **Tracing**.
    - Check the trace options you want to use.
    - Right-click on the HIP Application and select **Reload Definitions**.
    - Rerun the IMS Cedar Bank client application.
    - Locate the trace file in <*installdir*>\Program Files\Host Integration Server2004\traces.
    - Make sure to turn tracing off afterwards.
    - View the Windows Event Log for the Account Balance of 47.11.

See Also

Host-Initiated Processing Tutorials

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Sample Programs for Transaction Integrator

This section describes the four samples for Transaction Integrator (TI) included in the Microsoft® Host Integration Server 2004 Software Development Kit (SDK). This section provides detailed information about each sample, including the location of the folders and subfolders. These TI samples are designed to assist you in creating code for specific TI features.

The organization of this section is parallel to the organization of the SDK folders in which the samples themselves reside on your hard disk drive.

In order to first start working with TI, it is recommended that you use the CedarBank tutorial that comes with the TI installation, described in Transaction Integrator Tutorials. The CedarBank tutorial illustrates how to use of all of the TI remote environments and includes the TI type libraries, assemblies, as well as the COBOL code for the mainframe for all of the environments (IMS, CICS, APPC and TCP/IP). The CedarBank sample also includes sample programs for the client-side code written in Microsoft Visual Basic® and Microsoft Visual C#®.

Once connectivity has been established by working with the CedarBank tutorial, then the TI samples included with the Host Integration Server SDK can be used to gain an understanding of more advanced TI features not covered by the CedarBank tutorial.

This section contains:

- Windows-Initiated Processing Samples
- Host-Initiated Processing Sample

Windows-Initiated Processing Samples

This section describes three sets of samples showing you how to use Windows®-initiated processing.

This section contains:

- Bounded Recordsets Sample
- ProgrammingSpecifics Sample
- WindowsInitiated Sample

Bounded Recordsets Sample

The Bounded Recordsets sample demonstrates how to use Transaction Integrator (TI) with Microsoft® Visual Basic® bounded recordsets. This sample includes Visual Basic code and Customer Information Control System (CICS) COBOL code showing how to use bounded recordsets by calling into a CICS transaction program through LU 6.2 (Remote Environment CICS using LU 6.2).

Location in SDK

<drive>:\Program Files\Microsoft Host Integration Server\SDK\Samples\AppInt\BoundedRecordsets\

File Inventory

The following table shows the files in this sample and describes their purpose.

File(s)	Description
In the \BoundedRecordsets\COBOL-CICS folder RecordSetSample.cbl RecordSetSample.tlb	A TI type library (.tlb file) that can be used with this sample. The type library is set up for accessing a transaction named GETI on the host. This folder also contains sample COBOL code that can be compiled and linked on the mainframe side. The compiled code should be set up to run on the host as a transaction named GETI or the TI type library must be changed to reflect the name of the transaction if it is different.
In the \BoundedRecordsets\VB folder RecordSetSample.bas RecordSetSample.exe RecordSetSample.vbp RecordSetSample.vbw	A Visual Basic class file that illustrates the use of bounded recordsets. Note that additional Visual Basic code would need to be written to use this Visual Basic class file in a project. The code in the class file demonstrates how to create a recordset and populate it with data to send to the mainframe. Note that there is no code that actually displays the data that comes back from the mainframe. You can put in a breakpoint in the Visual Basic code using the debugger and use the immediate window to view the data or insert further code to examine the data that is returned.

See Also

Transaction Integrator Programmer's Guide

Transaction Integrator Programmer's Reference

Transaction Integrator Tutorials

ProgrammingSpecifics Sample

The Transaction Integrator (TI) supports a number of powerful features that are illustrated by this sample. The \ProgrammingSpecifics folder contains a complete Microsoft® Visual Basic® project that demonstrates the following features of TI:

- Returning a recordset
- Variable length tables
- Handling REDEFINES clauses
- Variably sized strings
- Handling FILLER
- Unbounded recordsets
- In/out variable length table

The sample type library is included for CICS using LU 6.2. There are seven methods defined in the type library. Check the properties for each method and review the **Host Names** tab to see the Mainframe TP name. The value of the mainframe TP name property can be changed to the name used when compiling the sample COBOL programs.

Location in SDK

<drive>:\Program Files\Microsoft Host Integration Server\SDK\Samples \AppInt\ProgrammingSpecifics

File Inventory

The following table shows the files in this sample and describes their purpose.

File(s)	Description

In the \ProgrammingSpecifics folder CreateCustomerID.cbl Customer.tlb CustomerDemographics.cbl CustomerInformation.cbl FRMerror.frm FRMerror.frx GetAllInvoices.frm GetInvoices.cbl GetInvoices.frm ProgrammingSepcificsSamples.vbp SendInvoices.cbl UnboundedRSet.cbl UpdateArray.cbl Vbclient.frm	The Visual Basic project contains comments with the Visual Basic source code that indicates which COBOL (*.cbl) file contains the associated COBOL code for the mainframe side.

In the \Programming Specifics\CICS NonLink folder Rcv50k.cbl	Sample COBOL code showing how to receive more than 32767 bytes of data in a single method call. This sample includes only the mainframe code (COBOL), and does not include the corresponding Microsoft® Visual Basic® or Microsoft Visual C++® code for the computer side. The code is intended to demonstrate the receiving side logic of a TI Non-link server application. This COBOL program contains comments explaining what is being done in the code. This sample is not intended to be a complete end-to-end program, but it demonstrates the receiving-side logic of a CICS non-Link server application program using TI
In the \Programming Specifics\SyncLev2 folder Synclev2.txt	Transaction Integrator (TI) supports the use of Sync Level 2 transactions. This sample includes COBOL source code illustrating transactional support (Sync Level 2) on the mainframe with CICS using LU 6.2. This sample only includes COBOL source code that contains comments describing each of the code sections. The sample code demonstrates executing a **Commit** and identifying that a rollback has been requested from TI. Note that there is also related documentation in Microsoft Knowledge Base article Q220967 available at http://go.microsoft.com/fwlink/?LinkId=14803. This article explains TI Metadata elements so that you can better understand how to use Metadata to enable the COBOL program to initiate a rollback of a transaction.

See Also

Transaction Integrator Programmer's Guide

Transaction Integrator Programmer's Reference

Transaction Integrator Tutorials

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

WindowsInitiated Sample

Transaction Integrator supports Windows-initiated processing (WIP), that is, a workflow in which a Windows COM-based or .NET-based application is a client to a server program running on a host computer. The \WindowsInitiated folder contains the files to build the Cedar Bank sample application for WIP.

Location in SDK

<drive>:\Program Files\Microsoft Host Integration Server\SDK\Samples \AppInt\WindowsInitiated

File Inventory

The following table shows the files in this sample and describes their purpose.

File(s)	Description

In the \All CedarBank Assemblies folder: CICS_Link_CedarBank_NET.DLL CICS_LinkELM_CedarBank_NET.DLL CICS_LinkTRM_CedarBank_NET.DLL CICS_LU62_CedarBank_NET.DLL CICS_TCP_ConcurrentELM_CedarBank_NET.DLL CICS_TCP_ConcurrentTRM_CedarBank_NET.DLL Dot Net Objects.tiproj IMS_Connect_CedarBank_NET.DLL IMS_LU62_CedarBank_NET.DLL IMS_TCP_Explicit_CedarBank_NET.DLL IMS_TCP_Implicit_CedarBank_NET.DLL OS400_DPC_TCP_CedarBank_NET.DLL	A .NET assembly that corresponds to each of the 11 programming models that TI supports for WIP.

In the All CedarBank Typelibs folder: CICS_Link_CedarBank.tlb CICS_LinkELM_CedarBank.tlb CICS_LinkTRM_CedarBank.tlb CICS_LU62_CedarBank.tlb CICS_TCP_ConcurrentELM_CedarBank.tlb CICS_TCP_ConcurrentTRM_CedarBank.tlb COM Objects.tiproj IMS_Connect_CedarBank.tlb IMS_LU62_CedarBank.tlb IMS_TCP_Explicit_CedarBank.tlb IMS_TCP_Implicit_CedarBank.tlb OS400_DPC_TCP_CedarBank.tlb	A COM+ type library that corresponds to each of the 11 programming models that TI supports for WIP.

In the \CSClient folder: \bin \obj \Web References AssemblyInfo.cs CedarTree.ico CSClient.csproj CSClient.csproj.user CSClient.sln CSClientSampleApp.cs CSClientSampleApp.resx ElmRERedirectInput.cs ElmRERedirectInput.resx PasswordInput.cs PasswordInput.resx	The files you need to create the client application using the C# programming language.
In the SNA CICS folder: Cdrbnk.cbl CICS_LU62_CedarBank.rcd Gtacct62.cbl SNA CICS Programs.tiproj	All the files you need to run the Cedar Bank sample application tutorial using the CICS RE type over SNA (APPC/LU 6.2) including the TI component type library (.tlb) file, a recording (.rcd) file that you can use instead of a live mainframe connection, COBOL source code (.cbl) files that you will need to install on the mainframe if you are using a live mainframe connection.
In the \SNA CICS Link folder: Cedrbank.cbl CICS_Link_CedarBank.rcd Getaccts.cbl SNA CICS Link Programs.tiproj	All the files you need to run the Cedar Bank sample application tutorial using the CICS Link RE type over SNA (APPC/LU 6.2) including the TI component type library (.tlb) file, a recording (.rcd) file that you can use instead of a live mainframe connection, COBOL source code (.cbl) files that you will need to install on the mainframe if you are using a live mainframe connection.

In the \SNA IMS folder: Cedrbank.cbl Getaccts.cbl IMS_LU62_CedarBank.rcd SNA IMS Programs.tiproj	All the files you need to run the Cedar Bank sample application tutorial using the IMS RE type over SNA (APPC/LU 6.2) including the TI component type library (.tlb) file, a recording (.rcd) file that you can use instead of a live mainframe connection, COBOL source code (.cbl) files that you will need to install on the mainframe if you are using a live mainframe connection.
In the \TCP CICS Concurrent folder	All the files you need to run the Cedar Bank sample application tutorial using the CICS Concurrent RE type over TCP/IP including the TI component type library (.tlb) file, a recording (.rcd) file that you can use instead of a live mainframe connection, COBOL source code (.cbl) files that you will need to install on the mainframe if you are using a live mainframe connection.
In the \TCP CICS MSLink folder	All the files you need to run the Cedar Bank sample application tutorial using the CICS MS Link RE type over TCP/IP including the TI component type library (.tlb) file, a recording (.rcd) file that you can use instead of a live mainframe connection, COBOL source code (.cbl) files that you will need to install on the mainframe if you are using a live mainframe connection.
In the TCP IMS Connect folder	All the files you need to run the Cedar Bank sample application tutorial using the IMS Connect RE type over TCP/IP including the TI component type library (.tlb) file, a recording (.rcd) file that you can use instead of a live mainframe connection, COBOL source code (.cbl) files that you will need to install on the mainframe if you are using a live mainframe connection.
In the \TCP IMS Explicit folder	All the files you need to run the Cedar Bank sample application tutorial using the IMS Explicit RE type over TCP/IP including the TI component type library (.tlb) file, a recording (.rcd) file that you can use instead of a live mainframe connection, COBOL source code (.cbl) files that you will need to install on the mainframe if you are using a live mainframe connection.
In the TCP IMS Implicit folder	All the files you need to run the Cedar Bank sample application tutorial using the IMS Implicit RE type over TCP/IP including the TI component type library (.tlb) file, a recording (.rcd) file that you can use instead of a live mainframe connection, COBOL source code (.cbl) files that you will need to install on the mainframe if you are using a live mainframe connection.
In the \TCP OS400 DPC folder	All the files you need to run the Cedar Bank sample application tutorial using the AS/400 DPC RE type over TCP/IP including the TI component type library (.tlb) file, a recording (.rcd) file that you can use instead of a live mainframe connection, RPG source code (.rpgl) files that you will need to install on the AS/400 if you are using a live AS/400 connection.
In the \TI Host folder	
In the \VB6 Client folder	The CedarBank Automation client application, VBClient.exe, and its source code files. This client is written in Visual Basic, so it shows you how to call the CedarBank TI Automation server application from a Visual Basic client application. See the note following this table for more information.
In the \VC7 Client folder	The CedarBank Automation client application, VCClient.exe, and its source code files. This client is written in Visual C++, so it shows you how to call the CedarBank TI Automation server application from a Visual C++ client application.
In the \Website folder	All the files you need to see how to call the CedarBank TI Automation server application from a Web-based client application by using Visual Basic Scripting Edition (VBScript) code in an active server page (ASP) file.

See Also

Transaction Integrator Programmer's Guide

Transaction Integrator Programmer's Reference

Transaction Integrator Tutorials

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Host-Initiated Processing Sample

Transaction Integrator supports host-initiated processing (HIP) that is, a workflow in which a host-based application is a client to a COM-based or .NET-based server program running on the Microsoft® Windows® platform. The folder HostInitiated contains the files to build the Cedar Bank sample application for HIP.

Location in SDK

<drive>:\Program Files\Microsoft Host Integration Server\SDK\Samples\AppInt\HostInitiated\

File Inventory

The following table shows the files in this sample and describes their purpose.

File(s)	Description
• CedarBank Tutorial HIP Solution.sln	Organizes all the TI projects, project items, and solution items into the Cedar Bank Tutorial HIP Solution by providing the environment with references to their locations on disk. Use Visual Studio .NET to view this file, or double-click on the file to launch Visual Studio .NET 2003 and displays the solution in the **Solution Explorer** pane.
• CedarBank Tutorial HIP Solution.suo	Records all of the options associated with the your Cedar Bank Tutorial HIP Solution so that each time you open it, it includes customizations that you have made. Use Visual Studio .NET to view this file, or double-click on the file to launch Visual Studio .NET 2003 and displays the solution in the **Solution Explorer** pane.
• CICS SNA Readme .Net.txt	Shows the steps to build the CICS SNA Link HIP .NET client programs and maps
• CICS SNA Readme.txt	Shows the steps to build the CICS SNA Link HIP COM client programs and maps
• CICS TCP Readme .Net.txt	Shows the steps to build the CICS TCP/IP Link HIP .NET client programs and maps
• CICS TCP Readme.txt	Shows the steps to build the CICS TCP/IP Link HIP COM client programs and maps
• IMSReadme.NET.txt	Shows the steps to build the IMS TCP/IP HIP .NET client programs and maps
• IMSReadme.txt	Shows the steps to build the IMS TCP/IP HIP COM client programs and maps
• OS400Readme .Net.txt	Shows the steps to build the OS/400 TCP/IP HIP .NET client programs and maps
• OS400Readme.txt	Shows the steps to build the OS/400 TCP/IP HIP client programs and maps connecting to a COM server.
• Read me first.tiproj	Launches Visual Studio .NET 2003 and displays all the Readme files in this folder as a tree view in the **Solution Explorer** pane.
In the \CedarBankClients\ folder • CICS • IMS • OS/400	Contains folders for each of the three HIP clients.

In the \CedarBank Clients\CICS folder - BMSMaps - COBOLSource - LinkControl - SNA CICS Programs.tiproj - TCP CICS Programs.tiproj	Contains the COBOL and other code for the CICS client.
In the \CedarBank Clients\IMS folder - COBOLSource - LinkControl - MFSMaps - TCP IMS Programs.tiproj	Contains the COBOL and other code for the IMS client.
In the \CedarBank Clients\OS/400 folder - RPGSource - TCP OS400 Programs.tiproj	Contains the RPG and other code for the AS/400 client.
In the \CedarBank Servers\ folder - COM - DotNET	Contains folders for the COM or .NET servers.
In the \CedarBank Servers\COM\VB6CedarBank folder - HIP.cls - VB6CedarBank.dll - VB6CedarBank.vbp - VB6CedarBank.vbw	Contains the sample code for writing a COM server in Visual Basic 6.0.

In the \CedarBankServers\DotNET\CSCedarBank folder \bin - AssemblyInfo.cs - CedarBank.cs - CedarBank.csproj - CedarBank.sln	Contains the sample code for writing a .NET server in C#.

See Also

Transaction Integrator Programmer's Guide

Transaction Integrator Programmer's Reference

Transaction Integrator Tutorials

Data Integration Samples

This section of the Microsoft® Host Integration Server 2004 Developer's Guide describes the sample applications that implement data integration using DB providers, drivers, and Microsoft ActiveX® controls.

For general information about programming for data integration, see the Data Integration Programmer's Guide section of the SDK.

For API references and other technical information about data integration, see the Data Integration Programmer's Reference section of the SDK.

This section contains:

- OLE DB Provider and ODBC Driver Samples
- ActiveX Controls Samples
- Managed Provider for DB2 Samples

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OLE DB Provider and ODBC Driver Samples

The source code and executable files for several sample programs that illustrate using the Microsoft® OLE DB Provider for AS/400 and VSAM, the Microsoft® OLE DB Provider for DB2, and the Microsoft® ODBC Driver for DB2 are included on the Microsoft Host Integration Server 2004 SDK. These sample programs are located in the \SDK\Samples\DataInt\DataAccess subdirectory, which is copied to your hard drive during Host Integration Server and Host Integration Client installation when the SDK option is selected.

These sample programs include the files in the following subdirectories:

Subdirectory	Description
DRDA_ASP	ADO sample script written in Active Server Pages (ASP) using the OLE DB Provider for DB2
DRDA_VB	ADO sample program written in Microsoft Visual Basic® using the OLE DB Provider for DB2
DRDA_VBS	ADO sample script written in Microsoft Visual Basic Scripting Edition (VBScript) using the OLE DB Provider for DB2
RLIO_ASP	ADO sample script written in ASP using the OLE DB Provider for AS/400 and VSAM
RLIO_VB	ADO sample program written in Visual Basic using the OLE DB Provider for AS/400 and VSAM
RLIO_VBS	ADO sample script written in VBScript using the OLE DB Provider for AS/400 and VSAM

The file named SAMPLE.HCD located in the DataAccess subdirectory contains two examples of a host column description (HCD) file required to access host VSAM files using the OLE DB Provider for AS/400 and VSAM. For more information, see the Host Column Description in the Data Access Reference section. The SAMPLE.HCD file is described in this same reference section.

Several sample programs with source code are provided with Host Integration Server 2004 that illustrate data access. These sample programs include the following:

- **Visual Basic ADO sample program**. This application enables you to open a connection through the OLE DB provider, open a recordset, and browse the records of a host file. Two versions of this sample application are provided. The sample in the DRDA_VB folder is for use with the OLE DB Provider for DB2. The sample in the RLIO_VB folder is for use with the OLE DB Provider for AS/400 and VSAM. Seeking on a key value in a host indexed file is also possible with this sample when the version of this sample is used with the OLE DB Provider for AS/400 and VSAM.
- **Visual Basic Script ADO sample program**. This VBScript application enables you to open a connection through the OLE DB provider, open a recordset, and browse the records of a host file. Two versions of this sample application are provided. The sample in the DRDA_VBS folder is for use with the OLE DB Provider for DB2. The sample in the RLIO_VBS folder is for use with the OLE DB Provider for AS/400 and VSAM.
- **Active Server Pages (ASP) sample programs**. Two ASP sample programs are included. One is a report application that enables you to return and display the first ten records in a host file to a client browser in a table view. The second sample enables you to display columns of a host file in a form view. Two versions of these sample applications are provided. The samples in the DRDA_ASP folder are for use with the OLE DB Provider for DB2. The samples in the RLIO_ASP folder are for use with the OLE DB Provider for AS/400 and VSAM.

Several additional SDK sample files for data access are included with the Microsoft Data Access Components (MDAC) SDK and are available as part of the Microsoft MSDN Platform SDK. These data access sample programs include files listed in the following table.

Sample Program	Description
ODBCQuery	The ODBC Query demo application written in C. This sample can be used with the ODBC Driver for DB2.
RowsetViewer	The OLE DB RowsetViewer sample application written in C++. This sample can be used with either the OLE DB Provider for DB2 or the OLE DB Provider for AS/400 and VSAM.

These sample programs with source code are provided as part of the MDAC SDK and the MSDN Platform SDK can be used with the data access features of Host Integration Server 2004:

- **OLE DB RowsetViewer sample program**. This application written on Visual C++® allows you to connect to the OLE DB provider, open a table window, type the host file name or database, return a rowset, and browse the contents. You can navigate the table, using seek and set range on indexed files when the version of this sample is used with the OLE DB Provider for AS/400 and VSAM.

Before running any of these examples with the OLE DB Provider for AS/400 and VSAM, you must create a data file on the SNA host that will be used for demonstration purposes. After a suitable file is created on the host, you must configure the appropriate default settings for the OLE DB Provider for AS/400 and VSAM, such as APPC mode, the character code set identifier (CCSID) to be used when converting host data, and the code page to be used on the local computer.

If the data is on a mainframe host, you must configure a data description (create a host column description file) using the Data Descriptions management console snap-in. The host column description specifies the column description of the data file on the host and how the OLE DB Provider for AS/400 and VSAM should convert data from the host to the computer. Although an HCD file is unnecessary to access data files on the AS/400, a host column description can be specified that overrides the default conversions.

For general information about programming for the OLE DB Provider for AS/400 and VSAM, see the OLE DB Provider for AS/400 and VSAM Programmer's Guide.

For general information about programming for the OLE DB Provider for DB2, see the OLE DB Provider for DB2 Programmer's Guide.

For general information about programming for the ODBC Driver for DB2, see the ODBC Driver for DB2 Programmer's Guide.

For API references and other technical information for OLE DB providers, see the OLE DB Providers Programmer's Reference.

This section contains:

- Visual Basic ADO Sample
- Visual Basic Script ADO Sample
- Active Server Pages Samples
- OLE DB RowsetViewer Sample

Visual Basic ADO Sample

The SDK\Samples\DataAccess folder contains an ADO sample application written in Microsoft® Visual Basic® version 6.0 that accesses data provided by an OLE DB provider. Two versions of this sample are supplied. One sample is for use with the Microsoft OLE DB Provider for AS/400 and VSAM (source files located in the RLIO_VB subdirectory). One sample is for use with the Microsoft OLE DB Provider for DB2 (source files located in the DRDA_VB subdirectory).

This sample illustrates using ADO to access data on a host.

To use this sample, you will need to change the ConnectionString property to point to a host that you can access and a data file or DB2 database to browse on the host.

This application enables you to open a connection through the OLE DB provider, open a recordset, and browse the records on a host file. This sample is built with ActiveX® Data Objects (ADO) version 2.0. Before building this Visual Basic sample, be sure to include the ADO 2.0 Library in your project. You can do this from inside the Visual Basic Integrated Development Environment by selecting **References** on the **Project** menu.

The sample application can be built with Microsoft Visual Basic version 6.0 or later.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Visual Basic Script ADO Sample

The SDK\Samples\DataAccess folder contains a sample Web client application written in Microsoft® Visual Basic® Scripting Edition (VBScript) using ActiveX® Data Objects (ADO) designed to access data provided by an OLE DB provider. Two versions of this sample are supplied. One sample is for use with the Microsoft OLE DB Provider for AS/400 and VSAM (source files located in the RLIO_VBS subdirectory). One sample is for use with the Microsoft OLE DB Provider for DB2 (source files located in the DRDA_VBS subdirectory).

This Web client application enables you to open a connection through the OLE DB provider, open a recordset, and browse the records of a host file.

To use this sample, you will need to change the ConnectionString property to point to a host you can access and a data file or DB2 database to browse on the host.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Active Server Pages Samples

The SDK\Samples\DataAccess folder contains an Active Server Pages (ASP) sample Web server application designed to access data provided by an OLE DB provider. Two versions of this sample application are supplied. One sample is for use with the Microsoft® OLE DB Provider for AS/400 and VSAM (source files located in the RLIO_ASP subdirectory), and one sample is for use with the Microsoft OLE DB Provider for DB2 (source files located in the DRDA_ASP subdirectory).

These sample applications require Microsoft Internet Information Services (IIS) version 5.0 or higher with ASP installed.

REPORT.ASP will return and display the first ten (10) records in a host file to a client browser in a table view.

OLEDBDDM.ASP and GLOBAL.ASA combine to display columns of a host file in a form view.

You will need to edit the host table names or DB2 database names to use these samples in your environment.

OLE DB RowsetViewer Sample

The Microsoft® Developer Network (MSDN®) Platform SDK contains an OLE DB RowsetViewer sample application written in Microsoft Visual C++®. This application enables you to connect to either the Microsoft OLE DB Provider for AS/400 and VSAM or the Microsoft OLE DB Provider for DB2, open a table window, type the host file name or DB2 database, return a rowset, and browse the contents. You can navigate the table, using seek and set range on indexed files when this sample is used with the OLE DB Provider for AS/400 and VSAM.

There are several security issues with the RowsetViewer Sample. For more information and alternatives, see OLE DB Provider for DB 2, AS/400, and VSAM Security.

To open a rowset using the OLE DB Provider for AS/400 and VSAM, type the following command in the command window:

exec open library/filename

You can use "/" or "." depending on whether you are accessing a host mainframe or an AS/400 file. Note that if a "." appears in the host file name, the file name must be enclosed in double quotes.

This sample is written to access bookmarkable AS/400 and VSAM file types only. You will not be able to access mainframe SAM, ESDS, or PDS/PDSE because these data set types do not support bookmarks.

The following files are needed to build this sample application. The Microsoft Host Integration Server 2004 CD does not include a copy of these files. If you do not have the Microsoft Platform SDK installed, you need to copy the following header files from the Microsoft Platform SDK into your project:

```
adoid.h
adoint.h
db2oledb.h
msdadc.h
msdaguid.h
msdasql.h
oledb.h
oledberr.h
snaoledb.h
transact.h
```

If you do not have the Host Integration Server 2004 SDK or the Platform SDK installed, you need to build your application using one of the following library files copied from the Microsoft Platform SDK:

```
OLEDB.LIB
OLEDBD.LIB (debug version of OLEDB library)
```

Note that only i386 LIB files are supported using Host Integration Server 2004.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

ActiveX Controls Samples

The samples listed below demonstrate the usage of the ActiveX® controls included with Microsoft® Host Integration Server 2004.

For general information about programming for ActiveX controls, see the ActiveX Controls Programmer's Guides section of the SDK.

For API references and other technical information about ActiveX controls, see the ActiveX Controls Programmer's Reference section of the SDK.

This section contains:

- Data Queue ActiveX Control Samples
- Host File Transfer ActiveX Control Samples

Data Queue ActiveX Control Samples

The source code for several sample programs that illustrate using the Microsoft® Data Queue ActiveX® control are included on the Microsoft Host Integration Server 2004 SDK. These sample programs are copied to your hard disk during Host Integration Server software or Host Integration Client software installation when the **Host Integration Server Software Development Kit** option is selected. These samples are installed in the Samples\DataQueues subdirectory below where the Host Integration Server SDK software is installed (C:\Program Files\Microsoft Host Integration Server\SDK, by default).

These sample programs are found in the following subdirectories:

Subdirectory	**Description**
DQChatC	A chat program written in Microsoft Visual C++® that illustrates using the Data Queue ActiveX control and AS/400 data queues.
DQChatB	A chat program written in Microsoft Visual Basic® that illustrates using the Data Queue ActiveX control and AS/400 data queues.

This section contains:

- DQChatC Sample
- DQChatB Sample

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DQChatC Sample

The sample program DQChatC is a Microsoft® Visual C++® program that demonstrates the use of Data Queues in the form of an Internet "chat room". Data, in the form of messages or "chat" strings, is transferred back and forth through a data queue. The DQChatC program was created using the Visual C++ AppWizard.

The DQChatC sample is designed to be built using Microsoft Visual Studio® .NET 2003. To build the DQChatC sample using the command-line compiler, set up your build environment as follows:

- Run VSVARS32.bat from the Microsoft Visual Studio® bin directory(by default, C:\Program Files\Microsoft Visual Studio .NET 2003\Common7\Tools).

To build the DQChatC sample, open a Command Prompt window, navigate to DataQueues\DQChatC subdirectory, and invoke NMAKE.

To build the DQChatC using Visual Studio .NET 2003, start Visual Studio .NET 2003 and open the appropriate Visual C++ project file (DataQueues\DQChatC\dqchatc.vcproj) from the **File** menu. Select a configuration and build the sample from the **Build** menu. Each project file has two configurations, one for a DEBUG build and one for a RETAIL build.

The files initially created by AppWizard included for this sample program are:

- DQChatC.dsp

  The Visual C++ project file used to build this sample. Other users can share the project (.dsp) file, but they should export any makefiles locally.

- DQChatC.h

  This is the main header file for the application. It includes other project specific headers (including Resource.h) and declares the CDQChatCApp application class.

- DQChatC.cpp

  This is the main application source file that contains the application class CDQChatCApp.

- DQChatC.rc

  This is a listing of all of the Microsoft Windows® resources that the program uses. It includes the icons, bitmaps, and cursors that are stored in the RES subdirectory. This file can be directly edited in Visual C++.

- DQChatC.clw

  This file contains information used by the Visual C++ ClassWizard to edit existing classes or add new classes. ClassWizard also uses this file to store information needed to create and edit message maps and dialog data maps and to create prototype member functions.

- DQChatCDlg.h, DQChatCDlg.cpp - the dialog

  These files contain your CDQChatCDlg class. This class defines the behavior of your application's main dialog. The dialog's template is in DQChatC.rc, which can be edited in Visual C++.

- eigdataqueue.cpp

  This source file contains computer-generated **IDispatch** wrapper classes created by Visual C++.

- eigdataqueue.h

  This header file contains computer-generated **IDispatch** wrapper classes created by Visual C++.

- StdAfx.h, StdAfx.cpp

  These files are used to build a precompiled header (PCH) file named DQChatC.pch and a precompiled types file named StdAfx.obj used by Visual C++.

- Resource.h

  This is the standard header file, which defines new resource IDs. Visual C++ reads and updates this file.

The following files are located in the DataQueues\DQChatC\res subdirectory:

- DQChatC.ico

  This is an icon file, which is used as the application's icon. This icon is included by the main resource file DQChatC.rc.

- res\DQChatC.rc2

  This file contains resources that are not edited by Visual C++. All non-editable resources should be placed in this file.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

DQChatB Sample

DQChatB consists of a Microsoft® Visual Basic application and a set of AS/400 Command Language (CL) programs. These programs allow a user on the Windows® system (running the DQTALK basic program) to talk to another user logged on to a AS/400 system (running the DQTALK CL program). DQChatB uses two AS/400 Data Queues for communication.

The DQTALK Visual Basic sample application can be run directly from Microsoft Visual Basic® 6.0, however if you intend to use this sample frequently, you may prefer to compile this into an executable binary file using Visual Basic. You can then create a shortcut on your desktop for this application, which can be used to quickly launch the DQTalk sample.

This file contains a summary of what you will find in each of the files that make up this sample application.

VB_Client Subdirectory

- FORM1.FRM

  This is the main and only form for the DQTALK sample. DQTalk is a single document interface application.

- FORM1.frx

  This is the Visual Basic Form Binary file that is generated when DQTALK is built.

- PROJECT1.VBP

  This is the main Visual Basic Project file. Double-click it to bring up the project.

- PROJECT1.VBW

  This file contains the Visual Basic Project Workspace.

AS400_CLIENT Subdirectory

- DQDEMO.DQCREATE

  This sample is an AS/400 Command Language (CL) program to create the AS/400 Data Queues on the AS/400 computer. Create this file as type CLP.

- DQDEMO.DQDELETE

  This sample is an AS/400 CL program to delete AS/400 Data Queues from the AS/400 side. Create this file as type CLP.

- DQDEMO.READFIFO

  This sample is an AS/400 CL program to read a message from one of the queues. Create this file as type CLP.

- DQDEMO.DQTALK

  This sample is the DQTALK AS/400 CL client program that talks with the Visual Basic application on Windows. Create this file as type CLP.

- DQDEMO.DQTALKLCL

  This sample is an AS/400 CL program talks to DQTALK CL client program on the AS/400 for testing the application locally on the AS/400. Create this file as type CLP.

- DQDEMO.CHAT

  This is the sample Display file used by DQTALK and DQTALKLCL. Create this file as type DSPF.

Copy these files to the AS/400. Create a library called TESTUSR and copy these files into it. Be sure to create them under the type specified. The CL files are configured for a library called TESTUSR and username of TESTUSR. The AS/400 sample files can be changed to use a different library and username to correspond with the user executing the AS/400 CL commands.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Host File Transfer ActiveX Control Samples

The source code for several sample programs that illustrate using the Microsoft® Host File Transfer ActiveX® control are included on the Microsoft Host Integration Server 2004 SDK. These files are copied to your hard disk during Host Integration Server software or Host Integration Client software installation when the **Host Integration Server Software Development Kit** option is selected. These samples are installed in the Samples\DataInt\FileTransfer subdirectory below where the Host Integration Server software is installed (C:\Program Files\Microsoft Host Integration Server\SDK, by default).

These sample programs include the files in the following subdirectories:

Subdirectory	Description
TestConnectC	A sample script written in Microsoft Visual C++® using the Host File Transfer ActiveX control.
TestConnectVB	A sample program written in Microsoft Visual Basic® using the Host File Transfer ActiveX control.

The TestConnectC sample is designed to be built using Microsoft Visual Studio® .NET 2003. To build the TestConnectC sample by using the command-line compiler, set up your build environment as follows:

- Run VSVARS32.bat from the Visual Studio bin directory (by default, C:\Program Files\Microsoft Visual Studio .NET 2003\Common7\Tools).

To build the TestConnectC sample, open a Command Prompt window, navigate to FileTransfer\TestConnectC subdirectory, and invoke NMAKE.

To build the TestConnectC using Visual Studio .NET, start Visual Studio .NET 2003 and open the appropriate Visual C++ project file (FileTransfer\TestConnectC\testconnectc.vcproj) from the **File** menu. Select a configuration and build the sample from the **Build** menu. Each project file has two configurations, one for a DEBUG build and one for a RETAIL build.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Managed Provider for DB2 Samples

The samples listed below demonstrate the use of the Microsoft® Managed Provider for DB2 interface included with Microsoft Host Integration Server (HIS) 2004.

This section contains:

- Managed Client for DB2 Sample
- WebApp and WebService Samples

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Network Integration Samples

This section of the Microsoft® Host Integration Server 2004 Developer's Guide describes the sample applications that implement APPC, CPI-C, LUA, and SNA print server data filter network integration.

For general information about programming for network integration, see the Network Integration Programmer's Guide section of the SDK.

For API references and other technical information for network integration, see the Network Integration Programmer's Reference section of the SDK.

This section contains:

- APPC Samples
- CPI-C Samples
- LUA Samples
- SNA Print Server Data Filter Samples

APPC Samples

The Microsoft® Host Integration Server 2004 SDK includes the source code for several sample programs that illustrate using Advanced Program-to-Program Communications (APPC). These sample programs are copied to your hard drive during Host Integration Server software or Host Integration Client software installation when the **Host Integration Server Software Development Kit** option is selected. These samples are installed in the Samples\SNA subdirectory below where the Host Integration Server SDK software is installed (C:\Program Files\Microsoft Host Integration Server\SDK, by default).

These APPC sample programs include the following:

APPC TP samples	Description
APPC Send and Receive TPs	Sample programs in C that represent simple APPC send and receive transaction programs (TPs) illustrating the use of asynchronous verb completion. The samples located in the SENDRECV subdirectory implement simple bulk data sending and receiving TPs (SENDTP and RECVTP)..
Multithreaded Send and Receive TPs	Sample programs in C that represent more advanced APPC send and receive TPs illustrating the use of multiple threads and multiple conversations per thread. The multithreaded receive TP samples illustrate using events or IO completion ports for notification These samples are located in the \SDK\Samples\SNA\msendrcv subdirectory on the CD.

In addition to these APPC sample programs, the following supplemental programs are included on the Host Integration Server CD-ROM.

Supplemental program	Description
TPSETUP	A sample installation program in C demonstrating an interface that assists in the configuration of autostarted invokable TPs. This sample is located in the \SDK\Samples\SNA\tpsetup subdirectory on the CD.
TPSTART	A sample program in C required for the automatic startup of invokable TPs that run as applications under Microsoft Windows® 2000. TPSTART is not required if a TP is written as a Windows 2000 service. An executable binary of TPSTART is installed by Host Integration Server Setup in the SYSTEM subdirectory of the Host Integration Server root directory. This sample is located in the \SDK\Samples\SNA\tpstart subdirectory on the CD.

This section contains:

- Building the TPs
- TPSETUP
- TPSTART
- APPC Send and Receive TPs
- Multithreaded Send and Receive TPs

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Building the TPs

The APPC samples are designed to be built by using the command-line compiler or the interactive development environment (IDE) in Microsoft® Visual Studio® .NET 2003

To build the APPC samples installed from the Host Integration Server CD, set the following environment variables:

Variable	**Specifies**
ISVLIBS	Directory containing the Microsoft Host Integration Server LIB files for Microsoft Windows® 2000
ISVINCS	Directory containing the WINSNA header files
SAMPLEROOT	Root directory of the sample code

For example, if you installed the Host Integration Server SDK directory to the default location (C:\Program Files\Microsoft Host Integration Server\SDK), use the following lines to set the variables (assuming that Intel binaries are being produced for Windows 2000):

```
ISVLIBS=C:\Program Files\Microsoft Host Integration Server\SDK\LIB
ISVINCS=C:\Program Files\ Microsoft Host Integration Server \SDK\Include
SAMPLEROOT=C:\Program Files\ Microsoft Host Integration Server \SDK\Samples\SNA
```

To build a specific sample (SendTp, for example) using the Visual Studio .NET 2003 IDE, start Microsoft Visual Studio .NET 2003 and open the appropriate Microsoft Visual C++® project file (SNA\appc\sendtp.vcproj, for example) from the **File** menu. Select a configuration and build the sample from the **Build** menu. Each Visual C++ project file has two configurations, one for a DEBUG build and one for a RETAIL build.

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TPSETUP

TPSETUP is a program that simplifies the setting of registry or environment variables needed by autostarted invokable TPs. Without an interface like that provided by TPSETUP, configuring such variables can be complicated and error prone. Therefore, it is recommended that you use code like TPSETUP in installation programs for autostarted invokable TPs.

Operation

INSTALL.C, the source code for TPSETUP, can be compiled to work in Microsoft® Windows® 2000.

It is recommended that autostarted invokable TPs be written as Windows 2000 services. To create the installation program for such TPs, study the code in INSTALL.C. For example, use the **CreateService** function or similar code when installing a TP that will run as a service under Windows 2000. (For important information about how services work under Windows 2000, see the documentation for Windows 2000.)

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

TPSTART

An autostarted TP that runs as an application under Microsoft® Windows® 2000 requires the support of the TPSTART program, which is installed with the Microsoft Host Integration Server software in the SYSTEM subdirectory of the Host Integration Server root directory. Therefore, the TPSTART program must be started on a Windows 2000-based client before an autostarted invokable TP can be started as an application. You can start TPSTART by using standard Windows 2000 methods, such as including TPSTART in the **Startup** group on the client.

APPC Send and Receive TPs

These are simple APPC send and receive TPs that illustrate the use of asynchronous verb completion. This sample implements simple bulk data sending and receiving TPs (SENDTP and RECVTP).

Setup

To set up these TPs, create an appropriate APPC LU-LU-mode triplet. The default is SENDLU-RECVLU-#INTER, but this can be configured (see the following sections).

Input and Output

The APPC send and receive TPs each use a configuration file for input. To name the file, use .CFG as the extension, and use the same base file name as the TP executable file (SENDTP.CFG, for example). Save this configuration file in the same directory location as the executable file (the TP itself).

For SENDTP, the configuration file (called SENDTP.CFG if the executable file is SENDTP.EXE) can contain the following items, one per line, in any order. If a variable is not found in the file or the file is not present at all, the default is used.

Line	Default value	Value to supply
ResultFile =	C:\SENDTP.OUT	File name to print timings to
LocalLUAlias =	SENDLU	Local LU alias
RemoteLUAlias =	RECVLU	Remote LU alias
ModeName =	#INTER	Mode name
LocalTPName =	SENDTP	Name of local TP
RemoteTPName =	RECVTP	Name of remote TP
NumConversations =	1	Number of conversations
NumSends =	2	Number of SEND_DATA verbs per conversation
SendSize =	1024	Size in bytes of data sent each time
ConfirmEvery =	1	Number of **SEND_DATA** verbs between CONFIRM verbs
SendConversation =	No	Yes or No: Use the SEND_CONVERSATION verb rather than the sequence of ALLOCATE, **SEND_DATA**, DEALLOCATE

RECVTP uses a RECVTP.CFG file in a similar way, but only to read the **LocalTPName** field.

The output from SENDTP and RECVTP consists of details of the configuration and the time taken for each conversation, and is sent to the result file specified in SENDTP.CFG.

Operation

RECVTP should be started first; it issues RECEIVE_ALLOCATE with the specified TP name. SENDTP is then started; it first issues MC_SEND_CONVERSATION to tell RECVTP how many conversations will be carried out. It then carries out the specified number of conversations.

For SENDTP, each conversation consists of an MC_ALLOCATE verb, followed by a given number of MC_SEND_DATA verbs of a given size, and interspersed with MC_CONFIRM verbs at a given interval, followed by an MC_DEALLOCATE.

RECVTP issues MC_RECEIVE_AND_WAIT when **RECEIVE_ALLOCATE** completes, and then issues either MC_RECEIVE_AND_WAIT or MC_CONFIRMED according to the return from the previous **MC_RECEIVE_AND_WAIT**.

At any stage, if the TPs encounter an error, they terminate. Use APPC API tracing to diagnose problems with the configuration.

At the end of the specified number of conversations, SENDTP sends timing information to a file.

Both TPs are built from a single source code file, SENDRECV.C. SENDTP is compiled only if **-DSENDTP** is used on the command line.

The TPs run as Microsoft® Windows® 2000 applications with a minimized window, the title bar of which displays the status. When the WndProc of this window, TPWndProc, receives the WM_CREATE message for the window, this triggers the issuing of the first verb. When TPWndProc receives an ASYNC_COMPLETE message from Windows APPC, this triggers the issuing of the next verb, dependent on what the previous verb was. When the window is closed, WinAPPCCleanup is issued to terminate any active conversations.

Multithreaded Send and Receive TPs

These multithreaded send and receive TPs are more advanced than the single-threaded equivalents. The samples located in the MSENDRCV subdirectory all use the asynchronous interface of APPC, with verb completion signaled by events (WinAsyncAPPCEx) or IO completion ports (WinAsyncAPPCIOCP). These TPs show how to code multithreaded APPC applications with multiple conversations per thread. They are more complex than the single-threaded equivalents, but are also more realistic.

If you are unfamiliar with APPC, examine the single-threaded TPs first. If you are unfamiliar with methods of creating threads or processing events in Microsoft® Windows® 2000, see the Microsoft Platform SDK documentation along with the multithreaded TPs.

Setup

There are four multithreaded send and receive routines that illustrate using asynchronous APPC calls:

- MRCV for receiving using events for notification
- MRCVIO for receiving using IO completion ports for notification
- MSEND for sending using events for notification
- MSENDRCV for simultaneous sending and receiving using events for notification

To set up these TPs, create an appropriate APPC LU-LU-mode triplet. The default is SENDLU-RECVLU-#INTER, but this can be configured (see the sections that follow). To run a large number of simultaneous conversations, increase the session limits for #INTER or use another mode with large session limits.

One obvious way of configuring these programs is to configure MSEND to run with MRCV or MRCVIO; another way is to configure MSENDRCV to run with another copy of MSENDRCV. However, you can also configure MSEND to run with one or more copies of RECVTP (the single-threaded version) and MRCV or MRCVIO to run with one or more copies of SENDTP. You can also configure MSENDRCV to run with MSEND, MRCV, SENDTP or RECVTP. For more information, see the sections that follow.

One possible arrangement is to place SENDTP (single-threaded) on multiple client computers, and configure MRCV or MRCVIO (multithreaded) on a server so that it interacts with all the TPs on the clients. Many other arrangements are possible.

Configuration for MRCV, MSEND, and MSENDRCV

The MRCV, MSEND, and MSENDRCV TP samples use a configuration file for configuration and input. To name the file, use .CFG as the extension, and use the same base file name and directory location as the executable file (the TP itself).

The following table shows examples of CFG files that could be used with MSEND and MRCV.

Example of MSEND.CFG file	Example of MRCV.CFG file
ResultFile=MSEND.OUT	TraceFile=MRCV.TRC
TraceFile=MSEND.TRC	LocalTPName=MRCVTP
RemoteTPName=MRCVTP	NumRcvConvs=32
LocalLUAlias=LUA	NumRcvThreads=4
RemoteLUAlias=LUB	RcvSize=4096
ModeName=#INTER	
NumSendConvs=32	
NumSends=128	
ConfirmEvery=16	
SendSize=256	

For MSEND, the configuration file (MSEND.CFG) can contain the following items, one per line, in any order. If a variable is not found in the file or the file is not present, the default is used.

Line	Default value	Value to supply
ResultFile =	MSEND.OUT	File name to print timings to (located in default directory for MSEND)
TraceFile =	MSEND.TRC	Trace file name (located in default directory for MSEND)
LocalLUAlias =	SENDLU	Local LU alias
RemoteLUAlias =	RECVLU	Remote LU alias
ModeName =	#INTER	Mode name
RemoteTPName =	MRCVTP	Name of remote TP (for MC_ALLOCATE)
NumSendConvs =	4	Number of conversations to send

NumSends =	8	Number of MC_SEND_DATA verbs per conversation
SendSize =	256	Size in bytes of data sent each time
ConfirmEvery =	2	Number of **MC_SEND_DATA** verbs between MC_CONFIRM verbs

The following lines are for MRCV:

Line	Default value	Value to supply
TraceFile =	MRCV.TRC	Trace file name (located in default directory for MSEND)
LocalTPName =	MRCVTP	Name of local TP (for RECEIVE_ALLOCATE)
NumRcvConvs =	4	Number of conversations to receive
NumRcvThreads =	2	Number of threads to start for processing receive conversations
RcvSize =	4096	Size in bytes of receive buffer for MC_RECEIVE_AND_WAIT

The following table shows examples of configuration files (MSENDRCV.CFG) that could be used with MSENDRCV. Each row of the table (Example A and Example B) contains two files that work together on a pair of computers.

Example A of MSENDRCV.CFG	Example B of MSENDRCV.CFG
ResultFile=MSENDRCV.OUT	ResultFile=MSENDRCV.OUT
TraceFile=MSENDRCV.TRC	TraceFile=MSENDRCV.TRC
LocalTPName=TPA	LocalTPName=TPB
RemoteTPName=TPB	RemoteTPName=TPA
LocalLUAlias=LUA	LocalLUAlias=LUB
RemoteLUAlias=LUB	RemoteLUAlias=LUA
ModeName=#INTER	ModeName=#INTER
NumRcvConvs=50	NumRcvConvs=25
NumRcvThreads=4	NumRcvThreads=4
RcvSize=4096	RcvSize=4096
NumSendConvs=25	NumSendConvs=50
NumSends=100	NumSends=100
ConfirmEvery=10	ConfirmEvery=10
SendSize=256	SendSize=256

The following lines are for MSENDRCV:

Line	Default value	Value to supply
ResultFile =	MSENDRCV.OUT	File name to print timings to (located in default directory for the MSEND or MSENDRCV sending TP)
TraceFile =	MSENDRCV.TRC	Trace file name (located in default directory for the MSEND or MSENDRCV sending TP)
LocalLUAlias =	SENDLU	Local LU alias
RemoteLUAlias =	RECVLU	Remote LU alias
ModeName =	#INTER	Mode name
RemoteTPName =	MRCVTP	Name of remote TP (for MC_ALLOCATE)
NumSendConvs =	4	Number of conversations to send
NumSends =	8	Number of MC_SEND_DATA verbs per conversation
SendSize =	256	Size in bytes of data sent each time
ConfirmEvery =	2	Number of **MC_SEND_DATA** verbs between MC_CONFIRM verbs
LocalTPName =	MRCVTP	Name of local TP (for RECEIVE_ALLOCATE)
NumRcvConvs =	4	Number of conversations to receive
NumRcvThreads =	2	Number of threads to start for processing receive conversations
RcvSize =	4096	Size in bytes of receive buffer for MC_RECEIVE_AND_WAIT

The output from MSEND and MSENDRCV consists of details of the configuration and the time taken for each conversation, and is sent to the result file specified in MSEND.CFG or MSENDRCV.CFG.

Operation of MRCV, MSEND, and MSENDRCV

The MRCV, MSEND, and MSENDRCV TPs use multiple event processing in Windows 2000 to avoid creating an unnecessary number of threads.

These TPs also use Windows-based processing, but this is incidental. Its only purpose is to display beneath the icon on the screen a running count of threads, the number of conversations currently sending or receiving data, and the number of conversations completed. The Windows-based processing could easily be removed to create a completely batch-oriented program. To do this, termination would need to be signaled with an event rather than with WM_CLOSE.

The TP name used in TP_STARTED is the name of the executable file (MSEND, MRCV, or MSENDRCV). The TP names used in MC_ALLOCATE and RECEIVE_ALLOCATE can be configured, as shown in the preceding tables.

MSEND reads its configuration file (or uses defaults) to determine the number of send conversations to start. Each conversation reads the value of **NumSends** (or uses the default), issues that number of MC_SEND_DATA verbs, and then terminates. When all of the conversations for a thread have terminated, the thread itself terminates. When all of the send threads have terminated, the program terminates.

An MC_CONFIRM verb is issued before the first **MC_SEND_DATA** and then at the intervals specified by **ConfirmEvery**. The complete data flow for a conversation is as follows:

TP_STARTED

MC_ALLOCATE

MC_CONFIRM

MC_SEND_DATA (repeated the number of times specified by **ConfirmEvery**)

MC_CONFIRM

MC_SEND_DATA (repeated the number of times specified by **ConfirmEvery**)

MC_CONFIRM

(Pattern repeats until the number of **MC_SEND_DATA** verbs equals **NumSends**.)

MC_DEALLOCATE

TP_ENDED

MRCV starts up an initial thread for issuing RECEIVE_ALLOCATE verbs, and then reads its configuration file (or uses defaults) to determine the number of receive threads to start and the number of conversations to receive. The initial thread issues a **RECEIVE_ALLOCATE** and waits. When the **RECEIVE_ALLOCATE** completes, the initial thread turns the processing of the conversation over to the next available receive thread, and issues another **RECEIVE_ALLOCATE**. This process continues until the configured number of **RECEIVE_ALLOCATE** verbs (that is, **NumRcvConvs**) have completed.

There is a limit to the number of conversations that can be supported on a thread, because of the limit to the number of events that can be waited for with **WaitForMultipleObjects** (a function in the Win32® API). For send threads, the limit is 64 conversations per thread; for receive threads, the limit is 63 conversations per thread.

MSEND works with this limit by starting enough threads to support the configured number of conversations. For example, if **NumSendConvs** is set to 200, four send threads are started: three of them process 64 conversations each and one processes the remaining eight conversations.

MRCV works with this limit by comparing **NumRcvConvs** to **NumRcvThreads**. If **NumRcvConvs** is more than (63 * **NumRcvThreads**), **NumRcvThreads** is increased. If **NumRcvThreads** is greater than **NumRcvConvs**, **NumRcvThreads** is reduced to prevent creating unneeded threads.

With MRCV, to ensure that a receive thread correctly picks up the conversation, two special events are used per thread: *event1* and *event2*. The following table illustrates their use.

RECEIVE_ALLOCATE thread	Receive thread
Issue RECEIVE_ALLOCATE and wait	Wait for *event1*
(**RECEIVE_ALLOCATE** completes)	
Select next receive thread and set *event1* for that thread; then wait for *event2* for that thread	
	(*Event1* completes)
	Add conversation to list of conversations being processed
	Set *event2*

(*Event2* completes)	
REPEAT	REPEAT

The receive thread waits not only on the *event1* set for it, but also on one event for each conversation the thread is processing.

If **NumRcvConvs** is set to zero, the **RECEIVE_ALLOCATE** thread will never terminate. If **NumSends** is set to zero, the conversation will never terminate; this is useful for getting the maximum number of simultaneous conversations.

Tracing of MRCV, MSEND, and MSENDRCV

If you want to observe the detailed processing of the MRCV, MSEND, or MSENDRCV sample TPs, you can enable tracing. To do this, find the following line, commented out, near the top of the file:

```
#define SRTRC
```

Enable this line or define this value on the command-line option to the compiler, and trace statements will be written to the trace file(s) specified by the **TraceFile** variable in the configuration.

There are also some trace statements that have been commented out. If they are left commented out, only MC_CONFIRM and MC_CONFIRMED processing is traced while a conversation is running, to maintain a send or receive count without generating a large amount of trace information. You can activate the detailed tracing of events (such as the sending of data) by enabling one or more trace statements.

The Trace Initiator (snatrace.exe) tool provides APPC API tracing for Microsoft Host Integration Server applications. For more information about the Trace Initiator and Trace Viewer tools, see Microsoft Host Integration Server Help.

Configuration for MRCVIO

The MRCVIO TP sample is a multithreaded console application that uses command-line options for configuration and input. If an option is not provided on the command line, then the default is used. The following table lists the possible command-line options for MRCVIO.

Command-line option	Description
-?	Displays usage information for this sample and exits.
-c numRcvConvs	The maximum number of APPC conversations to support. The default value is 8 with a maximum value of 64.
-d duration	The number of seconds that the sample application should run. The default value is 60 seconds. A value of 0 for duration means run indefinitely.
-h	Displays usage information for this sample and exits.
-i IntTraceFile	The name of the internal trace file if tracing is required. When this command-line option is specified, internal tracing is enabled. This option has no default value and internal tracing is turned off.
-n numRcvThreads	The number of Completion Port threads to allocate. The default value is 4 with a maximum value of 32.
-r rcvSize	The size in bytes of the buffer supplied on each **RECEIVE_ALLOCATE**. The default value is 4096 with a maximum value of 65535.
-t TPName	The name supplied on the **RECEIVE_ALLOCATE** verbs. The default value is the "MRCVTP" string.

Operation of MRCVIO

The MRCVIO TP sample uses IO completion ports for notification and will only operate on Windows 2000. Using the IO completion port mechanism is the preferable method for writing scalable APPC server applications.

The MRCVIO TP sample contains the routines for a multithreaded console application that uses asynchronous APPC calls on a single I/O completion port to receive data. The MRCVIO sample creates a small pool of threads that will be used for processing RECEIVE requests. It operates in conjunction with one of the following:

- Single-threaded version of send (SENDTP)
- Multithreaded event-based versions of send (MSEND, MSENDRCV)

The MRCVIO sample uses a server model that continues to accept conversations via RECEIVE_ALLOCATE until the application is manually terminated, or a specified timer expires. The conversations do not belong to any particular RECEIVE thread. Each receive thread issues **GetQueuedCompletionStatus** calls to wait for completion of an APPC verb (on any conversation). Each conversation issues **MC_RECEIVE_AND_WAIT** verbs to receive data. If confirmation is requested, an **MC_CONFIRM** verb is issued.

The TP name used in MC_ALLOCATE and RECEIVE_ALLOCATE can be configured by using the command-line options as shown in the preceding table of options for the configuration of MRCVIO.

MRCVIO starts up and parses its command-line options (or uses defaults) to determine the number of receive threads to start, the number of conversations to receive, the buffer size for each **RECEIVE_ALLOCATE**, its TP name, how long the application should run, and whether internal tracing is enabled.

Once command-line options are parsed, the MRCVIO sample calls the **CreateCompletionPort** function to allocate the IO completion port. If this call is successful, then the specified number of threads are created with the thread start routine pointing to the MRCVIO **ReceiveThread** function and the thread priority for each thread is lowered. Then the specified number of APPC conversations are started.

The MRCVIO sample uses the IO completion port structure and the WinAsyncAPPCIOCP function as listed below.

```
/* IOCP - Structure and function prototype          */
typedef struct
{
    HANDLE       APPC_CompletionPort;
    DWORD        APPC_NumberOfBytesTransferred;
    DWORD        APPC_CompletionKey;
    LPOVERLAPPED APPC_pOverlapped;
} APPC_IOCP_INFO;
extern HANDLE WINAPI WinAsyncAPPCIOCP(
    APPC_IOCP_INFO* iocp_handle, // IO completion port information
    long lpVcb);                 // pointer to APPC verb control block
```

The APPC_CompletionPort must be a HANDLE returned by the **CreateIoCompletionPort** function issued by the application before using **WinAsyncAPPCIOCP**. The other three fields can be set to any value whatsoever. The APPC library does nothing with these other fields, except to return them unaltered on the **GetQueuedCompletionStatus** when the APPC verb completes. Application developers can set these values to whatever they like, but assuming the server application is handling multiple concurrent APPC conversations, an application will need to use one of these three fields to correlate APPC verbs with their completions.

For example, the MRCVIO sample passes a pointer to a Conversation Control Block into the APPC_pOverlapped field when it issues an APPC verb. The same value is returned when the APPC verb completes on the **GetQueuedCompletionStatus**. This allows the sample MRCVIO TP to figure out which APPC verb has actually completed. APPC developers can use a different method (an index into an array of VCBs, for example) to provide the same effect.

Also, an application might use the APPC_CompletionKey field to distinguish between APPC events and other events posted to this IO Completion port. For example, the MRCVIO sample sets this value to a user-defined constant IOCP_VERB_COMPLETE so that the **GetQueuedCompletionStatus** function can distinguish APPC verb completions from the other events that are posted to this IO Completion port (IOCP_START_CONVERSATION, IOCP_END_CONVERSATION and IOCP_TERMINATE_THREAD). However, this is purely for the convenience of the application. An APPC developer could decide not to post any events to its IO Completion port (except implicitly for APPC completions). In such a case, it would be unnecessary to set any value in the APPC_CompletionKey.

CPI-C Samples

Microsoft® Host Integration Server 2004 SDK includes the source code for several sample programs that illustrate using Common Programming Interface for Communications (CPI-C) for transaction programs (TPs).

These files are copied to your hard drive during Host Integration Server software or Host Integration Client software installation when the Host Integration Server Software Development Kit option is selected. These samples are installed in the Samples\SNA subdirectory below where the Host Integration Server SDK software is installed (C:\Program Files\Microsoft Host Integration Server\SDK, by default).

These sample programs include the files listed in the following table.

Sample TP program	Description
APING and APINGD	Sample programs that provide a simple test for end-to-end connectivity. These samples are located in the \SDK\Samples\SNA\aping folder on the CD.
Multithreaded APINGD	A multithreaded connectivity test that illustrates nonqueued behavior in Microsoft® Windows Server™ 2003 and Windows® 2000. This sample is located in the \SDK\Samples\SNA\mping folder on the CD.
CPI-C Send and Receive TPs	A pair of simple CPI-C TPs that illustrate the use of asynchronous CPI-C calls. These samples are located in the \SDK\Samples\SNA\cpic folder on the CD.
AREXEC and AREXECD	A pair of TPs that execute commands on a remote computer and send the output back across the connection. These samples are located in the \SDK\Samples\SNA\arexec folder on the CD.
AREMOTE	A sample client and server program using APPC that enables you to invoke and control a text-mode program from another computer. This sample using APPC was based a Win32® sample program that originally used named pipes. These samples are located in the \SDK\Samples\SNA\aremote folder on the CD.

In addition to these TPs, the following supplemental programs are included on the Host Integration Server 2004 CD.

Supplemental program	Description
TPSETUP	A sample installation program, demonstrating an interface that assists in configuring autostarted invokable TPs. This sample is located in the \SDK\Samples\SNA\tpsetup folder on the CD.
TPSTART	A program required for the automatic startup of invokable TPs that run as applications under Windows Server 2003 or Windows 2000. TPSTART is not required if the TP has been written as a Windows Server 2003 or Windows 2000 service .TPSTART is installed by Host Integration Server 2004 Setup in the System folder of the Host Integration Server 2004 root directory. This sample is located in the \SDK\Samples\SNA\tpstart folder on the CD.

For general information about programming for CPI-C, see the CPI-C Programmer's Guide section of the SDK.

For API references and other technical information about CPI-C, see the CPI-C Programmer's Reference section of the SDK.

This section contains:

- Building the TPs
- TPSETUP
- TPSTART
- APING and APINGD
- Multithreaded APINGD
- CPI-C Send and Receive TPs
- AREXEC and AREXECD
- AREMOTE

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Building the TPs

The Common Programming Interface for Communications (CPI-C) samples are designed to be built using the command-line compiler or the IDE in Microsoft® Visual Studio® .NET.

To build the CPI-C samples installed from the Host Integration Server CD, set the following environment variables listed in the following table.

Variable	Description
ISVLIBS	The directory containing the Microsoft® Host Integration Server 2004 LIB files for Microsoft® Windows Server™ 2003 or Windows® 2000.
ISVINCS	The directory containing the Host Integration Server 2004 header files.
SAMPLEROOT	The root directory where the sample code provided as part of the SDK has been installed on a local hard disk.

For example, if you installed the Host Integration Server SDK directory to the default location (C:\Program Files\Microsoft Host Integration Server\SDK), use the following lines to set the variables (assumes Intel binaries are being produced for Windows Server 2003 or Windows 2000.

```
ISVLIBS=C:\Program Files\Microsoft Host Integration Server\SDK\LIB
ISVINCS=C:\Program Files\Microsoft Host Integration Server\SDK\Include
SAMPLEROOT=C:\Program Files\Microsoft Host Integration Server\SDK\Samples\SNA
```

To build a specific sample (APING, for example) using Visual Studio .NET 2003, open the appropriate Microsoft® Visual C++® project file (SNA\aping\aping.vcproj, for example) from the **File** menu. Select a configuration and build the sample from the **Build** menu. Each project file has two configurations, one for a DEBUG build and one for a RETAIL build.

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TPSETUP

The TPSETUP sample program simplifies the setting of registry or environment variables needed by autostarted invokable transaction programs (TPs). Without an interface provided by TPSETUP, configuring such variables can be complicated and prone to errors. Therefore, it is recommended that you use code like TPSETUP in installation programs for autostarted invokable TPs.

Operation

The source code for TPSETUP, contained in INSTALL.C, can be compiled to work in Microsoft® Windows Server™ 2003 or Windows® 2000. Although TPSETUP has been constructed so that the program responds correctly in different environments, it is now only supported for Windows Server 2003 and Windows 2000.

It is recommended that autostarted invokable TPs be written as Windows Server 2003 or Windows 2000 services. For the installation program for such TPs, study the code in INSTALL.C. For example, use the **CreateService** function or similar code when installing a TP that will run as a service under Windows Server 2003 or Windows 2000. For important information about how services work under Windows Server 2003 or Windows 2000, see the documentation included with the Platform SDK for Windows Server 2003, Windows 2000, and Win32®.

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TPSTART

An autostarted transaction program (TP) that runs as an application under Microsoft® Windows Server™ 2003 or Windows® 2000 requires the support of the TPSTART program, which is installed with the Host Integration Server 2004 software in the System subdirectory of the Host Integration Server 2004 root directory. Therefore, the TPSTART program must be started on a Windows Server 2003-based client or a Windows 2000-based client before an autostarted TP can start as an application. Starting TPSTART can be accomplished by using standard Windows Server 2003 or Windows 2000, such as including TPSTART in the **Startup** group on the client.

APING and APINGD

The sample code for APING and APINGD is ported from code on the IBM Advanced Program-to-Program Communications (APPC)/Common Programming Interface for Communications (CPI-C) disk. These samples are used to test end-to-end connectivity, and simply show that the configuration is correct by exchanging bytes of data across the link. APING is the client or invoking (local) half and attempts to contact APINGD (the APPC/CPI-C ping daemon or server), which is written here as a Microsoft® Windows Server™ 2003 or Windows® 2000 service so it can be installed as an invokable TP on the remote computer.

Setup

In order to use the APING and APINGD samples included in the Microsoft® Host Integration 2004 SDK the follow these steps:.

To set up APING and APINGD

1. Create an appropriate APPC LU-LU-mode triplet (for example, LUPING-LUPINGD-#INTER).
2. Set up a CPI-C symbolic destination name that contains the configured remote LU and mode. (The TP name for APINGD is APINGD.)
3. Assign the local APPC LU to the APING TP, either by using a registry entry of APING:REG_SZ:*LocalLUAlias* in the **SnaBase\Parameters\Clients** key, or by assigning the local LU as the default local APPC LU for the user who will run APING.

Input and Output

APING is a console application. The syntax of its command line is

aping [**-s***size*] [**-i***iterations*] [**-c***packets*] [**-m***mode*] [**-t***tpname*] *PartnerLUName*

aping [**-s***size*] [**-i***iterations*] [**-c***packets*] *SymbolicDestinationName*

where

-s*size*
Specifies the size, in bytes, of the packet transmitted. The default is 100 bytes.

-i*iterations*
Specifies the number of iterations to carry out. The default is 2.

-c*packets*
Specifies the number of consecutive packets sent by each side. The default is 1.

-m*mode*
Specifies the mode name. The default is #INTER.

-t*tpname*
Specifies the TP name of the TP to start on the remote server. The default is APINGD.

PartnerLUName
Specifies the partner LU name of the destination.

SymbolicDestinationName
Specifies the symbolic destination name of the destination.

Output goes to **stdout** and **stderr**, and details the data rates and timings for each iteration.

Operation

Note that with APINGD, Specify_Local_TP_Name is used to set the local TP name, so Wait_For_Conversation must be used to wait for the Accept_Conversation call to complete, because it will return asynchronously.

The code at the end of APINGD.C is a stub for making any TP into a Windows Server 2003 or Windows 2000 service. There are three routines that are needed: **main**, **ServiceMain**, and **ControlHandler**. For details about how these work, see the comments in the file. The **TPStart** routine is the entry point of the TP proper.

In particular, note that in response to the SERVICE_CONTROL_STOP or SERVICE_CONTROL_SHUTDOWN messages in the **ControlHandler** routine, action should normally be taken to stop the service, but because each run does not last long with these samples, no code is included to take such an action.

Multithreaded APINGD

The version of MPINGD provided in the sample code illustrates how to achieve nonqueued behavior from an invokable TP in Microsoft® Windows Server™ 2003 and Windows® 2000. This means that multiple copies of APING can talk to the same copy of MPINGD at the same time. However, you cannot run multiple copies of a Windows Server 2003 or Windows 2000 service. The features are achieved by always having a thread with an Accept_Conversation outstanding, so that any incoming attach for MPINGD will always be satisfied immediately.

Setup

Setup requirements for MPINGD are the same as for the single-threaded version, APINGD. The remote LU and mode that you use should support parallel sessions so that more than one conversation at a time is possible.

Input and Output

The input and output for MPINGD are the same as for the single-threaded version, APINGD.

Operation

The operation of MPINGD is similar to that of the single-threaded version, APINGD. The same three routines are used (**main**, **ServiceMain** and **ControlHandler**). **ServiceMain** calls the **TPStart** routine. This routine must not return until the service is ready to terminate.

The **TPStart** routine does some initialization, creates the first conversation thread, and then waits on an event created by the **ServiceMain** routine. This event is set when the service control manager issues an order to STOP or SHUTDOWN. When the event is set, it calls WinCPICCleanup, which will cancel any active conversations and return outstanding Accept_Conversation calls, thus making all conversation threads exit. It then marks the service as STOPPED.

The **ThreadStart** routine is the entry point for each of the conversation threads. It issues **Accept_Conversation** and Wait_For_Conversation, and when this completes, it creates another thread to wait for the next attach while the existing thread services the first attach.

CPI-C Send and Receive TPs

These transaction programs (TPs) are Common Programming Interface for Communications (CPI-C) versions of the APPC send and receive TPs. The sample code illustrates the use of asynchronous CPI-C calls.

Setup

In order to use these TPs, follow these steps:

To set up the send and receive TPs

1. Create an appropriate APPC LU-LU-mode triplet.
2. Set up a CPI-C symbolic destination name that contains the configured remote LU and mode. (The default symbolic destination name is CPICRECV.)
3. Assign the local APPC LU to the CPICSEND TP, either by using a registry entry of CPICSEND:REG_SZ:*LocalLUAlias* in the **SnaBase\Parameters\Clients** key, or by assigning the local LU as the default local APPC LU for the user who will run CPICSEND.

For example, use SENDLU-RECVLU-#INTER as your LU-LU-mode triplet. Then, create a CPI-C symbolic destination name CPICRECV containing the application TP name CPICRECV, the partner LU alias RECVLU, and the mode name #INTER. Finally, add the intended user to the users list, and assign SENDLU as the user's default local APPC LU.

Input and Output

CPICSEND and CPICRECV use the files Cpicsend.cfg and Cpicrecv.cfg for input. These files should be placed in the folder that contains the TP executable file. These files are similar to the input files for the APPC send and receive TPs.

The following entries are for CPICSEND only:

Line	Default Value	Description
ResultFile =	C:\Cpicsend.out	The file name where the timings results will be stored.
NumSends =	2	The number of Send_Data calls per conversation.
SendSize =	1024	The size of data sent each time in bytes .
ConfirmEvery =	1	The number of **Send_Data** calls between Confirm calls. If ConfirmEvery=0, CPICSEND will not issue CONFIRM verbs.
SymDestName =	CPICRECV	The symbolic destination name.
NumConversations =	1	The number of conversations. This setting must be the same for CPICSEND and CPICRECV. (They do not negotiate the number.) If this value is zero, the TPs will do an infinite number of conversations.
WaitMode=	No	Yes, No, or Block. If WaitMode=No, the verbs are completed through posted windows messages. The TPs issue Specify_Windows_Handle with a window handle so that Windows CPI-C will post completion messages to this window handle. If WaitMode=Yes, verbs are non-blocking and completed using asynchronous call completion. In this case, the TPs issue **Specify_Windows_Handle** with NULL so that the TPs must then issue a Wait_For_Conversation call to wait for the asynchronous call to complete. If WaitMode=Block, all verbs are blocking.

The following entries are for CPICRECV only:

Line	Default value	Description
ResultFile =	C:\Cpicrecv.out	The file name where the timings results will be stored.
LocalTPName =	CPICRECV	The local TP name to use on the Specify_Local_TP_Name call.
NumConversations =	1	The number of conversations. This setting must be the same for CPICSEND and CPICRECV. (They do not negotiate the number.) If this value is zero, the TPs will do an infinite number of conversations.
WaitMode=	No	Yes, No, or Block. If WaitMode=No, the verbs are completed through posted windows messages. The TPs issue Specify_Windows_Handle with a window handle so that Windows CPI-C will post completion messages to this window handle. If WaitMode=Yes, verbs are non-blocking and completed using asynchronous call completion. In this case, the TPs issue **Specify_Windows_Handle** with NULL so that the TPs must then issue a Wait_For_Conversation call to wait for the asynchronous call to complete. If WaitMode=Block, all verbs are blocking.

As with CPICSEND, CPICRECV produces C:\Cpicrecv.out (by default) with timings of the conversations in it.

Operation

CPICRECV should be started first. CPICRECV issues Specify_Local_TP_Name to set its local TP name, and then Accept_Conversation to accept a conversation (note that because **Specify_Local_TP_Name** is issued, the **Accept_Conversation** will complete asynchronously).

Both TPs issue Specify_Windows_Handle during initialization to set either the window handle or NULL. CPICSEND calls Set_Processing_Mode after completion of Initialize_Conversation to set the processing mode to non-blocking for this conversation.

After each call is issued, the return code is checked. If the return code is not CM_OPERATION_INCOMPLETE, the call has already completed, so an ASYNC_COMPLETE message is posted to trigger the next call. If **WaitMode** is set to YES and the issued call did not complete immediately, a Wait_For_Conversation call is issued to wait for call completion, at which point an ASYNC_COMPLETE message is posted. If **WaitMode** is set to NO and the issued call did not complete immediately, Windows CPI-C detects call completion and posts an ASYNC_COMPLETE message. The receipt of the ASYNC_COMPLETE message triggers the next call to be issued.

For CPICSEND, each conversation consists of an Allocate call, followed by a given number of Send_Data calls of given size and interspersed with Confirm calls at a given interval, followed by a Deallocate.

CPICRECV issues Receive on completion of the Accept_Conversation, and then issues either **Receive** or Confirmed according to the return from the previous **Receive**.

At any stage, if the TPs encounter an error, they terminate. Use CPI-C API tracing to diagnose problems with the configuration.

Both TPs are built from a single source-code file, CPICSR.C. CPICSEND is compiled only if CPICSEND macro is #defined. This macro is normally defined using the -DCPICSEND option on the command line to the C compiler.

The TPs run as Microsoft® Windows Server™ 2003 or Windows® 2000 applications with a minimized window, the title of which displays the status. When the WndProc of this window, TPWndProc, receives the WM_CREATE message for the window, it triggers the issuing of the first call. When TPWndProc receives an ASYNC_COMPLETE message from Windows CPI-C, it triggers the issuing of the next call, dependent on what the previous call was. When the window is closed, WinCPICCleanup is issued to terminate any active conversations.

AREXEC and AREXECD

The sample code for these two transaction programs (TPs) provides the ability to execute commands on a remote computer and to send the output back across the connection to the invoking TP.

Setup

In order to use the AREXEC and AREXECD samples provided with the Microsoft® Host Integration 2004 SDK, follow these steps:

To set up AREXEC and AREXECD

1. Create an appropriate APPC LU-LU-mode triplet.
2. Set up a CPI-C symbolic destination name that contains the configured remote LU and mode. (The TP name for AREXECD is AREXECD.)
3. Assign the local APPC LU to the AREXEC TP, either by using a registry entry of AREXEC:REG_SZ:*LocalLUAlias* in the **SnaBase\Parameters\Clients** key, or by assigning the local LU as the default local APPC LU for the user who will run AREXEC.

Input and Output

AREXEC is a console application. The syntax of its command line is

arexec [**-m***mode*] [**-t***tpname*] *destination command*

where

-m*mode*
  Specifies the mode name. The default is #INTER.
-t*tpname*
  Specifies the TP name.
destination
  Specifies the destination. Can be either a symbolic destination name or a partner LU name.
command
  Specifies the command string to execute on the remote computer.

The **stdout** and **stderr** from the command executed at the remote end is sent across the link and printed to **stdout** on the invoking end.

Operation

The AREXECD program is a Microsoft® Windows Server™ 2003 or Windows® 2000 service, using the same routines in APING, APINGD, and multithreaded APINGD. The execution of the command and sending back of data are done in the routine **execute_and_send_output** in CPICPORT.C. This sample creates a named pipe and connects to the read end of the pipe. It then creates a process to run the command and gives that process a handle to the write end of the pipe as its **stdout** and **stderr**. Then, the data is read from the pipe, and Send_Data is used to send it across the link.

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AREMOTE

The sample code for this TP provides the ability to control a text-mode program on a remote computer. AREMOTE is a Win32® console application that implements a client and a server. The AREMOTE server is invoked with the name of the text-mode program that the client wishes to control remotely. The AREMOTE client redirects **stdin** (keyboard input) from the client to the AREMOTE server. In turn, the AREMOTE server redirects **stdin** and **stderr** from the program being controlled back to the AREMOTE client.

Setup

In order to use the AREMOTE sample provided with the Microsoft® Host Integration 2004 SDK, follow these steps:

To set up AREMOTE

1. Create an appropriate APPC LU-LU-mode triplet.
2. Set up a CPI-C symbolic destination name that contains the configured remote LU and mode. (The TP name for AREMOTE is AREMOTE.)
3. Assign the local APPC LU to the AREMOTE TP, either by using a registry entry of AREMOTE:REG_SZ:*LocalLUAlias* in the **SnaBase\Parameters\Clients** key, or by assigning the local LU as the default local APPC LU for the user who will run AREMOTE.

Starting the client

The syntax of the command line to start the client end of AREMOTE is as follows.

```
aremote /C ServerLU [/T TPName] [/P TPName] [/L LocalLU]
     [/M Modename] [/N Lines] [/F Color] [/B Color]
```

Parameters

/C
Specifies the client mode.

ServerLU
Specifies the SNA LU for connecting to the server.

/T TPName
Specifies the TP name that the server is using. The default is AREMOTE.

/P TPName
Specifies the TP name that the client is using. The default is AREMOTE

/L LocalLU
Specifies the LU name for the local TP to use. The default is AREMOTE.

/M Modename
Specifies the mode name. The default is #INTER.

/N Lines
Specifies the number of lines to get.

/F Color
Specifies the foreground color. Color options are black, blue, green, cyan, red, purple, yellow, white, lblack, lblue, lgreen, lcyan, lred, lpurple, lyellow, and lwhite.

/B Color
Specifies the background color. Color options are black, blue, green, cyan, red, purple, yellow, white, lblack, lblue, lgreen, lcyan, lred, lpurple, lyellow, and lwhite.

Starting the server

The syntax of the command line to start the server end of AREMOTE is as follows.

```
aremote /S Cmd [/T TPName] [/M Modename] [/F Color] [/B Color]
```

Parameters

/S
Specifies the server mode.

Cmd
Specifies a text-mode program that you want to control from another computer.
/T TPName
Specifies the TP name that the server is using. The default is AREMOTE.
/M Modename
Specifies the mode name. The default is #INTER.
/F Color
Specifies the foreground color. Color options are black, blue, green, cyan, red, purple, yellow, white, lblack, lblue, lgreen, lcyan, lred, lpurple, lyellow, and lwhite.
/B Color
Specifies the background color. Color options are black, blue, green, cyan, red, purple, yellow, white, lblack, lblue, lgreen, lcyan, lred, lpurple, lyellow, and lwhite.

Output

The **stdout** and **stderr** from the command run at the remote end is sent across the link and printed to **stdout** on the client. The **stdin** from the client is sent across the link and becomes the **stdin** for the command run at the remote end.

The APPC remote installer (ARSETUP) included with this sample brings up a dialog box that prompts for TP configuration information. The information is then placed in the registry under Microsoft® Windows Server™ 2003 or Windows® 2000. The WIN32 compiler flag specifies that the Win32 version of ARSETUP should be built for use on Windows Server 2003 or Windows 2000.

Notes

The AREMOTE server can also be configured to run as a Windows Server 2003 or Windows 2000 service using the ARSETUP sample utility included in the same folder on the CD.

The AREMOTE client can exit by inputting the following character sequences:

%cQ : Quit but leave the AREMOTE server running.

%cK : Exit and stop the AREMOTE server.

Other special client commands include the following:

%cM : Send a message to the AREMOTE server.

%cP : Show a popup on the AREMOTE server.

%cS : Report the status of the AREMOTE server.

%cH : Provide help describing these special client commands.

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LUA Samples

The source code for several sample programs that illustrate using logical unit application (LUA) are included in the Microsoft® Host Integration Server 2004 SDK. These files are copied to your hard drive during Host Integration Server software or Host Integration Client software installation when the Host Integration Server Software Development Kit option is selected. These samples are installed in the Samples\SNA subdirectory below where the Host Integration Server SDK software is installed (C:\Program Files\Microsoft Host Integration Server \SDK, by default).

These sample programs include the following files.

Sample transaction program (TP)	Description
RUI3270	Sample code for a simple emulator based on using the Request Unit Interface (RUI) API. Sample code is provided for Win32® applications. This sample is located in the \SDK\Samples\SNA\RUI3270 folder on the CD.
SLI3270	Sample code for a simple emulator based on using the Session Level Interface (SLI) API. Sample code is provided for Win32 applications. This sample is located in the \SDK\Samples\SNA\SLI3270 folder on the CD.

These samples show how to build a simple 3270 emulator using either the RUI or SLI API. This emulator does not interpret the data it receives from the host, but does demonstrate how to use the APIs to establish a session with the host.

For general information about programming for the logical unit application (LUA), see the LUA Programmer's Guide section of the SDK.

For API references and other technical information about LUA, see the LUA Programmer's Reference section of the SDK.

This section contains:

- Building the LUA Samples
- Specifying a File Name for Table G for Code Conversion
- Code Samples Using the RUI API
- Code Samples Using the SLI API

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

Building the LUA Samples

The logical unit application (LUA) samples are designed to be built using Microsoft® Visual C++® 6.0 or later using the command-line compiler or using Microsoft Visual Studio® .NET.

To build the LUA samples, set the environment variables listed in the following table.

Variable	**Description**
ISVLIBS	The directory containing the Microsoft® Host Integration Server 2004 LIB files for Microsoft® Windows™ Server 2003 or Windows® 2000 Server.
ISVINCS	The directory containing the Host Integration Server 2004 header files.
SAMPLEROOT	The root directory where the sample code provided as part of the software development kit (SDK) has been installed on a local hard disk.

For example, if you installed the Host Integration Server SDK directory to the default location (C:\Program Files\Microsoft Host Integration Server\SDK), use the following lines to set the variables (assumes Intel binaries are being produced for Windows Server 2003 or Windows 2000):

```
ISVLIBS=C:\Program Files\Microsoft Host Integration Server \SDK\LIB
ISVINCS=C:\Program Files\Microsoft Host Integration Server \SDK\Include
SAMPLEROOT=C:\Program Files\Microsoft Host Integration Server \SDK\Samples\SNA
```

To build a specific sample (the Win32 version of RUI3270, for example) using Visual Studio .NET 2003, open the appropriate Visual C++ project file (SNA\RUI3270\Win32\NRUI3270.vcproj, for example) from the **File** menu. Select a configuration and build the sample from the **Build** menu. Each project file has two configurations, one for a DEBUG build and one for a RETAIL build.

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Specifying a File Name for Table G for Code Conversion

The sample emulators use a user-defined table referred to as Table G in Microsoft® Host Integration Server 2004 for converting between ASCII and EBCDIC characters. The sample applications require that the file name of this table be specified. Use the COMTBLG registry or create a COMTBLG environment variable to specify the file name. The registry entry is described in the sections on Host Integration Server Client Binary Setup.

A sample Table G file, COMTBLG.DAT, is installed with Host Integration Server in the SYSTEM subdirectory below the root directory where the product is installed. The default location where Host Integration Server is installed is the following:

C:\Program Files\Microsoft Host Integration Server

To use this COMTBLG.DAT file, copy it to the client computers where the sample programs will be run, and specify the file name using the COMTBLG environment variable or the registry entry.

Code Samples Using the RUI API

The following files located under the SNA\RUI3270 folder can be used to build simple 3270 emulators using the Request Unit Interface (RUI) API. Study the comments in the .C files for information about how to run the emulators.

File name	API used	Type of file	Target operating system
RUI3270.C	RUI	Source code for RUI3270.EXE	Microsoft® Windows Server™ 2003 or Windows® 2000 Server
Win32\NRUI3270.MAK	RUI	Makefile	Windows Server 2003 or Windows 2000
Win32\RUIINC.C	RUI	Source code that #includes RUI3270.c to build a Win32 version of WRUI3270.EXE	Windows Server 2003 or Windows 2000
Win32\WRUI3270.RC	RUI	Resource definition file	Windows Server 2003 or Windows 2000

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Code Samples Using the SLI API

The following files located under the SNA\SLI3270 folder can be used to build simple 3270 emulators using the Session Level Interface (SLI) API. Study the comments in the .C files for information about how to run the emulators.

File name	**API used**	**Type of file**	**Target operating system**
SLI3270.C	SLI	Source code for SLI3270.EXE	Microsoft® Windows Server™ 2003 or Windows® 2000 Server
Win32\NSLI3270.MAK	SLI	Makefile	Windows Server 2003 or Windows 2000
Win32\SLIINC.C	SLI	Source code that #includes SLI3270.c to build a Win32 version of SLI3270.EXE	Windows Server 2003 or Windows 2000
Win32\WSLI3270.RC	SLI	Resource definition file	Windows Server 2003 or Windows 2000

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SNA Print Server Data Filter Samples

The source code for a sample program that illustrates using the SNA Print Server Data Filter API is included in the Microsoft® Host Integration Server 2004 SDK. The sample program illustrates features of the SNA Print Server Data Filter API. These features can be used to extend the capabilities of the Host Print Service in Host Integration Server 2004. The sample code illustrates how to write a print data filter dynamic-link library (DLL) that will be called by Host Print Service when a print job is initiated, when data is sent to the printer, and when the print job is completed.

These files are copied to your hard disk during Host Integration Server or Host Integration Client software installation when the Host Integration Server Software Development Kit option is selected. These samples are installed in the Samples\SNA\PrnFltr subdirectory below where the Host Integration Server SDK software is installed (C:\Program Files\Microsoft Host Integration Server\SDK, by default).

The following table lists the sample program files.

Subdirectory	**Description**
NTFilter.c	The sample program written in C that illustrates use of the SNA Print Server Data Filter API.
NTFilter.h	An include file with function defines.
NTFilter.def	A DEF file for use by the compiler and linker. Note that exported functions from the SNA Print Server Data Filter DLL must not be decorated.
NTFilter.rc	A resource file.
Makefile	A command-line Makefile that can be used with **nmake**. This Makefile can be used with Microsoft Visual Studio® .NET 2003.
prnfltr.vcproj	A project file for use with Microsoft Visual C++® and Visual Studio .NET 2003.

The PrnFltr sample is designed to be built using Microsoft Visual Studio .NET 2003.

To build the PrnFltr sample using the command-line compiler, set up your build environment as follows:

- Open a Command Prompt window
- Run VSVARS32.bat from the Visual Studio bin directory (by default, C:\Program Files\Microsoft Visual Studio .NET 2003\Common7\Tools)
- Navigate to SNA\PrnFltr subdirectory, and invoke NMAKE

To build the PrnFltr sample using Visual Studio .NET 2003, open the appropriate Visual C++ project file (SNA\PrnFltr\ntfilter.vcproj) from the **File** menu. Select a configuration and build the sample from the **Build** menu. Each project file has two configurations, one for a DEBUG build and one for a RETAIL build.

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Administration and Management Samples

The source code for several sample programs that illustrate using Windows® Management Instrumentation (WMI) for administration and management of Microsoft® Host Integration Server (HIS) 2004 are included in the Host Integration Server 2004 SDK. These files are copied to your hard drive during HIS software or HIS Client software installation when you select the **Host Integration Server Software Development Kit** option. These samples are installed in the Samples\Admin subdirectory below where the HIS SDK is installed (C:\Program Files\Microsoft Host Integration Server\SDK, by default).

These sample programs include the files in the following subdirectories:

File or subdirectory	**Description**
ImportExport\	A WMI sample script written in Microsoft Visual Basic® Scripting Edition (VBScript) that illustrates how to import and export configuration information from Host Integration Server.
SNAWMI.ASP	The main page of a WMI sample script written in Microsoft Active Server Pages (ASP) for retrieving configuration information from Host Integration Server using WMI.
SnaWebAdmin\	Subsidiary pages of WMI sample scripts written in Microsoft Active Server Pages (ASP) for retrieving configuration information from HIS using WMI. Each one of these subdirectories contains ASP sample scripts that illustrate how to retrieve information from Host Integration Server on a specific feature.

Several sample programs (with source code) that illustrate administration and management are provided with HIS.

For general information about programming for administration and management, see Administration and Management Programmer's Guide.

For API references and other technical information about administration and management, see Administration and Management Programmer's Reference.

This section contains:

- Active Server Pages SNAWebAdmin Sample
- VBScript ImportExport Sample

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Active Server Pages SNAWebAdmin Sample

The Admin\SnaWebAdmin folder contains a collection of Active Server Pages (ASP) for use with a Web server application designed to access configuration, management, and status information from the SNA server component of Microsoft® Host Integration Server (HIS) 2004. These sample applications require Microsoft Internet Information Services (IIS) version 5.0 or higher with ASP installed. HIS 2004 and IIS must be installed and running on the same computer.

The Windows Management Instrumentation (WMI) ASP samples must be installed into the public directories of the Web server below WWWRoot. Copy the contents of the entire Admin directory from the SDK\Samples\Sna\Admin subdirectory, including SNAWebAdmin subdirectory, to your WWWROOT directory on the Web server. After these files have been copied, you should have a copy of the SNAWMI.ASP, fphover.class, and fphoverx.class files in WWWROOT and a WWWROOT\SNAWebAdmin folder with a series of subdirectories containing a number of ASP and Graphics Interchange Format (GIF) files.

You can then run the samples by using Microsoft® Internet Explorer, or some other Web browser on the same computer, or a different computer. Type **HTTP://<*computer name*>/SNAWMI.asp** in the **Address** box.

Substitute the network name of the computer hosting the Web server and HIS for the computer name in angle brackets in the URL above. This opens the main page of the SNAWebAdmin ASP application and enables you to select any of the other sample ASP pages. Information about each sample is provided on this Web page. Additional information is available at HTTP://<*computer name*>/admin/headers/welcome.htm.

These ASP pages illustrate using WMI to retrieve SNA management and configuration from HIS 2004.

The two Java class files, **fphover.class** and **fphoverx.class**, are redistributable files that ship with Microsoft® FrontPage®. These Java class files are used in some of the WMI sample scripts instead of a **Submit** button to stop and start services.

Several subdirectories below SNAWebAdmin need to have IIS security enabled (no anonymous access); otherwise the scripts in these subdirectories fail since the anonymous user account by default does not have access rights that would allow it to start or stop services on Microsoft Windows® 2000 or make changes to the HIS 2004 system. The subdirectories that need IIS security enabled are the following:

- SNASebAdmin\Change
- SNASebAdmin\Connections
- SNASebAdmin\Services
- SNASebAdmin\Status

It is possible to host these ASP pages on a computer running the Web server that is different from the computer running HIS 2004. However, this requires some changes to the ASP pages to handle connections to a different computer, security, and authentication issues.

To download updated Host Integration Server 2004 Help from www.microsoft.com, go to http://go.microsoft.com/fwlink/?linkid=29507.

VBScript ImportExport Sample

The Admin\ImportExport folder contains a sample written in Microsoft® Visual Basic® Scripting Edition (VBScript) that illustrates how to import and export SNA configuration information from Host Integration Server (HIS) 2004 in managed object format (MOF) using Windows Management Instrumentation (WMI). This sample relies on the MOFCOMP.exe application supplied with Microsoft Windows® for importing.

In the following examples, ImportExport.VBS has been renamed to HISCFG.vbs.

The usage for this command-line tool for exporting configuration information is as follows:

```
HISCFG [/S:server] [/N:namespace] [/C:class] [/O:outfile]
      [/U:username] [/W:password] [/Q]
```

The various command-line options are explained in the following table.

> **Note** Case is ignored for command-line options except for help and either the '/' or '-' character is interpreted as the leading character for an option. The following table uses the '/' character for illustration.

Command-Line Switch	**Comments**
/?	This flag shows the usage for this command and exits.
/C	The name of the WMI parent class to be queried. This should be set to one of the WMI classes defined in the MOF files supplied with HIS 2004. This parameter defaults to *MsSna_Config* and exports all of the classes SNA classes and their associations.
/h	This flag shows the usage for this command and exits.
/N	The WMI namespace to be queried. This parameter defaults to "root\MicrosoftHIS" for HIS 2004.
/O	The name of the file used for output. This parameter has no default value.
/Q	This Boolean flag indicates whether this is query should be completed quietly without displaying any status or error messages. This parameter defaults to verbose option.
/S	The name of the computer running HIS 2004. This parameter has no default value.
/U	The user name of a user on the domain or active directory where HIS 2004 is running with administrative rights. This parameter has no default value.
/W	The password of a user on the domain or active directory where HIS 2004 is running with administrative rights. This parameter has no default value.

The usage for this command-line tool for importing SNA configuration information is as follows:

```
HISCFG [/I:inputfilename]
```

A potential problem using WMI can occur with duplicate logical unit (LU) pools that can be illustrated using this sample program. Normally, exporting and re-importing the MOF file would not create duplicates. However, the HIS WMI provider allows pool-to-workstation association instances to be duplicated because, by design, duplicates of this type of object are allowed. It is possible to associate the same pool to the same workstation or user multiple times. Emulators use this to create more sessions for clients. Therefore, it is not possible to identify one such association from another. The WMISNA Provider, WMISNA.DLL, always create new associations of these types, even if an association with the same pair (Pool, Wks) already exists. Only in the case of this object type is this allowed. However, this can create a problem for applications developed using WMI (the Import/Export sample, for example) if the application does not know to not create the duplicates.

The following sequence illustrates this issue using the ImportExport sample:

1. Create a Pool-Workstation association by using Host Integration Server Manager or the Administration Manager client.
2. Export the SNA configuration to a MOF file using the ImportExport utility.
3. Import that same MOF file again using the ImportExport utility.
4. Duplicate Pool-Workstation associations will be created.

The result is that if a client uses the import/export sample or a similar application developed using WMI on a HIS 2004 configuration that has pool-to-workstation associations, then the number of associations will effectively double after running the sample. The workaround using the ImportExport sample would be as follows:

1. Export the configuration to a MOF file.
2. Remove the pool to workstation associations from the MOF file just created.
3. Import the MOF file back.

When importing the configuration from one domain to another using the ImportExport sample or a similar application developed using WMI, then step 2 should be ignored. Normally, WMI applications should copy an existing configuration to a blank configuration file so this condition does not arise.

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Messaging Samples

This section describes program samples that demonstrate the use of the extensions and components that make up Microsoft® MSMQ-MQSeries Bridge.

For general information about programming for MSMQ-MQSeries Bridge, see the Messaging Programmer's Guide in the Programmer's Guide section of the SDK.

For API references and other technical information for MSMQ-MQSeries Bridge, see Messaging Programmer's Reference in the Programmer's Reference section of the SDK.

This section contains:

- Sample Programs for MSMQ-MQSeries Bridge

Sample Programs for MSMQ-MQSeries Bridge

The source code for several sample programs that illustrate using MSMQ-MQSeries Bridge are included in the Microsoft® Host Integration Server 2004 SDK. These files are copied to your hard drive during Host Integration Server software or Host Integration Client software installation when the Host Integration Server Software Development Kit option is selected. These samples are installed in the Samples\AppInt\Bridge subdirectory below where the Host Integration Server SDK software is installed (C:\Program Files\Microsoft Host Integration Server\SDK, by default).

These sample programs include the files in the subdirectories listed in the following table.

Subdirectory	**Description**
EPRecv	EPRecv Sample A sample program in C that uses the MSMQ-MQSeries Bridge Extensions API to display the MQMD structure in the Message Queuing (also known as MSMQ) extension property.
EPSend	EPSend Sample A sample program in C that uses the MSMQ-MQSeries Bridge Extensions API to override the default MSMQ-MQseries Bridge message property mapping MsgType, ReplyToQMgr, and ReplyToQ in the MQSeries MQMD structure.
MQSRRecv	MQSRRecv Sample A sample program in C that uses the MQSeries API to receive messages from a specified MQSeries queue.
MQSRSend	MQSRSend Sample A sample program in C that uses the MQSeries API to send ten test messages to a specified MQSeries queue.
MSMQRecv	MSMQRecv Sample A sample program in C that uses the Message Queuing API to receive messages from a specified Message Queuing queue.
MSMQSend	MSMQSend Sample A sample program in C that uses the Message Queuing API to sends ten test messages to a specified Message Queuing local or foreign queue.
WMI	WMI MSMQ-MQSeries Bridge Sample A collection of Windows Management Instrumentation (WMI) sample scripts written in Active Server Pages (ASP) that shows how to use WMI to configure the MSMQ-MQSeries Bridge.

Several sample programs with source code are provided with Host Integration Server 2004 that illustrate how to use the MSMQ-MQSeries Bridge and Bridge Extensions.

The MSMQ-MQSeries Bridge samples are designed to be built using Microsoft® Visual Studio® .NET 2003. Most of these samples also require that the IBM MQSeries Client toolkit be installed, providing access to several MQSeries include and library files.

To build the MSMQ-MQSeries Bridge samples using the command-line compiler, set up your build environment as follows:

- Run VSVARS32.bat from the Visual Studio bin directory (by default, C:\Program Files\Microsoft Visual Studio .NET 2003\Common7\Tools.
- Set the MQS_INC environment variable so it points to the INCLUDE directory where MQSeries was installed. The default location for this variable is normally C:\Program Files\MQSeries Client\tools\c\include.
- Set the MQS_LIB environment variable so it points to the LIB directory where MQSeries was installed. The default location for this variable is normally C:\Program Files\MQSeries Client\tools\lib.

For example, set the following environment variables for building the MQS samples:

```
set MQS_INC=C:\Program Files\MQSeries Client\tools\c\include
set MQS_LIB=C:\Program Files\MQSeries Client\tools\lib
```

To build all the C/C++ samples (EPSend, EPRecv, MQSRRecv, MQSRSend, MSMQSend and MSMQRecv), open a Command Prompt window, navigate to the Bridge subdirectory, and invoke NMAKE. This recursively invokes NMAKE and builds all of the Bridge samples.

To build a specific sample (EPSend, for example), using the command-line compiler, open a Command Prompt window, navigate to the appropriate subdirectory (Bridge\EPSend, for example), and invoke NMAKE.

> To build a specific sample (EPSend, for example) using Visual Studio .NET 2003, open the appropriate Visual C++ project file (epsend.vcproj, for example) from the **File** menu. Select a configuration and build the sample from the **Build** menu. Each project file has two configurations, one for a DEBUG build and one for a RETAIL build.
>
> **Note** Several of the MSMQ-MQSeries Bridge samples require access to the IBM MQSeries Client toolkit and library

files.

The project files for these samples assume that the IBM MQSeries Client toolkit is installed in the default location at C:\Program Files\MQSeries Client\tools. You need to modify the project files if the IBM MQSeries Client toolkit is installed in a different location. For each C source file, you need to change the **Additional Include Directories** property under **C/C++/General**. For the target, you need to change the **Additional Dependencies** property under **Linker/Input**.

This section contains:

- EPRecv Sample
- EPSend Sample
- MQSRRecv Sample
- MQSRSend Sample
- MSMQRecv Sample
- MSMQSend Sample
- WMI MSMQ-MQSeries Bridge Sample

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EPRecv Sample

The MSMQ-MQSeries Bridge Extension API can be used to obtain the original MQSeries message properties for an MQSeries message sent using the MSMQ-MQSeries Bridge to Message Queuing (also known as MSMQ). The Bridge\EPRecv folder contains a sample program written in C that receives messages from a Message Queuing queue using the Message Queuing APIs and prints the original MQSeries message descriptor (MQMD) properties in the PROPID_M_EXTENSION, if they exist. The sample illustrates how to use MSMQ-MQSeries Bridge Extensions. You can use it for testing or troubleshooting the MSMQ-MQSeries Bridge and Bridge Extensions.

The usage for this command-line tool is as follows:

```
EPRecv <computer name>\<queue name>
```

The parameter <*computer name*>\<*queue name*> is the path name where messages are received. This is a Message Queuing queue name and is specified in UNC or DNS format.

Sample program usage and sample output are as follows:

```
eprecv MSBRIDGE\QUEUE
Queue opened.
Waiting for messages to arrive.
Use CTLR-C to stop.
-------> Message arrived:
Label = ''
Body (256) = 'Test Message 0 - 19:41:26'
Body Type (4113)
Extension property found.  Dumping values:
    MQMD1 Extension Field found.  Dumping values:
        MQMD1.Report = 00000000   MQMD1.MsgType = 00000008
        MQMD1.Feedback = 00000000   MQMD1.Priority = 0
        MQMD1.Version = 00000001  MQMD1.Expiry = -1
        MQMD1.ReplyToQMgr = 'BRIDGE2K_QM                                      '
        MQMD1.ReplyToQ    = '                                                '
        MQMD1.UserIdentifier = 'testuser     '
        MQMD1.ApplIdentityData = '            '
        MQMD1.PutApplName = 'n Server\sys'
        MQMD1.PutDate = '20000628'
        MQMD1.PutTime = '02530720'
        MQMD1.MsgId = '414D512053544152 5741525F514D2020 9197523913300000'
        MQMD1.CorrelId = '0000000000000000 0000000000000000 0000000000000000'
```

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EPSend Sample

You can use the MSMQ-MQSeries Bridge Extension API to override the default MSMQ-MQSeries Bridge message property mapping.

The Bridge\EPSend folder contains a sample written in C that illustrates how to use the MSMQ-MQSeries Bridge Extension API to override the default MSMQ-MQSeries Bridge message propery mapping for MsgType, ReplyToQMgr, and ReplyToQ in the MQSeries MQMD structure. This sample sends messages to the Message Queuing (also known as MSMQ) queue, overriding the default values for these MQMD extension fields.

This sample can be used for testing or troubleshooting the MSMQ-MQSeries Bridge and Bridge Extensions.

The usage for this command-line tool is as follows:

```
EPSend <computer name>\<queue name>
```

The parameter <*computer name*>\<*queue name*> is the path name of the specified Message Queuing queue name where messages are to be sent. This Message Queuing queue name can be specified in UNC or DNS format.

Sample program usage and sample output are as follows:

```
epsend IBMNT_QM\QUEUE
Queue opened.
Reply Q Manager Name : MSBRIDGE1
Reply Q Name : QUEUE
------> Sending message (Use CTRL-C to stop).Label: ABC
Body: ABC
```

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MQSRRecv Sample

The Bridge\MQSRRecv folder contains a sample program written in C that uses the MQSeries API to receive messages from a specified MQSeries queue. This sample can be used to receive messages sent from MQSeries or sent from Message Queuing (also known as MSMQ) using the MSMQ-MQSeries Bridge. The sample can be used for testing or troubleshooting the MSMQ-MQSeries Bridge.

The usage for this command-line tool is as follows:

```
MQSRRecv <QM name> <queue name>
```

The first parameter, *QM name*, is the name of the MQSeries Queue Manager. The second parameter, *queue name*, is the queue name from which to receive the messages. Note that the program assumes that queue name is located on the *QM name* computer.

You can run the MQSRRecv program on a computer where the MQSeries Client is installed and configured. The environment variables used by the MQSeries client should point to the appropriate channel table file. The computer running the MSMQ-MQSeries Bridge is a good choice because it should already be properly configured.

MQSRSend Sample

The Bridge\MQSRSend folder contains a sample written in C that uses the MQSeries API to send ten test messages to a specified MQSeries queue. This sample can be used to send messages to a specified MQSeries queue or to a specified Message Queuing (also known as MSMQ) queue using the MSMQ-MQSeries Bridge. The sample can be used for testing or troubleshooting the MSMQ-MQSeries Bridge.

The usage for this command-line tool is as follows:

```
MQSRSend <local QM name> <destination QM name>
        <queue name>
```

The first parameter, *local QM name*, is the name of the immediate MQSeries Queue Manager to connect to (the server side of the MQI channel). **MQSRSend** needs this information to establish the MQI channel connection.

The second parameter, *destination QM name*, is the destination queue manager for the messages. To send messages to Message Queuing, specify the queue manager alias for the destination QM name representing the Message Queuing queue.

The third parameter, *queue name*, is the name of the queue where the messages should be sent.

You can send MQSeries message to a Message Queuing queue with one of the following methods.

1. Specify the MSMQ-MQSeries Bridge computer name in the destination QM name and the Message Queuing format name in the queue name.
2. Define QREMOTE for the Message Queuing destination QM name in MQSeries.

You can run the MQSRSend program on a computer where the MQSeries Client is installed and configured. The environment variables used by the MQSeries client should point to the appropriate channel table file. The computer running the MSMQ-MQSeries Bridge is a good choice because it should already be properly configured.

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MSMQRecv Sample

The Bridge\MSMQRecv folder contains a sample written in C that uses the Message Queuing (also known as MSMQ) API to receive messages from a specified Message Queuing queue. This sample can be used to receive messages sent from Message Queuing or receive messages sent from MQSeries using the MSMQ-MQSeries Bridge. The sample illustrates how to receive messages using Message Queuing and can be used for testing or troubleshooting the MSMQ-MQSeries Bridge.

The usage for this command-line tool is as follows:

```
MSMQRecv <computer name>\<queue name>
```

The parameter <*computer name*>\<*queue name*> is the path name of the specified Message Queuing queue name where messages are received. This Message Queuing queue name can be specified in UNC or DNS format.

You can run the MSMQRecv program on any computer where Message Queuing is installed, not necessarily the computer running the MSMQ-MQSeries Bridge.

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MSMQSend Sample

The SDK\Samples\Bridge\MSMQSend folder contains a sample written in C that sends ten test messages using the Message Queuing (also known as MSMQ) APIs. This sample can be used to send messages to a specified Message Queuing queue or a foreign MQSeries queue through the MSMQ-MQSeries Bridge. The sample illustrates how to send messages using Message Queuing and can be used for testing or troubleshooting the MSMQ-MQSeries Bridge.

The usage for this command-line tool is as follows:

```
MSMQSend <computer name>\<queue name>
```

The parameter <*computer name*>\<*queue name*> is the path name of the specified Message Queuing queue name where messages are to be sent. This Message Queuing queue name can be specified in UNC or DNS format.

You can run the MSMQSend program on any computer where Message Queuing is installed, not necessarily the computer running the MSMQ-MQSeries Bridge.

WMI MSMQ-MQSeries Bridge Sample

The Bridge\WMI folder contains a collection of Active Server Pages (ASP) for use with a Web server application that enables you to view and make changes to the MSMQ-MQSeries Bridge configuration using Windows® Management Instrumentation (WMI). These sample applications require Microsoft® Internet Information Services (IIS) version 3.0 or greater with ASP installed. Microsoft Host Integration Server 2004 and IIS must be installed and running on the same computer.

The WMI ASP samples must be installed into the Web server's public directories below WWWRoot. Copy the contents of the entire WMI directory from the SDK\Samples\Bridge\WMI subdirectory to your WWWROOT directory on the Web server. After these files have been copied you should have a WWWROOT\WMI folder containing a number of ASP and GIF files.

The samples may then be run by opening Microsoft® Internet Explorer or some other Web browser on the same computer or a different computer and entering the following URL in the address line:

```
http://<computer name>/WMI/WMI_Test_Main.asp
```

Substitute the network name of the computer hosting the Web server and the MSMQ-MQSeries Bridge for the computer name (in angle brackets in the URL above). This will open the main page of the Bridge WMI ASP application and enable you to select any of the other sample ASP pages. Information about each sample is provided on this Web page.

These ASP pages illustrate using WMI to view and make changes to the MSMQ-MQSeries Bridge configuration. The management functions supported by this application enable you to create a new instance, move to other instances (previous and next), delete an instance, and save an instance.

The WMI subdirectory below WWWROOT needs to have IIS security enabled (no anonymous access). Otherwise, the scripts in these subdirectories will fail since the anonymous user account by default does not have access rights that would allow it to start or stop services on Windows 2000 or make changes to the MSMQ-MQSeries Bridge on the Host Integration Server system.

It is possible to host these ASP pages on a computer running the Web server that is different from the computer running the MSMQ-MQSeries Bridge and Host Integration Server. However, this requires some changes to the ASP pages to handle connections to a different computer, security, and authentication issues.